





Plant <b>MRPL Mangalore</b>	Client <b>MRPL</b>	Contract Code <b>WSS for PFCC Flue Gas</b>	Document ID	
	<b>LSTK PACKAGE FOR PFCC UNIT FLUE GAS WET GAS SCRUBBER SYSTEM AT MRPL, MANGALURU</b>			 Rev <b>00</b>

**Tender No: 3200000481**

**LSTK PACKAGE FOR PFCC UNIT FLUE GAS WET GAS  
SCRUBBER SYSTEM AT MRPL, MANGALURU**

**SECTION-4**



**SPECIAL CONDITIONS OF CONTRACT (SCC)**

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## SPECIAL CONDITIONS OF CONTRACT

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## 1.0 GENERAL

- 1.1. These Special Conditions of Contract shall be read in conjunction with the General Conditions of Contract, specifications of work, drawings and any other document forming part of this contract wherever the context so requires.
- 1.2. Notwithstanding the sub-division of the document into these separate sections and volumes, every part of each shall be deemed to be supplementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.
- 1.3. The materials, design and workmanship shall satisfy the relevant Indian Standards, the Technical Specifications contained herein and codes referred to. Where the job specifications stipulate requirements in addition to those jobs contained in the standard codes and specifications, these additional requirements shall also be satisfied. In absence of any standards/ specifications/ codes of practice for detailed specifications covering any part of the work covered in this tender, the instructions/ directions of Engineer-in-charge will be binding on the CONTRACTOR.
- 1.4. Where any portion of the GCC is repugnant to or at variance with any provisions of the Special Conditions of Contract, then unless a different intention appears, the provision(s) of the Special Conditions of Contract shall be deemed to override the provision(s) of GCC only to the extent that such repugnancies of variations in the Special Conditions of Contract are not possible of being reconciled with the provisions of GCC.
- 1.5. Without prejudice to the provisions of the General Conditions of Contract, whenever in the Bidding documents it is mentioned or stated that the CONTRACTOR shall perform certain work or provide certain facilities it is understood that the CONTRACTOR shall do so at his own cost and the Contract price shall be deemed to have included cost of such performance and/or provision, as the case may be.
- 1.6. In case of an irreconcilable conflict between Indian or other applicable standards, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings and/or Schedule of Rates, the following shall prevail to the extent of such irreconcilable conflict in descending order of precedence:
  - i. Formal Contract.
  - ii. Detailed Letter of Acceptance.
  - iii. Fax/ Letter of Acceptance.



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- iv. Schedule of Price / Lumpsum Schedule of Price
- v. Job/Particular Specification.
- vi. Drawings.
- vii. Technical/ Material Specifications.
- viii. Special Conditions of Contract.
- ix. Instructions to Bidders
- x. Special Instructions to Bidders
- xi. General Conditions of Contract.
- xii. Standard Specifications.
- xiii. Indian Standards.
- xiv. Other applicable Standards.

- 1.7. In the absence of any Specifications covering any material, design or work(s) the same shall be performed/supplied/executed in accordance with standard Engineering Practice as per the instructions/directions of the Engineer-in-Charge, which will be binding on the CONTRACTOR.

## 2.0 TIME SCHEDULE



- 2.1 The Work shall be executed within the Time Schedule given in **Annexure-I** to the Special Conditions of Contract.

## 3.0 CONSTRUCTION WATER & POWER SUPPLY

- 3.1 Clause 3.5.1.0 of the General conditions of Contract and its sub-clauses shall be modified as follows :

Without prejudice to the provision of Clause 3.5.0.0. of GCC and “Subject to availability, construction power shall be supplied by OWNER upto 250 KVA on chargeable basis at single point at nearest substation. All onward power distribution from the locations of issue of power shall be by the CONTRACTOR. However, non-availability of construction power due to any other reasons shall not entitle the CONTRACTOR for any claim on OWNER on account of time and cost implications.

The cost of power supply shall be recovered by the OWNER every month at prevailing rate (without prejudice to any other mode of recovery available to the OWNER) by deduction from the CONTRACTOR's bills. The energy meter to be installed by the CONTRACTOR shall be tested and certified by State

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Electricity Board or any other agency approved by the OWNER. Required cable, cable laying and panel etc. is in the scope of contractor. The Construction power as above shall be made available to the CONTRACTOR and no time extension or Compensation shall be payable on account of grid disturbance. Therefore, the CONTRACTOR shall within the price of services make alternate arrangement to cope with such eventuality. Additional power, if required, to meet the contractual requirements, shall be arranged by the CONTRACTOR at its own cost. Contract remains unaltered.

Construction water shall not be provided by the OWNER and the CONTRACTOR shall make all the arrangements for Construction water required for this work at their sole cost and expense. However, Construction water if available will be provided only for hydro test, free of cost.



Non-availability of water & power due to any reason shall not entitle the CONTRACTOR for any claim against OWNER on account of cost and time implications.

#### 4.0 EXCESS MATERIAL

- 4.1 The Contractor shall deliver the package as per the scope and terms of the contract. In case, the contract includes commissioning or mandatory spares etc., then these shall be handed over to the CONSULTANT/OWNER store with required SAP codes as per contractual terms. The Contractor shall remove all excess or balance or left-over materials which are procured or brought by him including the scrap generated by him during Erection and clear the work location before Closure of Contract / Demobilisation. Scrap generated during execution of work shall be handed over to MRPL scrap yard. Reconciliation of all supply items including free issue material with respect to scope of supply shall be carried out by contractor. All such left-over materials if in case belongs to contractor after reconciliation, shall be considered as owned by the Contractor and shall be taken out by him and all necessary documentation shall be done by him. OWNER shall only be facilitating in issuing the necessary gate pass for removal such material from the Site. If any left out items belonging to owner shall be handed over to MRPL stores with SAP code provided by MRPL.

#### 5.0 LAND FOR SITE OFFICE AND RESIDENTIAL ACCOMMODATION



- 5.1 HSE for labours considering labour colony including sanitation, drinking water, dispensary, Canteen, Power supply, Cleaning etc. shall be in CONTRACTOR'S scope and the CONTRACTOR shall adhere to all safety norms as per Government/statutory guideline and Bidding Documents.

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- 5.2 All other terms & conditions of Clause No. 3.7.0.0 of the General Conditions of contract remain unaltered.
- 5.3 Contractor to arrange for site office like portal cabin & Necessary space for the same will be allotted at site. Contractor to arrange for necessary telephone and other required facilities to site office. **Only flameproof / intrinsically safe mobile phones are allowed at the SITE. Contractor to strictly adhere to these conditions.**

## 6.0 PRICE, TAXES AND DUTIES

- 6.1 The quoted price shall be deemed to be inclusive of all taxes and duties, cess including municipal taxes, statutory levies, royalty, Custom duty and Custom Related duties, income tax, Withholding tax in case of foreign bidder, GST Compensation cess (if applicable), etc., irrespective of whether the same is categorically specified or not but exclusive of "Goods and Services Tax" (hereinafter called GST) (i.e. IGST or CGST and SGST/UTGST applicable in case of interstate supply or intra state supply respectively. The GST as legally leviable & payable by the Contractor under the provisions of applicable law(s)/act(s) shall be reimbursed by MRPL as per Contractor's GST invoice to MRPL.
- 6.2 Price quoted by the bidder/Contractor shall be inclusive of prices, taxes, duties, cess, etc., including GST on any transaction between Contractor and their sub-supplier/sub-contractor. The quoted price shall also be deemed to be inclusive of all taxes / duties / cess / levies / fees etc. including GST as applicable and CONTRACTOR only shall within their quoted price be liable to pay and bear any and all duties, taxes, levies, cesses etc. lawfully payable or liable to be payable on any goods, equipment or materials imported into India or procured within any local limits for incorporation in the work(s).
- 6.3 The Quoted prices shall also be inclusive of cost towards insurance taken by the Bidder/Contractor, except for the Comprehensive Marine Cum Erection Insurance policy taken by OWNER as stipulated in this tender document , till contractual /extended Contractual completion period .
- 6.4 It shall be the duty of the CONTRACTOR to duly observe and comply with all laws, rules, regulations, orders and formalities etc., including applicable to GST, Customs Duty and Custom related Duties etc. on the import, manufacture, sale and/or supply, etc., of any material and taking input credit wherever available to the OWNER and performance of the Works Contract Services under the Contract. The CONTRACTOR shall keep the OWNER indemnified from and against any and all claims, demands, prosecutions, actions, proceedings, penalties, damages, demurrages and/or other levies whatsoever made or levied by any Court, Tribunal or the Customs or other Authorities with respect to any alleged

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breach, evasion or infraction of such duties, taxes, charges or levies or any breach or infraction of any applicable laws, rules, regulations, orders or formalities concerning the same etc and from the consequence thereof.

6.5 The CONTRACTOR shall be liable for and shall pay any and all fees, cesses, taxes, duties, levies etc. assessable against CONTRACTOR in respect of or pursuant to the Contract.

6.6 In addition, the CONTRACTOR shall be responsible for payment of all duties, levies, and taxes assessable against the CONTRACTOR or CONTRACTOR's employees or their Sub Contractors whether corporate or personal or applicable in respect of property.



6.7 Any errors of interpretation of applicability of all taxes / duties / cess / levies / fees etc by the CONTRACTOR shall be to CONTRACTOR's account.

**6.8 Goods and Services Tax (GST)**

GST is implemented by Government of India w.e.f 01.07.2017. "GST" shall mean Goods and Services Tax charged on the supply of Goods and Services. The term "GST" shall be construed to include the Integrated Goods and Services Tax (hereinafter referred to as "IGST") or Central Goods and Services Tax (hereinafter referred to as "CGST") or State Goods and Services Tax (hereinafter referred to as "SGST") / Union Territory Goods and Services Tax (hereinafter referred to as "UTGST") depending upon the import / interstate or intrastate supplies, as the case may be.



**6.9 Invoicing under Goods and Services Tax (GST) Rules:**

- i. CONTRACTOR shall be required to issue tax invoice in accordance with GST and GST Rules, as applicable from time to time, so that input credit can be availed by Owner. In the event that the CONTRACTOR fails to provide the invoice in the form and manner prescribed under the GST Act read with GST Invoicing Rules there under, Owner shall not be liable to make any payment on account of GST against such invoice.
- ii. As per Section 17 (5) c) of CGST Act, the Owner will not get Input Tax credit for Works contract services when supplied for construction of an immovable property (other than plant and machinery).
- iii. GST shall be paid against receipt of tax invoice. Contractor / Vendor shall forthwith upload the appropriate document at GSTN portal complying with all GST regulations including but not limited

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to payment of GST by contractor / vendor. In case of non-receipt of tax invoice or non-payment of GST by the CONTRACTOR, Owner shall withhold the payment of GST.

- iv. GST payable under reverse charge for specified services or goods under GST act or rules, if any, shall not be paid to the CONTRACTOR. If the same has already been reimbursed / paid to the Contractor for any reason whatsoever, the said amount shall be deducted / recovered / adjusted from the payment due to the Contractor.
- v. Further, GST payment shall be limited to the amount worked out on the total executed and certified amount (on which GST is applicable) based on the contracted rates.
- vi. The CONTRACTOR shall mention their registration status (Registered / Composition / Unregistered) on the bill / invoice. In case there is change in the Registration status of the CONTRACTOR during the execution of the contract the same should be advised immediately. Due to change in the Registration status. Owner will not be liable for any additional payments, whatsoever, including tax payments.
- vii. The classification/description of goods/services as per GST Tariff should be correctly done by the CONTRACTOR to ensure that input tax benefit is not lost to the OWNER on account of any error on the part of the CONTRACTOR.
- viii. The CONTRACTOR shall comply with all the provisions of the GST Act /Rules / requirements like providing of tax invoices, payment of taxes to the authorities within the due dates, filing of returns within the due dates etc. To enable Owner to take Input Tax Credit. The CONTRACTOR shall always comply with the requirements of applicable laws and provide necessary documents as prescribed under the Rules & Regulations, as applicable from time to time. In particular, if any tax credit, refund or other benefit is denied or delayed to OWNER due to any non-compliance / delayed compliance by the CONTRACTOR under the Goods & Service Tax Act (such as failure to upload the details of the sale on the GSTN portal, failure to pay GST) or due to non-furnishing or furnishing of incorrect or incomplete documents by the CONTRACTOR, the CONTRACTOR shall be liable to reimburse OWNER for all such losses and other consequences including, but not limited to the tax loss, interest and penalty. Notwithstanding anything contained anywhere in the Agreement, Owner shall be entitled to recover such amount from the CONTRACTOR by way of adjustment from the invoice or from any other Securities like Bank Guarantees available to Owner. In addition to the amount of GST, OWNER

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shall also be entitled to recover interest at the rate prescribed under GST Act and penalty, in case any penalty is imposed by the tax authorities on Owner.

- ix. Notwithstanding anything contained anywhere in the Agreement, in the event that the input tax credit of the GST charged by the Contractor / Vendor is denied by the tax authorities to OWNER due to reasons attributable to Contractor/Vendor. OWNER shall be entitled to recover such amount from the Contractor / Vendor by way of adjustment from the next invoice or from Bank Guarantee. In addition to the amount of GST, OWNER shall also be entitled to recover interest and/or penalty, as the case may be, imposed by the tax authorities on OWNER.
- x. Notwithstanding anything contained anywhere in the Agreement, any cost, liability, dues, penalty, fees, interest as the case may be, to which OWNER becomes liable, at any point of time on account of non-compliance of applicable tax laws or rules or regulations thereof or otherwise due to default on the part of CONTRACTOR shall be borne by the CONTRACTOR. Such cost, liability, dues, penalty, fees, and interest as the case may be shall be paid forthwith by the CONTRACTOR and /or OWNER shall be entitled to recover such amount from the CONTRACTOR by way of adjustment from the invoice or from any other Securities like Bank Guarantees available to OWNER. Any GST as may be applicable on such recovery of amount shall also be borne by CONTRACTOR.”
- xi. TDS under GST, if applicable, shall be deducted from CONTRACTOR’s bill at applicable rates. A certificate for tax deducted at source by OWNER shall be provided to CONTRACTOR.
- xii. CONTRACTOR shall raise their invoice in favour of OWNER with following details:

**Mangalore Refinery and Petrochemicals Limited**



**Kuthethoor P.O., Via Katipalla**

**Mangaluru – 575030.**

**GSTIN: 29AAACM5132A1ZZ**

**PAN: AAACM5132A**

- xiii. Recoveries if any by MRPL shall be with applicable GST thereon as per GST laws.

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#### 6.10 Road Permits / Way bills

- (i) CONTRACTORS shall arrange Road Permits / Way bills etc. By themselves and comply with all applicable statutory laws.
- (ii) In case statutory laws require issuance of Road Permit / Way bill etc. is to be arranged by the OWNER, OWNER will arrange to issue the same. In case any implication of the same is borne / to be borne by Owner and the same shall be adjusted against the payments due to CONTRACTORS against their bills or from any other Securities like Bank Guarantees.
- (iii) The CONTRACTOR will be under obligation for proper utilization of the same for the specific supply and in case of seizure of goods / vehicle; the CONTRACTOR will be wholly responsible for release and also pay the litigation cost of Owner. Owner also reserves the right to recover the same against the payments due to CONTRACTORS against their bills or from any other Securities like Bank Guarantees available to Owner.

#### 6.11 NEW TAXES & DUTIES

All new taxes / duties / cess / levies / fees notified after the date of unpriced bid opening / submission of any subsequent price implication / revised prices, but within Time for Completion / extended Time for Completion (by Owner due to reason attributable to OWNER), shall be to Owner's account. These shall be reimbursed against documentary evidence. However, in case of delay attributable to contractor, any new taxes / duties / cess / levies / fees imposed after Time for contractual Completion, shall be to contractor's account.

#### 6.12 STATUTORY VARIATIONS



No variation on account of taxes / duties / cess / levies / fees, etc., statutory or otherwise, shall be payable by OWNER to CONTRACTOR except for the variation in GST.

Any Increase in GST after the contractual completion period (including extended Completion period for reasons attributable to owner) shall be to CONTRACTOR's account, however, any decrease shall be passed on.

#### 6.13 IMPORT DUTIES

Custom duties on the imported material shall be included in the quoted prices and supplier/contractor shall be responsible for the timely payment of the custom duties to the relevant government authority. All harbour dues/ pilotage fees, port fees, wharf fees, unloading costs incurred in India in respect of any imported goods shall be to supplier's/contractor's account.



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The Vendor / Contractor shall be responsible for, and shall exercise due diligence in properly classifying the goods and materials, undertaking the payment of custom duties, and/or otherwise complying with all applicable laws w.r.t. any import of the goods and materials.

In case Owner is exposed to any penal action, interest /penalties by the custom authorities for incorrect declaration and / or valuation of the goods or material by the supplier, or otherwise on account of any breach of applicable laws in the course of the import of the goods and material by supplier, the supplier shall indemnify and hold harmless, Owner for any and all costs, expenses or losses suffered or incurred by Owner in this regard.

The bidder must ascertain, if any custom duty exemption/waiver is applicable to the products being supplied by him under any CEPA/FTA/multi-lateral/bi-lateral trade agreements between India and bidder's country.

Any custom duty applicability on account of any change in the CEPA/FTA/multilateral/ bi-lateral trade agreement shall be to bidder's account.

#### 6.14 **INCOME TAX**

The CONTRACTOR shall be exclusively responsible and liable for all Direct Taxes, including income tax, profession tax and wealth tax, whether payable in India or in any other jurisdiction.

The CONTRACTOR shall be responsible for ensuring compliance with all provisions of the direct tax laws of India including, but not limited to, the filing of appropriate Returns and shall promptly provide all information required by the owner for discharging any of its responsibilities under such laws.



Tax shall be deducted at source by OWNER from all sums due to CONTRACTOR in accordance with the provisions of the Income Tax Act, as in force at the relevant point of time.

OWNER shall issue a Tax deduction or withholding certificate to the CONTRACTOR evidencing the Tax deducted or withheld and deposited by OWNER on payments made to the CONTRACTOR.

##### **a. Indian Income Tax : Withholding Tax / Deduction of Tax at Source**

Wherever the Indian Income Tax laws require MRPL to deduct or withhold and remit to the accounts of the Government of India, a sum as Tax Deducted at Source or Withholding Tax, out of any amount payable to or/and paid to the successful bidder in pursuance of any agreement/contract



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arising out of this tender, the same shall be effected by MRPL and such Tax Deducted at Source or Withholding Tax shall be from the amount payable to or/and paid to the bidder and not on account of MRPL.

**b. In case of Indian Bidder:**

- a) Tax deduction at source to be effected at the applicable rates, shall be to the account of the Indian Bidder and not to the account of MRPL. The Indian Bidder's Bid Value mentioned in the Price Bid under this tender shall be inclusive of the Tax deduction at source applicable under the Indian Income Tax Act, 1961.
- b) MRPL shall effect the tax deduction at source (TDS) at the rates applicable as per the Indian Income Tax Act, 1961 or any other applicable law in force, from any amount payable to or/and paid to the Indian Bidder.
- c) Where the Indian Bidder obtains from appropriate Indian Income Tax Authority, Withholding Tax Order in the name of MRPL mentioning MRPL's Tax Deduction Account Number (TAN) 'BLRM00218B' (WHT Order), under section 197 of the Indian Income Tax Act, 1961, for deduction of tax at source at lower rate or for no deduction of tax at source, and furnishes the said Withholding Tax Order to MRPL at the time of remittance of any amount payable to the Indian Bidder, then MRPL shall effect the tax deduction at source at the lower rate specified in the Withholding Tax Order or shall effect no tax deduction at source, as the case may be, from the amount payable to the Indian Bidder. However, such effecting of tax deduction at source at the lower rate specified in the Withholding Tax Order or effecting of no tax deduction at source, as the case may be, from the amount payable to the Indian Bidder shall be subject to the limits or conditions prescribed in the said Withholding Tax Order.
- d) MRPL shall furnish to the Indian Bidder, original or certified copy of Certificate of tax deduction at source remitted to the Government Accounts in Form-16A or equivalent, for any tax deduction at source affected by MRPL under the Indian income Tax Act, 1961.

**6.15 FIRM PRICES**

The quoted price shall remain firm and fixed and valid until completion of the contract and shall not be subject to escalation for any reason what so ever.

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## 7.0 APPLICABILITY OF TAX CREDIT OF GST:

MRPL may claim input tax credit on GST and on any other taxes & duties as per the relevant statutes in force and the credit on account of the same shall be considered for evaluation. The bidders shall furnish the present rate of GST as applicable and is payable against proper invoice as per statutes. The bidders should quote taxes and duties separately (In rates as well as in values) expected in the Schedule of Price (SP).

## 8.0 TERMS OF PAYMENT



Terms of Payment shall be as per attached **Annexure – II.**

In addition to the Payments Terms as per Annexure-II, Bidder should also take a note of the following:

As per The Karnataka Labour Welfare Fund Act, 1965, any Employer/Establishment employs fifty or more employees /persons contribution towards Labour Welfare Fund need to done on yearly basis on or before 15<sup>th</sup> January of every year. This includes both regular and contractual employees.

<b>Labour Welfare Fund Contribution (Under Section 7A of the Act)</b>					
Category	Employee Contribution	Employer Contribution	Total Contribution	Date of Deduction	Last Date for Submission
All employees who are employed for wages to do any work skilled or unskilled, manual or clerical, in an establishment	20.00	40.00	60.00	31 <sup>st</sup> December	15 <sup>th</sup> January

Accordingly, the CONTRACTOR is requested to do the needful and submit the proof with regard to same to MRPL. If no communication is received from the CONTRACTOR, then MRPL being principal employer, will remit the same on behalf of every CONTRACTOR and contribution amount will be deducted from their bills as per prevailing practice.

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## 9.0 PENALTIES

Payments are subject to deductions towards the Penalties as provided in **Annexure II** to the SCC:

## 10.0 SUB-CONTRACTING

- 10.1 If the CONTRACTOR is required to engage a Sub-Contractor for any part of work, then such Sub-Contractors shall have prior proven experience of similar work and shall require specific approval by CONSULTANT / OWNER after award of work.
- 10.2 Following the notification of Acceptance of Bid the CONTRACTOR will submit to the PMC/ OWNER for approval, the details of Sub-Contractors as per **Annexure-III** to these Special Conditions of Contract. CONTRACTOR shall ensure that very competent and resourceful agencies with proven track record and performance should be proposed for the work to be sub-contracted.



## 11.0 QUALIFICATION AND EXPERIENCE OF KEY SUPERVISORY PERSONNEL

Qualification and Experience of Key Supervisory Construction Personnel to be deployed for this work shall be as per **Annexure-IV** to these Special Conditions of Contract. CONTRACTOR shall submit bio-data of Key Supervisory Personnel meeting the requirement of this Appendix, after award, which will be reviewed and approved by Engineer-in-Charge.

## 12.0 INDIRECT OR CONSEQUENTIAL LOSS

The CONTRACTOR shall not be liable for loss of use of any part (or full) of the works or for loss of production, loss of profit or other indirect or consequential loss or any like damage which may be suffered by the OWNER in connection with the Contract.

## 13.0 OTHER CONDITIONS

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1.	GST	%age of GST Input Credit available to OWNER.	Applicable GST as quoted shall not be considered for evaluation of total cost to the extent of input Tax credit (as applicable), as MRPL will claim Input credit on the same. Balance (as applicable) of GST shall be considered for evaluation for Total cost.
2.	Custom Duty	Import shall be at merit of Custom Duty or any other concessional rate Of Custom Duty.	This project is not entitled for any concession.
3	Consignee details	Who will be Consignee of goods for Import as well as Indigenous?	Contractor
4	Bill of Entry	Bill of Entry shall be filed in whose name i.e. Client /OWNER.	Contractor
5	Road Permit	Road Permit shall be issued by Client Or PMC or Contractor.	Contractor



#### 14.0 LABOUR LICENSE/ LABOUR LAWS AND REGULATIONS

14.1 Before starting of work, the CONTRACTOR shall obtain a license from the concerned authorities under the Contract Labour (Abolition and Regulation) Act, 1970 and shall furnish copy of the same to OWNER. The labour license for the appropriate labour shall be valid for the total contractual period including extended period, if any.

14.2 **LABOUR LAWS AND REGULATIONS** Labour laws and regulations as mentioned in GCC Clause No. 8.3.0.0 are applicable.

However the following is added to the said clause:

- i. Contractors and their Sub-Contractors shall carry out all payments to their workforce through their individual bank accounts only. The records of such bank transfer shall be submitted as proof of compliance along with the wage registers. The wage registers are to be certified by Engineer in charge. Wage registers without these statements will not be accepted.
- ii. Details of bank accounts of the individual workmen shall be submitted for issuance of gate pass. Contractors and their sub-contractors shall ensure that minimum wages as notified from time to time are paid and the wage register and transfers shall be verified on the basis of such minimum wages.

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- iii. Group term Life insurance cover to be taken having a risk coverage 24X7 death coverage (Natural / Accidental death) with a sum assured of Rs. 10,00,000/- (Rs.Ten lakh ) per person by the contractor.
- iv. The details of documents to be submitted to HR Department by the Contractor duly signed by Engineer-In-charge as per relevant clause of SCC.

## 15.0 LABOUR RELATIONS

- 15.1 In case of labour unrest/ labour dispute arising out of non-implementations of any law the responsibility shall solely lie with the CONTRACTOR and he shall remove/ resolve the same satisfactorily at his cost and risk.
- 15.2 The CONTRACTOR shall deploy only duly qualified and competent personnel for carrying out the various jobs as assigned by the Engineer-in-Charge from time to time. The workmen deployment by the CONTRACTOR should also possess the necessary licence etc., if required under any law, rules and regulations.

## 16.0 EMPLOYMENT OF LOCAL LABOUR



- 16.1 The CONTRACTOR shall ensure that local labour, skilled and/or unskilled, to the extent available shall be employed for this work. In case of non-availability of suitable labour in any category out of the above persons, labour from outside may be employed.
- 16.2 The CONTRACTOR shall not recruit personnel of any category from among those who are already employed by the other agencies working at site but shall make maximum use of local labour available.

## 17.0 CONTRACTOR'S LABOURERS TO LEAVE SITE ON COMPLETION OF THE WORK

The Labourers of Contractor must leave the location of the refinery/township/project site after the work is tapered off/completed.

## 18.0 FUEL REQUIREMENT OF WORKERS

The CONTRACTOR shall be responsible to arrange for the fuel requirement of his workers and staff without resorting to cutting of trees, shrubs etc. Cutting of trees, shrubs etc. is strictly prohibited for this purpose.

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## 19.0 PROVIDENT FUND

The CONTRACTOR shall strictly comply with the provisions of Employees Provident Fund Act and register the establishment with the concerned Regional Provident Fund Commissioner before commencing the work. The CONTRACTOR shall deposit “Employees” and “Employers” contributions in the designated account with the designated Authority every month. The CONTRACTOR shall furnish along with each running bill, the challan/ receipt for the payment of provident fund made to the RPFC for the preceding month(s).

In case the Provident Fund Authority’s receipted challan referred to above is not furnished, OWNER shall deduct 5% (five percent) of the payable amount from the CONTRACTOR’S running bill and retain the same as a security for the payment of the Provident Fund. Such retained amounts shall be refunded to the CONTRACTOR only on production of challan/ receipt of the Provident Fund Authority for the period covered by the related deduction.

## 20.0 ENTRY PASSES, GATE PASSES, WORK PERMITS AND SAFETY REGULATIONS

As such, CONTRACTOR is required to abide by safety and security regulations of OWNER enforced from time to time.



### 20.1 ENTRY PASSES

- The CONTRACTOR has to apply for photo entry passes for his workers & staff in a prescribed proforma available with OWNER, for entry into MRPL Refinery premises. The photo entry passes shall be issued by OWNER for a maximum period of 2 months and if extension is required by the CONTRACTOR, he has to apply separately for extension. As a special case temporary passes for a maximum period of 3 days may be issued.

Unutilized/ Expired entry passes shall have to be submitted immediately to OWNER.

In case of loss of any entry pass, the CONTRACTOR has to lodge FIR with local police station and inform the Engineer-in-charge and shall have to pay Rs. 150/- against each entry pass. The CONTRACTOR is required to keep track of all entry passes issued and returned.

Identity card issued by the Security Section should always be carried/ displayed by the CONTRACTOR's employee or person while working inside the Plant.

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- b. As per the Security Guidelines issued by Ministry of Home Affairs (MHA), Government of India, verification of Character & Antecedents (Police verification) in respect of all personnel working in Refineries is mandatory. The Contractor shall submit Police Verification Report of the workmen employed under them. Submission of Police Verification Report to MRPL is compulsory for issue of fresh passes to work in Plant Process Areas and other sensitive jobs in Non-Plant areas of MRPL.

## 20.2 GATE PASSES



To bring materials/ equipment's/ tools/ tackles etc. inside the plant for construction work, the CONTRACTOR has to produce challans/ proper documents to OWNER/ 's personnel at gate. The materials shall be checked thoroughly by OWNER's personnel at Gate and recorded in their register before allowing any material to bring inside the plant by CONTRACTOR. It is CONTRACTOR's responsibility to see that the recorded entry no., date, signature of OWNER/ authorised representative with stamp challans/ supporting documents signed by company's personnel at gate during entry. Materials which are to be taken out after completion of work to be brought inside refinery through returnable gate pass. Materials which are to be installed at site or to be handed over to MRPL have to be brought inside refinery through non-returnable gate pass.

## 20.3 WORK PERMIT

When the work is to be carried out in hazardous areas, hot work permit are to be obtained before start of work for all the jobs which are capable of generating flame, spark, heat etc. namely, Gas cutting, grinding, welding, use of any electrical/ diesel/ petrol/ battery operated prime mover/ machine/ tools/ equipment/ generator sets/ mixer machine/ drilling machine/ pumps/crane, fork lifter/ hand truck/ trailer, chipping/ breaking of rocks/concrete, hacksaw cutting and drilling, etc.

Cold work permits are to be obtained for the jobs which are not coming under the category of hot work and where there is no risk of fire, viz, transportation/ backfilling of ordinary soil in manual process, piling testing, hydro testing, shuttering, fixing of reinforcement, hand mix concreting, plastering, brick work etc.

According to nature of work and use of various types of equipment's& tools the CONTRACTOR has to apply for cold/hot permits in a prescribed format at least 2 days before the work is planned to start. No work permit shall be issued by OWNER unless proper arrangement is made by the CONTRACTOR to ensure safe performance of work inside the plant. Job wise and area wise permits shall be issued to the CONTRACTOR and against each permit at least one construction supervisor and one safety supervisor

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of required level shall always be made available at site by the CONTRACTOR. These safety permits shall be issued at one point contact by OWNER.

Whenever excavation has to be carried out within Refinery Premises, applicable Permit as per MRPL procedure shall be obtained from OWNER before start of job.

CONTRACTOR shall arrange for Cable tracker and Pipe Tracker for locating UG facilities, wherever required.

#### 20.4 VEHICLE PERMIT

Permits are to be obtained separately for entry/use of vehicles/ trailers etc. inside the plant. The following requirements are to be met to obtain vehicle permit:

- i) Vehicle/Equipment etc. should be brought to site in good conditions.
- ii) Valid Road tax certificate, fitness certificate and insurance policy from competent authority.
- iii) Valid operating/ driving licence of driver/operator.

#### 20.5 VALIDITY OF THE WORK PERMIT



- I. Permit is valid for 24 hours.
- II. No permit is valid if it is not renewed by the shift incharge/ shift representative in shifts (Morning & Evening).
- III. The permit shall be issued for a maximum period of one month and if extension is required, the CONTRACTOR has to apply for fresh permit.
- IV. No permit is valid on holidays unless special permission is obtained from the competent authority.
- V. For works in the operational areas, Contractor shall follow MRPL work permit system.

#### 20.6 SAFETY REGULATIONS

##### Regarding work Permit

- I. The work shall be carried out inside the plant as per safety practices enforced by OWNER's safety section and instructions of Engineer-in-charge issued from time to time. Many times it may happen that the working hours shall be drastically reduced or increased to meet certain safety requirements and the CONTRACTOR shall meet these requirements without any argument for time and financial implications. To obtain work permit and to satisfy all conditions laid down therein, shall be the



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- responsibility of the CONTRACTOR. No claim for idling of machinery, plant, manpower etc. for safety reasons or non-issuance of work permit by In-charge, Safety Section shall be considered.
- II. The CONTRACTOR shall abide by all safety regulations of the plant and ensure that safety equipment for specific job kit as stipulated in the factory act/ safety handbook is issued to the employee during the execution of work, failing which all the works at site shall be suspended.

### Regarding Hot work



- I. When doing hot work inside the plant the CONTRACTOR must ensure that the fire hose is hooked up with the fire water system and extended to the work spot. Fire extinguisher must be kept near the working spot. Area around and below the hot working place must be adequately protected from falling/ coming out of sparks/hot metals from the booth made of Fire retardant material cloth/sheet and wetting them with water. The CONTRACTOR must arrange sufficient number of fire hoses and firefighting equipment of approved quality at his own cost to carry out hot job inside the plant.
- II. Welding & electrical cables should be of approved quality, and no jointing and loose connection shall be permitted.
- III. At the end of the working day the CONTRACTOR must inform electrical section to switch off power at sub-station end.
- IV. The CONTRACTOR must provide cotton dress, safety shoe, safety helmet, safety belt, hand gloves of approved quality to his workers to meet the safety requirement of various jobs to be carried out inside the plant.

Regarding use of Vehicle:

- i) Vehicle must not ply on any road within the MRPL plant at speed exceeding 20KM/hr.
- ii) Mobile crane/ loaded trucks/ trailers must not exceed speed limit of 15 KM/hr inside the plant.
- iii) No crane is allowed to move inside the plant with load.
- iv) No vehicle is allowed to park inside the plant.

### DEDUCTION TOWARDS ACCIDENTS

In addition to price reduction and deductions as provided for in the Contract, the OWNER shall be entitled to deduct from any payment due to the CONTRACTOR, for violations of safety provisions, as per details given below:

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- (i) Violation of applicable safety, health and environment related norm, a price reduction of Rs.5000/- per occasion.
- (ii) Violation as above resulting in:
  - a) Any physical injury – a price reduction of 0.5% of the lump sum Price(maximum of Rs.2,00,000) per injury in addition to Rs.5,000/-.
  - b) Fatal accident – a price reduction of 1% of the Lump sum Price (maximum of Rs.10,00,000) per fatality in addition to Rs.5,000/-.

## 21.0 HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT

Safety is to be given prime importance. During construction and operation CONTRACTOR shall strictly follow the safety procedures, precautions, norms laid down by OWNER. In case of non-compliance, Engineer-in-Charge shall give notice to the Contractor. In case of repeated failure of the Contractor, Engineer-in- Charge is free to take actions such as withholding of bills, heavy penalty etc. The quantum of such actions will be decided by the Engineer-in- Charge.

Bidder shall include in his offer the Health, Safety and Environment (HSE) Management and procedures which is required to be adhered to during the execution of contract. After the award of the contract, detailed Health, Safety and Environment (HSE) programme to be followed for execution of contract under various divisions of works will be mutually discussed and agreed to.



The CONTRACTOR shall establish document and maintain an effective Health, Safety and Environment (HSE) management system.

In case CONTRACTOR fails to follow the instructions of Engineer-in-charge with respect to above clauses, next payment due to him shall not be released unless until he complies with the instructions to the full satisfaction of Engineer-in-charge.

The Contractor shall also adhere to the requirements of OWNER specifications on Safety, enclosed as **Annexure- V** to this SCC.

## 22.0 COMPUTERISED CONTRACTOR'S BILLING SYSTEM

Without prejudice to stipulation in General Conditions of Contract, CONTRACTOR should follow following billing system:

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The bills will be prepared by the CONTRACTOR on their PCs as per the standard formats and codification scheme proposed by PMC/OWNER. The CONTRACTOR will be provided with data entry software to capture the relevant billing data for subsequent processing. The CONTRACTOR will submit these data to PMC/OWNER in an electronic media along with the hard copy of the bill, necessary enclosures and documents. The CONTRACTOR will also ensure the correctness and consistency of data so entered with the hard copy of the bill submitted for payment.

OWNER will utilize these data for processing and verification of bill of the CONTRACTOR.



### 23.0 INTEGRITY PACT

Pro-forma of Integrity Pact (IP) as per **FORM – M1 along with format of AFFIDAVIT W.R.T. INTEGRITY PACT (FORM M2)** of Proposal Forms shall be returned by the bidder along with the un priced bid, duly signed on all pages by the same signatory who is authorized to sign the bid documents. Bidder's failure to submit the Integrity Pact duly signed shall result in the bid not being considered for further evaluation.

### 24.0 SETTLEMENT OF DISPUTE BETWEEN GOVERNMENT DEPARTMENT AND PUBLICSECTOR UNDERTAKINGS

If the CONTRACTOR is a PSU or Enterprise or is a Govt. Department, any disputes or differences between the Contractor and PMC/OWNER hereto arising out of any notified claim of the Contractor in terms hereof and/or arising out of any amount claimed by PMC/OWNER (whether or not the amount claimed by PMC/OWNER or any part thereof shall have made to the CONTRACTOR in respect of the work), then in suppression of the provisions of Section 9 of the General Conditions of Contract, the following provisions shall apply, namely; such disputes or differences shall be resolved amicably by mutual consultation or through the good offices or empowered agencies of the Government. If such resolution is not possible, then the unresolved disputes or differences shall be referred to arbitration of an arbitrator to be nominated by the Secretary, Department of legal affairs (Law Secretary) in terms of the Office Memorandum No. DPE/4(10)/2001- PMA-GL-I date 22<sup>nd</sup> January, 2004 issued by the Cabinet Secretariat (Department of Cabinet Affairs) as modified from time to time.

The Arbitration Act shall not be applicable to the arbitrator under this clause. The award of the arbitrator shall be binding upon parties to the dispute, provided, however any party aggrieved by such award may make a further reference for setting aside or revision of the award to Law Secretary whose decision shall bind the parties finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the arbitrator.

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## 25.0 COMBINED REGISTER UNDER VARIOUS LABOUR LAWS RULES, 2017:



As per the Notification issued by Ministry of Labour and Employment vide their gazette notification no. G.S.R.154 (E) dated 21/02/2017, for ease and for expedient compliance of the requirement of the various labour related laws, a combined registers has to be maintained under certain labour related laws. If the combined register is required for inspection by the concerned inspector appointed under any of the enactments referred in the rules, the concerned persons shall make available the combined registers or provide necessary particulars for the purpose of accessing the information as the case may be.

## 26.0 THIRD PARTY INSPECTION AGENCIES

Pursuant to clause no 4.7.4.0 of General Conditions of Contract the CONTRACTOR shall arrange Third Party Inspection through approved agencies of the PMC/OWNER for items sourced & supplied within India and also for Imported Items as per Annexure XII.

## 27.0 PRICE REDUCTION / ADJUSTMENT FOR DELAY IN MECHANICAL COMPLETION/PRICE ADJUSTMENT FOR SLIPPAGE IN COMPLETION

1. The Clause No. 4.4.0.0.of GCC stand partially modified to the following extent:  
In case of any delay in **MECHANICAL COMPLETION OF THE UNIT** beyond the Time schedule as defined in Table A of Annexure I to SCC the Owner shall be entitled to a discount in the total Lump sum price. The discount shall be applicable at the rate of 0.5% (half percent) of the total Lump sum price of LSTK Contract for every week of the delay or part thereof subject to a maximum of 5% of the total Lump sum price of LSTK Contract. The above discount shall be recovered by the Owner out of the amounts payable to the Contractor or from any Bank Guarantees or Deposits furnished by the Contractor or the Retention Money retained from the Bills of the Contractor, either under this contract or any other Contract with Owner.
2. Price Adjustment, if applicable, shall be made only after settlement of the contractor request for time extension. Until finalization of this aspect, whether price adjustment or extension of time schedule, the contractor shall submit a bank guarantee for the amount of price adjustment, in a format approved by OWNER

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3. As an alternative the contractor shall have an option to provide a Bank Guarantee from a scheduled Bank and in a format acceptable to the OWNER for a sum equal to 5% (FIVE Percent) of the total contract value which shall be available for recovery of the Price Adjustment for Slippage in completion (if any) finally determined after **MECHANICAL COMPLETION OF THE UNIT**. This Bank Guarantee shall be in addition to any other Guarantee to be provided by the Contractor and shall be valid for a period of not less than 12 (TWELVE) months from the date of Mechanical completion or 18 months from date of Commissioning whichever is earlier.
4. In case the Contractor submits a BG in lieu of "Price Adjustment for slippage incomplection" which has been deducted/ proposed to be deducted, the amount withheld on account of "Price Adjustment for slippage in completion" would be released/ "Price Adjustment for slippage in completion" would not be deducted.

## 28.0 MECHANICAL COMPLETION

Definition of Mechanical completion clause 1.0.32.0 of GCC, stands modified and replaced as given below:

The plant is said to have achieved Mechanical Completion when:

- the construction of the Plant has been completed in all respect with completion of all activities as listed in this document (but not limited to) to be performed by the CONTRACTOR.
- attending to all punch list items as provided by OWNER/PMC and/or LICENSOR and/or Statutory bodies like OISD, CCE, TAC, Factory Inspectorate, Pollution control authorities etc., other than in minor respects which do not prevent commissioning.
- all civil works including grouting and structural is completed.
- all equipment and machinery are installed and aligned.
- all piping and instrumentation work is completed.
- all hydrostatic/ pneumatic testing is done.
- insulation & painting is completed.
- all electrical work is completed.
- speed and direction of rotation of all prime movers is checked.
- relays are set and all scales, meters, measuring devices and recorders are calibrated, all instrumentation jobs are completed in all respect as per requirements.
- all the loops and interlocks are tested and the plant should be ready for Pre-Commissioning and Start-Up and Commissioning.

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## 29.0 COMMISSIONING

Definition of "Commissioning" as provided in clause 1.0.10.0 of GCC, stands modified and replaced as given below:

Carrying out following activities shall be defined as "Commissioning".

After completion of all the scope as listed in technical specification and enquiry document, the plant is said to have achieved commissioning when:



- Pressing into service the unit(s), equipment(s), vessels, pipeline(s), Machinery and systems & sub systems comprised within the Plant in accordance with procedures as approved in plant specific Operating Manual and
- as per the requirement of LICENSOR which is the subject matter of the contract after successful testing and trial run of the plant.
- Commissioning assistance shall be provided by CONTRACTOR, to the extent necessary. OWNER shall carryout the commissioning with the Technical assistance of the expert LICENSOR Personal.
- CONTRACTOR shall, within his responsibilities for and the scope of Commissioning the Unit, train OWNER's personnel at the site of the Unit, in such number and for such period as the CONTRACTOR considers reasonably necessary for running of the Plant.
- Commissioning means the successful introduction of intended feed in the unit and the stable operation of the unit for a continuous period of not less than seventy two (72) consecutive hours thereafter.

## 30.0 DEFECT LIABILITY

Defect Liability Clause 5.4.1.0 of GCC stands modified and replaced as given below:

Notwithstanding the expiry of the primary Defect Liability Period aforesaid, the CONTRACTOR shall be and remain liable:

- i. To correct and/or rectify or replace, as the case may be, the defective works or materials with respect to which a greater defect liability period has been specified in any of the Contract Documents, for the entirety of the period so specified; and
- ii. To pass on to the OWNER the benefit(s) of any or all warranties or guarantees which may be available to the CONTRACTOR from its vendors in respect of materials or parts or components thereof which ensure(s) for a period in excess of the primary Defect Liability Period specified above.
- iii. Following additional guarantees shall be make good: -

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- a) Guarantee with respect to meeting all statutory requirements including emission requirements, the CONTRACTOR is not responsible for the emission guarantees of the LICENSOR. However, within and to the extent applicable to the scope of supply and execution, the CONTRACTOR shall be responsible for emission guarantees of the UNIT.
- b) Hydraulic guarantee and any performance guarantee mentioned elsewhere in the FEED @ document (like Package Units).
- c) Guarantee for engineering and workmanship.

### **31.0 POLICY FOR PROVIDING PREFERENCE TO INDIAN MANUFACTURED IRON &STEEL PRODUCTS IN GOVERNMENT PROCUREMENT (DMI & SP).**

**“Ministry of steel, Govt of India, vide their notification The gazette of India, extraordinary part II no.357 dated 09.05.2017”, notified the policy for providing preference to domestically manufactured iron & steel products in government procurement”:**



Under the policy, purchase of the iron & steel products covered under column “a” of **Annexure – IX TO SCC (Enclosed)** of the policy shall be subject to minimum value addition as stipulated in the Appendix. Value addition shall be determined by formula specified in clause 7.2 of the policy.

The bidder shall be the manufacturer of offered product except if the specific enquiry permits sole selling/authorized distributors/authorized dealers/authorized supply houses etc. Of the domestic manufacturers.

In case of detection of mis-declaration by the bidder of the prescribed domestic value addition, in the tender document, at any stage before or after award, the following actions shall be taken by the procuring company:

- A. Forfeiture of CPBG depending upon the stage of detection.
- B. Banning of business dealings in line with the policy.

In case of any complaint or doubt regarding the domestic value addition furnished by a bidder in his bid, PMC/OWNER shall reserve the right to verify the domestic value addition. The bidder shall provide unhindered access to his relevant records in this regard, to the authorized representatives of PMC/OWNER. In case of such verification, if the bidders claim is found to be incorrect, in addition to the

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actions stipulated in 64.3 above, the bidder shall pay Rs. 10 Lakh to OWNER as the lump sum cost of verification.

Bidder shall furnish self-certification as per format enclosed FORM-1 (Enclosed as **Annexure-X with SCC**) with the policy else bid of such bidder shall be rejected. The same is enclosed here with for bidder compliance.

**Clause 7.2 of the policy:**

*In case the iron & steel products are made-*



- Using domestic input steel (semi-finished/finished steel), invoices of purchases from the Actual domestic producers along with quantities purchased and other related documents must be furnished to procuring government agency.*
- Using a mix of imported and domestic input steel, the invoices of purchase from the actual producers along with quantities purchased and other related documents must be furnished separately. to derive the extent of domestic value addition, the weighted average of both (imported & domestic) input steel shall be considered to ensure that the minimum stipulated domestic value addition requirement of the policy is complied with.*
- Using only imported input steel, the following formula shall apply to calculate the Percentage of domestic value-addition. Domestic value addition (%) = (net selling price-landed cost of imported steel at the plant)\* 100/(landed cost of imported input steel at the plant) Bidder to comply with the above requirement of the Gazette.*

**32.0 DETAILS OF MINIMUM PAYMENT TO WORKFORCE EMPLOYED BY CONTRACTOR**

The contractor shall pay Minimum as per the following table to the workforce deployed by him under various categories (Unskilled / Semiskilled / Skilled / Highly Skilled) as applicable;

Sl no	Description	Payment basis
1	Basic Wages per day	As per Minimum wages act issued from time to time by ALC





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2	PF/Admin charges	13.00 % of Basic Wages & MRPL Special Allowance			
3	ESI	3.25 % of Basic Wages, MRPL Special Allowance & Shift allowance (if applicable).			
4	Leave Wages	5 % of Basic Wages (As per ALC)			
5	Bonus	8.33 % of min wages or Rs 7000 /- per annum whichever is higher			
6	Holiday wages	10 days per year			
7	MRPL Special Allowance per day	Unskilled (in Rs)	Semi Skilled (in Rs)	Skilled (in Rs)	Highly skilled (in Rs)
		34	50	70	90

**Note:** Please refer details of the Minimum wages as mentioned in the SCC/Scope of Work (as applicable).

The following to be complied:

- Shift allowance (if applicable) – Shift allowance @ Rs 25/- per shift to be provided to Secondary work force coming in rotational shift (i.e., morning, evening and night shifts) working in plant area.
- Annual Medical Check-up for Workforce to be complied by the contractor.
- PF/ESI remittance to be ensured on MRPL Special Allowance.
- Rates of MRPL special allowance shall be Rs 34, Rs 50, Rs 70 & Rs 90 for Unskilled, Semi-Skilled, Skilled & Highly Skilled Category respectively.
- Gratuity to be paid as per the statutory norms based on the government directives.
- Number of closed Holidays shall be 10 days per year.
- Extended working hours shall be compensated suitably as per statutory provisions.
- Group term life Insurance cover to be taken having a risk coverage 24 X 7 death coverage (Natural/Accidental death) with a sum assured of Rs.10,00,000/- (Rs. Ten lacs only) per person.
- Statutory provisions if in contradiction will prevail over any Special conditions of the Contract.
- Transportation facility in respect of Secondary Workforce for commuting to entry gates of MRPL shall be in the scope of the contractor. However, for internal transport from entry gate to place of work; existing circular vehicles to be utilised.
- For ensuring compliance to the above, suitable number of welfare officers to be placed by contractors with respect to all statutory provisions.
- Uniform / Boiler suit-2 sets per year, Helmet, Shoes, Raincoat to be provided to the workforce and proof to be submitted.

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### 33.0 INSURANCE:

Following clauses shall be read in conjunction with GCC Clause No. 8.5.0.0 pertaining to insurance:



All the material and equipment's within Project premises to be incorporated impermanent works shall be covered by Owner under Comprehensive Marine Cum Erection Insurance policy. The OWNER at his own cost has taken an "all risk" type Comprehensive Marine Cum Erection Insurance policy. These policy apply only to insurance risks at site and to no other location. The CONTRACTOR shall be solely liable in the event of his and/or SUBCONTRACTOR's having caused any loss or damage of any nature arising out of or in connection with the execution of the WORK not covered under those policies and shall indemnify the OWNER and /or his representative in respect of any claim in respect of any such loss or damage. The CONTRACTOR shall make himself fully familiar with the terms of the said policy and take such additional insurance as he may deem necessary at his own cost.

#### **CONTRACTOR FURNISHED INSURANCE: as applicable to the Scope of works as per tender:**

**Insurance Cover for Workmen:** The: The contractor shall obtain adequate Insurance Policy in respect of his workmen to be engaged for the work compulsorily towards compensations as admissible under the Workmen's Compensation Act 1923, and Rules framed there under upon death/disablement of a worker and the same has to be produced to the concerned in charge of Administration Section before start of the work.

All workers whose salary is more than **Rs 21,000/-** per month (Prevailing rate as per the act) need not to be covered by ESI. However, contractor to take insurance policy to cover the risk towards temporary disablement and permanent disablement for the workmen. CONTRACTOR shall at his cost and expense take out from a suitable insurance company acceptable to owner and maintain for the entire period until ACCEPTANCE OF WORKS or until such time thereafter as the CONTRACTOR may consider appropriate the following insurances.

- 1) **Workmen's Compensation Insurance (WCI):** This insurance shall confirm to and satisfy all the requirements of the applicable laws and regulations of the country, state territory or province having jurisdiction over the CONTRACTOR's employees engaged in the WORKS.
- 2) **Employer's Liability Insurance (ELI):** The insurance shall cover the liability of the CONTRACTOR as employer, for compensation beyond the coverage of the Workmen's Compensation Insurance for bodily injury to or loss of life the CONTRACTOR's employees while engaged in the WORKS.

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3) **Third Party Liability Insurance (TPL):** This insurance shall cover legal liability for bodily injury to loss of life of and/or damage to and loss of properties of the third person party arising out of the performance by the CONTRACTOR of the works.



4) **Automobile Liability Insurance (ALI):** This insurance shall cover all the CONTRACTOR's liabilities in connection with use by the CONTRACTOR for the WORKS of any mobile equipment and automobile and when used which are owned, non-owned hired and otherwise placed under the CONTRACTOR's administration and control, for bodily injury to loss of life of and/or property damage of any person or party.

5) **Movable All Risks Insurance (MRI):** This insurance shall cover the damage to and/or loss of the CONSTRUCTION EQUIPMENT including watercraft and aircraft and further including the CONTRACTOR's TEMPORARY WORKS, owned, non-owned, hired or otherwise placed under the CONTRACTOR's administration and control with the full replacement value coverage for each and every occurrence.

6) **Other Insurance**

Other insurance which shall be necessary or which the CONTRACTOR deems necessary for proper performance of the WORKS e.g.

- Overseas (and/or Domestic) Travellers' accident Insurance.
- Burglary Insurance
- All Risks marine cargo Insurance for the CONTRACTOR's construction - Equipment, tools and machinery, and for equipment and materials that the CONTRACTOR's TEMPORARY WORKS and that the CONTRACTOR under the CONTRACT may supply for the WORKS and/or the PERMANENT WORK and
- Fidelity Guarantee Insurance.
- Group term Life insurance cover to be taken having a risk coverage 24X7 death coverage (Natural / Accidental death) with a sum assured of Rs. 10,00,000/- (Rs.Ten lakh ) per person by the contractor.
- The CONTRACTOR agree that the provisions of this Clause shall to the extent as appropriate, be apply all the contracts that may for the WORKS be entered into by and between the CONTRACTOR and the respective SUBCONTRACTORS and unless the CONTRACTOR furnished insurance called for by the CONTRACT are good also for the SUBCONTRACTORS their properties

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and/or their liabilities in connection with the WORKS the CONTRACTOR shall include in such contracts as aforementioned the requirements for insurance conforming to this clause. Inclusion of such insurance requirements in such contracts as aforementioned however, shall not release the CONTRACTOR from any of his responsibilities and liabilities under the CONTRACT.

### **34.0 BROAD GUIDELINES FOR EFFECTIVE IMPLEMENTATION OF CONTRACT MANAGEMENT SYSTEM AND MEETING OF STATUTORY REQUIREMENTS IN ENGAGEMENT OF SECONDARY WORKFORCE**



A. Wherever a work order is issued following documents are required to be submitted to HR Department by Contractor duly signed by Engineer in Charge :

I) Where labour engaged by the Contractors is less than 19 :

1. Copy of the valid Work Order/ LOA Copy.
2. Work Commencement letter by the Contractor in Form 6A/ Notice of commencement.
3. Register of Workmen in Form No. XIII.
4. Copy of PF Code allotted by the Competent authority.
5. Copy of ESI code allotted by the competent authority.
6. Workmen's compensation policy.
7. Age proof, Aadhar card number and Bank account details of the worker.

II) Where labour engaged by the Contractors is more than 19 :

1. Copy of the valid Work Order.
2. Work Commencement letter by the Contractor Form 6A/ Notice of commencement.
3. Register of Workmen in Form No. XIII.
4. Copy of PF Code allotted by the Competent authority.
5. Copy of ESI code allotted by the Competent authority.
6. Request letter from the Contractor for issuance of Form No. V for apply labour license through EIC.
7. Submission of Form No. IV for proof of applying labour license attested by the ALC.
8. Interstate migrant license copy if labour engaged more than five from other states.
9. Workmen's compensation policy.
10. Age proof, Aadhar card number and Bank account details of the worker.

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III) Documents required on monthly basis duly certified by Engineer in Charge:



1. Wage Register duly certified by the Engineer Incharge.
2. Attendance Register duly certified by Engineer Incharge.
3. Payment of wages should be disbursed within 7 days from the close of wage period.
4. ESI/ PF Challans receipt along with PF-ECR Copy & Monthly contribution details for payment permitted to Statutory Authorities in respect of the wages paid for the previous month with covering letter.
5. Bank Statement for wages paid.
6. Insurance copy for those who are not covered under ESI Act.
7. Form No. 5 & 10 and Male and female data for each month.

B. Documents required on Annual basis for release of Bank Guarantee / Security Deposit duly certified by the Engineer In charge:

1. Work Completion letter by the Contractor in Form 6A/ Notice of completion.
2. Annual Medical Check-up data.
3. Payment of bonus as per Statue.
4. Payment of leave with wages @ 1day for the every 20 days worked by workers.
5. Payment of gratuity if applicable (on completion of 5years of continuous service).
6. NOC from Security Department on surrendering of punch card and entry pass issued by MRPL.
7. Register of overtime. Form No. XXIII.
8. Wage slip in Form no. XIX.
9. Register of damages or loss Form no. XX.
10. Register of fine. Form No. XXI.
11. Register of Advance form no. XXII.
12. Employment card XIV.
13. Indemnity bond
14. Half yearly/ yearly labour return in form XXIV (see rule 82(1)) to the licensing officer under contract labour returns.
15. Half yearly return in form 5A (regulation 26) on ESI contribution.

C. PROCEDURE ADOPTED BY HR IN DEALING WITH CONTRACTORS:

1. Contractor shall submit the documents as specified above with a cover note signed through EIC to HR Department.

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2. On submission of compliance report/ recommendations from EIC, HR will give clearance to Finance for release of payment.
3. Any deviation from the above procedure and non-production of required documents will result in delay in issuance of gate pass and payment of monthly bill, final bill and release of retention money/ Security Deposit/ Bank Guarantee.
4. Contractor should also give an indemnity bond to MRPL absolving MRPL of all statutory, non-statutory clearance by their employees, sub-contractors and suppliers.

### 35.0 COORDINATION WITH CONSULTANT

CONTRACTOR shall coordinate with Consultant for PMC services for his day-to-day activities and provide free access and assistance during the inspections and other activities to be carried out by consultant. CONTRACTOR shall comply to the requirements of Consultant and obtain all the clearances from Consultant for his work. Information regarding the Project management Consultant (PMC) will be given to the successful bidder after placement of LOA.

### 36.0 ERRANT BIDDER



In case after price bid opening the lowest evaluated bidder (L1) is not awarded the job for any mistake committed by him in bidding or withdrawal of bid or varying any term in regard thereof leading to re-tendering, OWNER shall debar such bidders from participation in re-tendering of the same job(s)/item(s).

### 37.0 CORRUPT AND FRAUDULENT PRACTICES

Bidders are required to furnish the complete and correct information/ documents required for evaluation of their bids. If the information/ documents forming basis of evaluation is found to be false/ fake/ forged, the same shall be considered adequate ground for rejection of the bids.

OWNER requires that the CONTRACTOR observes the highest standard of ethics during the execution of Contract. In pursuance of this policy, OWNER defines, for the purposes of this provision, the terms set forth below as follows:

- a. "Corrupt Practice" means the offering, giving, receiving, or soliciting of anything of value to influence the action of public official in contract execution; and
- b. "Fraudulent Practice" means a misrepresentation of facts in order to influence the execution of a Contract to the detriment of OWNER, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive OWNER of the benefits of free and open competition.

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- c. “False/Fake” means to make or construct falsely. “Faked alibi” is a made, manufactured, or false alibi. Something that is not what is purports to be; counterfeit, an imposter.
- d. “Forgery” means the false making or the material altering of a document with the intent to defraud. A signature of a person that is made without the person’s consent and without the person otherwise authorizing it. A person is guilty of forgery if, with the purpose to defraud or injure anyone or with knowledge that he is facilitating a fraud or injury to be perpetrated by anyone, the actor (i) alters any writing of another without his authority (ii) makes, completes, authenticates, executes, issues or transfers any writing, so that it purports to be the act of another who did not authorize that act or to have been executed at a time or place or in a numbered sequence other than was in fact the case, or to, be a copy of an original when no such original exists. Utters any writing which he knows to be false in a manner specified in (i) & (ii) above.

OWNER may terminate the Contract if it discovers subsequently that the Contractor had engaged in Corrupt Practices or Fraudulent Practices in competing for the Contract.

The Contractor is required to execute the “Integrity Pact” if specified in the Bidding Document.

In case, the information/ document furnished by the Contractor forming basis of evaluation of its Bid is found to be false / fake/ forged after the award of the Contract, OWNER shall have the right to terminate the Contract and get the remaining Works executed by a third party at the risk & Cost of the Contractor and without any prejudice to other rights available to OWNER under the Contract such as forfeiture of the Contract Performance Bank Guarantee, withholding of payment etc.

In case, this issue of submission of false/fake documents comes to the notice after execution of the Works, OWNER shall have full right to forfeit any amount due to the Contractor along with forfeiture of the Contract Performance Bank Guarantee furnished by the Contractor.



Further, any Contractor which is found guilty of any Corrupt or Fraudulent Practice or submission of false/fake /forged documents, shall be put on the negative/ holiday list of OWNER debarring them from future business with OWNER.

### **38.0 PURCHASE PREFERENCE LINKED WITH LOCAL CONTENT (PP-LC 2017)**

MOP&NG has notified the purchase preference (linked with local content)-PP-LC for the Procurement of goods and services under Oil & Gas Projects in India. Under this Policy, the bidders are allowed to avail the purchase preference linked with attaining the stipulated Local content.

MRPL reserves the right to allow Manufacturers or Suppliers or Service providers, purchase preference as admissible under the prevailing policy, subject to their complying with the requirements/conditions



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defined herewith and submitting documents required to support the same. In order to avail the Purchase preference under this policy, bidder shall achieve minimum Local Content (LC) for enquiries floated year-wise (Date of Notice inviting tender) as per table given below.

**Table of Local Content-Enclosure-1.**

Items	Local Content (%)		
	2017-18	2018-20	2020-22
Service Contracts	20%	22%	25%
Supply Contracts	20%	22%	25%
EPC Contracts (others)	30%	35%	40%

**Notes**

1. Above policy is not applicable for Domestically Manufactured Electronic Products (DMEP) and MSME as there being specific policies for products / services.
2. The prescribed local content in above table shall be applicable on the date of Notice Inviting Tender.

**A) Margin of Purchase Preference**



The manufacturers/service providers having the capability of meeting/ exceeding the local content targets given above shall be eligible for 10% purchase preference under the policy. i.e where the quoted price of eligible LC manufacturers/LC service providers is within 10% of the lowest price, purchase preference may be granted at the lowest valid price bid.

**B) Procedure for availing benefits under Purchase Preference (Make in India Policy)**

The option in case of MSE bidders qualifying under both Policies, namely, Purchase Preference under the Public Procurement Policy – 2012 (PPP-2012) for MSE bidders and Purchase Preference Linked with Local Content (PP-LC 2017) shall be exercised as under:

- i. The MSE bidder can avail only one out of the two applicable purchase preference policies, i.e., PP-LC 2017 for PPP-2012 and therefore, bidder will be required to furnish the option under which he desires to avail purchase preference. This option must be declared within the offer and in case bidder fails to do so although he is eligible for both the Policies, MRPL shall evaluate his offer considering PPP- 2012 as the default chosen option.



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- ii. In case a MSE bidder opts for preference under PPP-2012, he shall not be eligible to claim benefit under PP-LC 2017 (irrespective of the fact whether he furnishes the details of LC in his offer and this LC meets the stipulated LC criteria).
- iii. In case a MSE bidder opts for purchase preference based on PP-LC 2017, he shall not be entitled to claim benefit of purchase preference benefit as applicable for MSE bidders under PPP-2012. However the exemptions from furnishing Bid security Declaration Form shall continue to be available to such a bidder.
- iv. In view of the above:
  - a) The bidder's quoted prices against various items of enquiry shall remain valid even in case of splitting of quantities of the items, except in case of items where the quantity cannot be split since these are to be awarded in a Lot or as a package or Group.
  - b) While evaluating the bids, for price matching opportunities and distribution of quantities among bidders, the order of precedence shall be as under:
    - MSE bidder (PPP-2012)
    - PP-LC complied bidder (PP-LC)

In case the bidder has not declared his status as to whether he is an MSE Bidder or PP-LC Bidder during bid submission, then he will be considered as non PP-LC compliant bidder and evaluated accordingly. No further correspondence will be made in this regard.

#### **Examples of Purchase Preference:**

##### **Non divisible item**

L1 bidder is non MSE, non PP-LC bidder

L2 bidder is PP-LC (**within 10%**)

L3 bidder is MSE bidder (**within 15%**)



MSE bidder shall be given preference to match the L1 price. If L3 bidder matches the L1 price, Order shall be placed on him, otherwise, option for matching the L1 price shall be given to L2 bidder (PP-LC).

##### **Divisible item**

L1 bidder is non MSE, non PL-LC bidder

L2 bidder is PP-LC (**within 10%**)

L3 bidder is MSE bidder (**within 15%**)

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MSE bidder shall be given preference to match the L1 price. If bidder matches the L1 price, order shall be placed on him for the quantity specified in the bidding document. For the balance quantity (i.e. 50% of tendered quantity/value) option for matching the L1 price shall be given to L2 bidder (PP-LC). Balance quantity shall be awarded to natural lowest bidder.

For further clarification, in case an item has quantity 4 nos. then 1 no. can be given to MSE bidder, 2 to PP-LC bidder and left out 01 no. to natural L1 bidder.

**Note:**

The above two examples are not applicable to the Works Contracts since the Purchase Preference under PPP-2012 is not applicable to works contracts:

- In case lowest bidder is a MSE bidder, the entire work shall be awarded to him without resorting to purchase preference to bidders complying with Local Content.
- In case lowest bidder is a PP-LC bidder, purchase preference shall be resorted to MSE bidder as per provisions specified in the enquiry document w.r.t. PPP-2012 only.

**The PP-LC Policy shall be implemented in the following manner**



Quantum of purchase preference for bidders qualifying under local content (for LC Bidder) meeting minimum local content, subject to accepting L1 Price and tender applicability criteria, referred to as eligible LC bidder as explained under previous sections are stated below:

A. For goods:

- 1) If L-1 is LC bidder, entire quantity will be awarded to such LC bidder
- 2) If L-1 is non-LC bidder,
  - a) 50% of the quantity will be awarded to LC bidder and rest to non-LC bidder
  - b) If quantity cannot be split in the ratio of 50:50, the next higher quantity greater than 50% that is practically splittable shall be awarded to LC bidder and rest to non-LC bidder
  - c) If quantity is indivisible, 100% shall be awarded to LC bidder
  - d) If there are more than one LC bidders, 50% quantity shall be awarded to lowest LC bidder and rest to non LC bidder

B. For Services/ EPC contracts:

Normally the service / EPC contract are not splittable and therefore the eligible LC bidder shall be awarded 100% of the contract. However, in cases where the contract are splittable the LC bidder shall be awarded contract as explained under section A.2) above as in procurement of goods.

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C. CERTIFICATION OF LOCAL CONTENT

Manufacturers of goods and/or providers of service, seeking Purchase preference under the policy, shall be obliged to certify the LC of goods, service or EPC contracts as under:

**At bidding stage:**

**The bidder shall provide the percentage local content in the bid (Unpriced Bid)**

**The bidder must have LC in excess of the requirement specified in table given in Enclosure-1**

- The bidder shall submit an undertaking from the authorized signatory of the bidder having **the power of attorney** along with the bid stating the bidder meets the mandatory minimum local content requirement, which shall become part of the contract.
- In cases of procurement for an estimated value in excess of Rs 10 Crores, the undertaking submitted by the bidder shall be supported by a certificate from the **statutory auditor or cost auditor** of the company (in case of companies) or from a **practicing cost accountant or practicing chartered accountant** (in respect of other than companies) **giving the percentage of local content**.
- However, in case of foreign bidder, certificate from the statutory auditor or cost auditor of their own office or subsidiary in India giving the percentage of LC is also acceptable. In case office or subsidiary in India does not exist or Indian office/subsidiary is no required to appoint statutory auditor or cost auditor, certificate from practicing cost accountant or practicing chartered accountant giving the percentage of LC is also acceptable.



**After awarding of Contract/Purchase Order**

**The LC Certificate as per Table attached as per relevant Enclosures (II, III & IV) shall be submitted along with each Invoice as per following criteria**

**a) Where the total quoted value is less than INR 5 Crore:**

In the case of procurement of goods and or services with the value less than Rs Five Crores, the local content shall be calculated (self-assessment) by the supplier of goods and/or the provider of services and certified by the Director/ Authorised representative of the company.

**b) Where the total quoted value is INR 5 Crore or above** -The verification of the procurement of goods, services or EPC contracts with the value Rupees Five Crore and above shall be carried out as follows:

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- i. The Proprietor and an independent Chartered Accountant, not being an employee of the firm, in case of a proprietorship firm.
- ii. Any one of the partners and an independent Chartered Accountant, not being an employee of the firm, in case of a partnership firm.
- iii. Statutory auditors in case of a company. However, where statutory auditors are not mandatory as per laws of the country where bidder is registered, an independent chartered accountant, not being an Employee of the bidder's organization.

However, procuring company shall also have the authority to audit as well as witness production processes to certify the achievement of the requisite local content and/or to obtain the complete back up calculation before award of work failing which the bid shall be rejected and appropriate action may be initiated against the bidder.



### C) CALCULATION AND DETERMINATION OF LOCAL CONTENT

**Bidder claiming Local Content have to calculate the LC and indicate the same in the Unpriced Bid and substantiate the calculation while submitting each invoice.**

1. LC shall be calculated on the basis of verifiable data. In the case of data used in the calculation of LC being non verifiable, the value of LC of the said component shall be treated as nil.
2. Format for calculation of LC is enclosed as
  - a) Enclosures II, for procurements of:
    - i) Supply of goods
    - ii) Supply of goods along with installation and commissioning.
    - iii) Supply of goods along with installation , commissioning & AMC
  - b) Enclosure III for calculation of LC for Services
  - c) Enclosure IV for calculation of LC for EPC
3. Determination of Local Content
  - a) For Goods/installation & commissioning/AMC as evaluated under Enclosure II:
    - i. LC of goods shall be computed on the basis of the cost of domestic components in goods, compared to the whole cost of product. The whole cost of product shall be constituted of the cost spent for the production of goods, covering: direct component (material) cost; direct manpower cost, factory overhead cost and shall exclude profit, company overhead cost and taxes for the delivery of goods.
    - ii. The criteria for determination of local content cost shall be as following:

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- In the case of direct component (material) based on country of Origin.
  - In the case of manpower, based on INR component.
  - In the case of working equipment/facility, based on the country of Origin
- iii. The calculation of LC of the combination of several kinds of goods shall be based on the ratio of the sum of the multiplication of LC of each goods with the acquisition price of each goods to the acquisition price of the combination of goods.
- b) For services as evaluated under Enclosure III:
- I) LC of service shall be calculated on the basis of the ratio of service cost of domestic component in service to the total cost of service.
- II) The total cost of service shall be constituted of the cost spent for rendering of service covering.
- Cost of component (material) which is used.
  - Manpower and consultant cost, cost of working equipment/facility and
  - General service cost excluding profit, company overhead cost , taxes and duties
- III) The criteria for determination of cost of local content in the service shall be as follows
- In the case of material being used to help the provision of service, based on country of origin.
  - In the case of manpower and consultant based on INR component of the services contract.
  - In the case of working equipment/facility, based on the country of Origin and
  - In the case of general service cost, based on the criteria mentioned under 3.b)III above.
  - Indian flag vessels in operation as on date.
- c) LC of EPC contracts given under Enclosure IV.
- I) LC of EPC contracts shall be ratio of the whole cost of domestic components in the combination of goods and services to the whole combined cost of goods and services.
- II) The whole combined cost of goods and services shall be the cost spent to produce the combination of goods and services, which is incurred on work site.LC of the combination of goods and services shall be counted in every activity of the combination work of goods and services.
- III) The spent cost as mentioned above(3.c.II) shall include production cost in the calculation of LC of goods as mentioned in 3.a.I and service cost in the calculation of LC of services as mentioned in clause 3.b.II.

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- d) Determination of LC of the working equipment/facility shall be based on the following provision.  
Working equipment produced in the country is valued as 100% local content and working equipment produced abroad is valued as Nil Local Content (0%).
- e) As regards cases where currency quoted by the bidder is other than INR, exchange rate prevailing on the date of Tender (NIT) shall be considered for the calculation of LC.

**The onus of submission of appropriately certified documents lies with the bidder and purchaser shall not have any liability to verify the contents & will not be responsible for same.**

**However, in case the procuring company has any reason to doubt the authenticity of the Local Content, it reserves the right to obtain the complete back up calculations before award of work failing which the bid shall be rejected.**



**D) Failure of bidder in complying with the local content post award:**

In case a bidder, who has specified in his bid that the bid meets the minimum Local Content specified in the enquiry document fails to achieve the same the following actions shall be taken by the procuring company:

- Pre-determined penalty @ 10% of total contract value.
- Banning business with the supplier/contractor for a period of one year

To ensure the recovery of above pre-determined penalty, payment against dispatch/shipping document shall be modified to the extent that the 10% payment out of this milestone payment shall be released after completion of this milestone as well as submission of certification towards achievement of Local Content, as per provision of enquiry document.

Alternatively, this payment can be released against submission of additional bank guarantee valid till completion Schedule Plus 3 months or as required by purchasing company.

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**Enclosure-II**



**CALCULATION OF LOCAL CONTENT – GOODS**

Name of Manufacturer	Calculation by manufacturer			
	Cost per one unit of product			
Cost component	Cost (Domestic component) a	Cost (Imported component) b	Cost Total Rs/US\$ C=a+b	% Domestic component d=a/c
I. Direct material cost				
II. Direct labour Cost				
III. Factory overhead				
IV. Total production cost				

**Note:**

$$\% \text{ LC Goods} = \frac{\text{Total cost (IV.c)} - \text{Total imported component cost (IV.b)}}{\text{Total Cost (IV.c)}} \times 100$$

$$\% \text{ LC Goods} = \frac{\text{Total domestic component cost (IV.a)}}{\text{Total Cost (IV.c)}} \times 100$$

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**Enclosure-III**

**CALCULATION OF LOCAL CONTENT – SERVICE**



NAME OF SUPPLIER OF GOODS/PROVIDER OF SERVICE							
			Domestic	Imported Rs/US\$	Total	LC	
						%	Rs/US\$
			b	c	d	e=b/d	f=d x e
A	Cost component						
	I. Material used cost	Rs US\$					
	II. Personnel & Consultant cost	Rs US\$					
	III. Other services cost	Rs US\$					
	IV. Total cost (I to IV)	Rs US\$					
B	Taxes and Duties	Rs US\$					
C	Total quoted price	Rs US\$					

**Note:**

$$\% \text{ LC Service} = \frac{\text{Total cost (A. IV. d)} - \text{Total imported component cost (A. IV. c)}}{\text{Total Cost (A. IV. d)}} \times 100$$

$$\% \text{ LC Service} = \frac{\text{Total domestic component cost (A. IV. b)}}{\text{Total Cost (A. IV. d)}} \times 100$$



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**Enclosure-IV**



**CALCULATION OF LOCAL CONTENT – EPC (GOODS AND SERVICE)**

A.	COST COMPONENT (Rs/US\$)		Cost Summary			
		Domestic	Imported Rs/US\$	Total	LC	
					%	Rs/US\$
		b	c	d	e=b/d	f=d x e
I	GOODS					
1	Material used cost					
2	Equipment cost					
3	<b>Sub Total I</b>					
II	SERVICES					
1	Personnel & Consultant cost					
2	Equipment & Work Facility Cost					
3	Construction/Fabrication Cost					
4	Other Services Cost etc					
5	<b>Sub Total II</b>					
III.	<b>TOTAL COST GOODS + SERVICES</b>					
B.	Non Cost Component					
C.	TOTAL QUOTED PRICE					

**Note:**

% LC Combination =

$$\frac{\{\text{Total domestic component cost of goods (AI3b)} + \text{Total domestic component cost of service (AII5b)}\}}{\text{Total Cost (AIII d)}} \times 100$$

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### **Domestically Manufactured Electronic Items (DMEP)**

Ministry of Electronics and IT (MeITy) has specified the preference to local content in Domestically Manufactured Electronics Items as follows:

<b>Electronic Items</b>	<b>Local Content</b>	<b>Purchase Preference</b>
1. Desktop computers	45%	50%
2. Laptop personal computers	40%	50%
3. Tablet personal computers	45%	50%
4. Dot-matrix printers	55%	50%
5. Smart cards-contact type	65%	50%
6. Smart cards-contactless type	70%	50%
7. LED products	65%	50%
8. Biometric Access control/authentication	45%	50%
9. Biometric fingerprint sensors	45%	50%
10. Biometric Iris Sensors	45%	50%
11. Servers	40%	50%



### **Certification of Local Content For electronics goods:**

It is mandatory for the bidder should submit a certificate duly certified by a practicing cost accountant/chartered account, in line with the said along with prescribed Form (enclosed) in the technical bid, mentioning the location(s) at which local value addition is made. In case of companies, the certification shall be from the statutory auditor or cost auditor for the company. In case the procurement value is <Rs 10Crores self-certification is acceptable.

**The bidder claiming benefits of Purchase Preference on the above shall provide at least 2 sets of data each under the following heads:**

#### **1. Domestic Bill of Materials**

- Sum of the costs of all the inputs which go into the product (including duties and taxes levied on procurement of inputs except those for which credit/setoff can be taken) and which have not been imported directly or through a domestic trader or a intermediary.

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- b) Ex-factory price of product minus profit after tax minus sum of imported bill of material used (directly or indirectly) as inputs in producing the product (including duties and taxes levied on procurement of inputs except those for which credit/setoff can be taken) minus warranty costs.
- c) Market price minus post production freight, insurance and other handling cost minus profit after tax minus warranty cost minus sum of imported bill of material used as inputs in producing the product (including duties and taxes levied on procurement of inputs except those for which credit/setoff can be taken) minus sales and marketing expenses.

## 2. Total Bill of Materials

- a) Sum of the costs of all the inputs which go into the product (including duties and taxes levied on procurement of inputs except those for which credit/setoff can be taken).
- b) Ex-factory price of product minus profit after tax, minus warranty costs.
- c) Market price minus post production freight, insurance and other handling cost minus profit after tax minus warranty cost minus sales and marketing expenses.

**The percentage domestic value addition shall be calculated as per the following formula,**

**% Domestic Value addition = Domestic Bill of Material/Total Bill of Material.**

Under “notification for electronics products under public procurement order 2017” **Public procurement (Preference to Make in India)-order 2017-Notification on Cellular Mobile Phones.**

In furtherance of above order, MeITy has added cellular Mobile Phones vide notification no 33(5)/2017-IPHW dated 1/08/2018 and can be downloaded from

[http://dipp.nic.in/sites/default/files/Meity\\_dated\\_01082018.pdf](http://dipp.nic.in/sites/default/files/Meity_dated_01082018.pdf)



### **Public Procurement (Preference to Make in India) Order 2018 for Cyber Security Products**

MeITy has issued notification viz File No 1 (10)/2017-CLSES dated 2/7/2018 to give purchase preference to domestically manufactured /produced Cyber Security Products as per the above Order.

The definition of cyber security product, local supplier of domestically manufactured Cyber Security Products, exclusions, Verifications etc are available under <http://meity.gov.in/cyber-security>

The local supplier at the time of bidding shall provide self-certification that the item offered meets the definition of local supplier of domestically manufactured/ produced Cyber Security Products.

Certification authority for estimated values beyond Rs 10 Crores shall be statutory auditor or cost auditor of the company (in case of companies).

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In case of false declarations, provisions under clause-24-Instructions to Bidders of Section-1 of Tender Document will apply. Complaints received against claims of a bidder regarding supply of domestically manufactured Cyber Security Product shall be referred to STQC under MeITy.



For certification of local content in electronic goods shall be as per the circular F.No.33(1)/2017-IPHW issued by Government of India Ministry of Electronics and Information Technology dated 14<sup>th</sup> September 2017, which may be downloaded from <http://meity.gov.in/esdm/ppo>

**Purchase Preference in case where Negotiation is also required:**

In case purchase preference is applicable, but negotiation is to be conducted with L1 bidder, negotiation shall be carried out MSE and/or LC-complied bidder shall be offered to match the negotiated prices (even if, post negotiation, they are higher by more than 10% as compared to L1 bidder provided they were within 10% of L1 bidder as per original quoted prices) and left out quantity, if any, as per provisions of enquiry document shall be awarded to that bidder.

**Note:**

**Relevant policy guidelines issued including modifications made from time by the concerned Ministry in respect to Purchase Preference to Make in India, shall be applicable.**

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**UNDERTAKING (To be submitted on Company's Letterhead)**



(Where the total quoted value is less than INR 5 Crore)

I \_\_\_\_\_, Son/ Daughter of \_\_\_\_\_, do solemnly affirm and state as under:

1. That I am the \_\_\_\_\_ <<Designation of the authorized signatory>> of \_\_\_\_\_ and I am duly authorized to furnish this undertaking declaration on behalf of \_\_\_\_\_.
2. That \_\_\_\_\_ has submitted its bid no \_\_\_\_\_ dated \_\_\_\_\_ against bidding document no \_\_\_\_\_ dated \_\_\_\_\_ for \_\_\_\_\_ item / works for \_\_\_\_\_.
3. That the Company is fully aware of the provisions of Purchase Preference (Linked with Local Content) 2017 (PP-LC) Policy, enclosed in the above bidding document.
4. We hereby confirm that our offer is achieving the minimum local content target as per of PP-LC Policy.
5. I confirm that I am aware of the implication of the above undertaking and our liability on account of wrong declaration.

(Authorized signatory of Supplier)

Note : This undertaking shall be certified by the authorized signatory of the bidder, signing the bid.

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**UNDERTAKING (To be submitted on Company's Letterhead)**

(Where the total quoted value is INR 5 Crore or above)

Certification by the bidder

I \_\_\_\_\_, Son/ Daughter of \_\_\_\_\_, do solemnly affirm and state as under:

1. I am the \_\_\_\_\_ <<Designation of the authorized signatory>> of \_\_\_\_\_ and I am duly authorized to furnish this undertaking declaration on behalf of \_\_\_\_\_.
2. That \_\_\_\_\_ has submitted its bid no \_\_\_\_\_ dated \_\_\_\_\_ against bidding document no \_\_\_\_\_ dated \_\_\_\_\_ for \_\_\_\_\_ item / works for \_\_\_\_\_.
3. That the Company is fully aware of the provisions of Purchase Preference (Linked with Local Content) 2017 (PP-LC) Policy, enclosed in the above bidding document.
4. We hereby confirm that our offer is achieving the minimum local content target as per of PP-LC Policy and the break-up of the same is provided in the Priced bid.
5. I confirm that I am aware of the implication of the above undertaking and our liability on account of wrong declaration.

(Authorized signatory of Supplier)

Certification by the statutory auditor / Chartered Accountant of the bidder

We, \_\_\_\_\_, a CA firm having our registered office address \_\_\_\_\_ and certificate number \_\_\_\_\_ certify that we are statutory auditor of the Company M/s \_\_\_\_\_, having its registered office at \_\_\_\_\_.

OR



We, \_\_\_\_\_, a CA firm having our registered office address \_\_\_\_\_ and certificate number \_\_\_\_\_ certify that statutory auditor is not mandatory for the company M/s \_\_\_\_\_, having its registered office at \_\_\_\_\_ as per prevailing law and we are practicing Chartered Accountant, not being an employee / Director and not having any interest in the company.

We have understood the provisions of Purchase Preference (Linked With Local Content) 2017 (PP-LC) Policy, enclosed in the above bidding document.

We hereby certify that offer is achieving the minimum local content target as per of PP-LC Policy.

(Statutory auditor / Chartered Accountant of the bidder)

Note : This undertaking shall be certified by:

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The Proprietor and an independent Chartered Accountant, not being an employee of the firm, in case of a proprietorship firm.

ii. Any one of the partners and an independent Chartered Accountant, not being an employee of the firm, in case of a partnership firm.

iii. Statutory auditors in case of a company. However, where statutory auditors are not mandatory as per laws of the country where bidder is registered, an independent chartered accountant, not being an Employee of the bidder's organization.

#### LIST OF ITEMS / SERVICES TO BE PROCURED FROM INDIAN MANUFACTURERS/SERVICE

The list of items to be procured from Indian manufacturer /services are as follows:

- 1
- 2
- 3
- 4

\*\*\*\*\*

**Subject: Policy to provide Purchase preference (linked with local content) (PP – LC) in all Public Sector Undertakings under Ministry of Petroleum and Natural Gas- Amended**

**1 Preamble**

- 1.1 In tune with Make in India (MII) campaign in oil and gas sector, the Government has decided to incentivise the growth in local content in goods and services while implementing oil and gas projects in India, and
- 1.2 Whereas the Public procurement policy rests upon the core principles of competitiveness, adhering to sound procurement practices and execution of orders for supply of goods or services in accordance with a system which is fair, equitable, transparent, competitive and cost effective, and
- 1.3 Whereas, the local content can be increased through partnerships, cooperation with local companies, establishing production units in India or Joint Ventures (JV) with Indian suppliers, increasing the participation of local employees in services and training them etc.
- 1.4 Whereas incentivising enhanced local content in the procurement of goods and/or services in oil and gas business activities would lead to increased local industry content;
- 1.5 Therefore, the Ministry of Petroleum and Natural Gas (MoPNG) has decided to stipulate the following policy for providing Purchase Preference to the manufacturers/ service providers having the capability of meeting/ exceeding the local content targets in oil and gas business activities;
- 1.6 This policy considers the Local Content (LC) as the added value brought to India through the activities of the oil and gas industry. This may be measured (by project, affiliate, and/or country aggregate) and undertaken through Workforce development and investments in supplier development through developing and procuring supplies and services locally.

**2 Definitions**

- 2.1 **Oil and Gas Business Activity** shall comprise of Upstream, Midstream and Downstream business activities.



- 2.2 **Domestic products** shall be goods and/or service (including design and engineering), produced by companies, investing and producing in India.
- 2.3 **Local Content** hereinafter abbreviated to LC means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.
- 2.4 **Domestic Manufacturer** shall be business entity or individual having business activity established under Indian law and producing products domestically.
- 2.5 **Supplier** of goods and/or provider of service shall be a business entity having capability of providing goods and/or service in accordance with the business line and qualification thereof and classified as under:
- ‘Class-I local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50% as defined under this Policy.
- ‘Class-II local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%, as defined under this Policy.
- ‘Non-local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than or equal to 20%, as defined under this Policy.
- 2.6 **Steering Committee** means the committee to be constituted by MoPNG to provide effective guidance and to oversee the implementation of the Policy on a regular and continuing basis.
- 2.7 **Verification** shall be an activity to verify the accomplishment of LC by domestic manufacturers and/or suppliers of goods and/or providers of service with the data obtained or collected from respective business activities.
- 2.8 **Purchase preference:** Where the quoted price is within the margin of purchase preference of the lowest price, other things being equal, purchase preference may be granted to the bidder concerned, at the lowest valid price bid.

- 2.9 **Local Content (LC)** in Goods shall be the use of raw materials, design and engineering towards manufacturing, fabrication and finishing of work carried out within the country.
- 2.10 **Local Content (LC)** in Services shall be the use of services up to the final delivery by utilizing manpower (including specialist), working appliance (including software) and supporting facilities carried out within in the country.
- 2.11 **Local Content (LC)** in EPC contracts shall be the use of materials, design and engineering comprising of manufacturing, fabrication, assembly and finishing as well as the use of services by utilizing manpower (including specialist), working appliance (including software) and supporting facility up to the final delivery, carried out within the country.
- 2.12 **Factory overhead cost** shall be indirect costs of manpower, machine/working appliance/facility and the whole other fabrication costs needed to produce a unit of product with the cost not chargeable directly to specified product.
- 2.13 **Company overhead cost** shall be costs related to the marketing, administration and general affairs cost of the company.
- 2.14 **Indian Company** means a company formed and registered under the Companies Act, 2013.
- 2.15 **Foreign company** means any company or body corporate incorporated outside India which— (a) has a place of business in India whether by itself or through an agent, physically or through electronic mode; and (b) conducts any business activity in India in any other manner.

### 3. **Scope**

- 3.1 The regulation shall be intended to:
- 3.1.1 Support and boost the growth of domestic manufacturing sector so as to be able to support oil and natural gas business activities and contribute added value to economy, absorb manpower as well as have national, regional and international competitiveness;

- 3.1.2 Support and boost the growth of innovation/technology of domestic manufacturing sector.
- 3.2 This policy shall apply to all the Public Sector Undertakings and their wholly owned subsidiaries under the Ministry of Petroleum and Natural Gas; Joint Ventures that have 51% or more equity by one or more Public Sector Undertakings under the Ministry of Petroleum and Natural Gas; attached and subordinate offices of MoPNG.
- 3.3 This policy shall not include goods/ services falling under Micro Small and Medium Enterprises (MSME) or Domestically Manufactured Electronic Products (DMEP), as those products/ services are already covered under specific policy. However, an option would be given in the tender for the bidder to declare preference for seeking benefit under PP-LC/MSME or DMEP.
- 3.4 The policy is not applicable for HP-HT operations for the time being. The Charter Hiring of offshore vessels shall continue to be governed by DG, Shipping Guidelines. Indian Flag Vessels shall be considered as having 100% LC.
- 3.5 The prescribed local content in the Policy shall be applicable on the date of Notice inviting Tender.

#### **4. Procurement**

- 4.1 The procuring companies shall follow their own procurement procedures. Aggregation of annual requirements and such other procurement practices, which facilitate the implementation of this policy, may be adopted by procuring companies.
- 4.2 In respect of Global Tender Enquiry (GTE) the guidelines as issued by Government of India from time to time shall be applicable on the procuring entities.
- 4.3 **Margin of Purchase preference:** The margin of purchase preference shall be 20%.
- 4.4 (a) In respect of all goods, services or works in respect of which the Nodal Ministry/ Department under DPIIT's Public Procurement (Preference to Make in India) Order, 2017 has communicated that there is sufficient local capacity and local competition, only Class-I local supplier shall be eligible to bid irrespective of purchase value.

- 4.4 (b) For all other local tenders, Class-I local supplier and Class-II local supplier shall be eligible to bid irrespective of purchase value, but preference to be given as per PP-LC to the Class-I local supplier.
- 4.4 (c) Only Class-I local supplier and Class-II local supplier, as defined under the Order, shall be eligible to bid in procurements undertaken by procuring entities, except when Global tender enquiry has been issued. In global tender enquiries, Non-local suppliers shall also be eligible to bid along with Class-I local suppliers and Class-II local suppliers.
- 4.4 (d) Class-II local supplier will not get purchase preference in any procurement, undertaken by procuring entities.
- 4.5 In National Competitive Bid procurements of all items not covered by para 4.4 (a) and where the estimated value to be procured i.e. total value of enquiry/ tender, is less than Rs. 1 Crore shall be exempt from this Policy. In case of International Competitive Bids, the policy shall be applicable irrespective of the tender estimate. However, it shall be ensured by procuring entities that procurement is not split for the purpose of avoiding the provisions of this Policy.
- 4.6 The producers of goods and/or providers of services shall be obliged to fulfil the requirements of quality and delivery time in accordance with the provisions of the respective contracts of goods and services.
- 4.7 If the Ministry is satisfied that Indian suppliers of an item are not allowed to participate and/or compete in procurement by any foreign government, it may, if it deems appropriate, restrict or exclude bidders from that country from eligibility for procurement of that item and/or other items relating to the Ministry.
- 4.8 For the purpose of para 4.7 above, a supplier or bidder shall be considered to be from a country if (i) the entity is incorporated in that country, or (ii) a majority of its shareholding or effective control of the entity is exercised from that country, or (iii) more than 50% of the value of the item being supplied has been added in that country. Indian suppliers shall mean those entities which meet any of these tests with respect to India.

## **5. Purchase Preference- Linked with Local Content (LC)**

- 5.1 In procurement of all items not covered by para 4.4 (a), the following provisions may be considered for LC linked Purchase Preference:

- 5.1.1 The manufacturers/ service providers having the capability of meeting/ exceeding the local content targets shall be eligible for purchase preference under the policy, i.e. LC manufacturers/ LC service providers respectively as described below.
- 5.1.2 Wherever the goods/ services are procured under this policy, eligible (techno-commercially qualified) Class I Local supplier may be granted a purchase preference where the quoted price is within the margin of purchase preference of the lowest price, other things being equal, purchase preference may be granted to the eligible (techno-commercially qualified) Class I Local supplier concerned, at the lowest valid price bid.
- 5.1.3 **Goods:** The tender for procuring goods would specify that the contract for 50% of the procured quantity would be awarded to the lowest techno-commercially qualified Class I Local supplier, subject to matching with L1, if such bidders are available. The remaining will be awarded to L1.
- 5.1.3.1 However, if L1 bidder happens to be a Class I Local supplier, the entire procurement value shall be awarded to such bidder;
- 5.1.3.2 If in the opinion of the procuring company, the tenders (procured quantity) cannot be divided in the prescribed ratio of 50:50, then they shall have the right to award contract to the eligible Class I Local supplier for quantity not less than 50%, as may be divisible.
- 5.1.3.3 In continuation to 5.1.3.2 above, if the tendered item is non divisible, (to be included in the tender document by procuring company) the contract can be awarded to the eligible Class I Local supplier for the entire quantity.
- 5.1.4 **Services/ EPC Contracts:** The tender for oil and gas services/ EPC contracts shall not normally be split. For such procurement the tender would specify that the entire contract would be awarded to the lowest techno-commercially qualified Class I Local supplier, subject to matching with L1, if such bidders are available. However, tender for certain oil & gas services can normally be split, in such cases, splitting shall be allowed and specified in tender document. Such services shall follow the procedure outlined for goods as described in para 5.1.3. The procuring company should clearly specify in the tender document whether the tender shall be split or not.

5.1.5 For para 5.1.3 and 5.1.4 above, only those LC manufacturers/ service providers whose bids are within the margin of purchase preference would be allowed an opportunity to match L1 bid.

5.1.6 The tender conditions would ensure that local content in oil & gas products is encouraged. However, the procuring company may incorporate such stipulations as may be considered necessary to satisfy themselves of the production capability and product quality of the manufacturer.

5.1.7 The procedure for award under the policy is at **Enclosure-I**.

## **6. Determination of LC**

### **6.1 LC of goods**

6.1.1 LC of goods shall be computed on the basis of the cost of domestic components in goods, compared to the whole cost of product.

6.1.2 The criteria for determination of the local content cost in the goods shall be as follows:

- a) in the case of direct component (material), based on country of origin;
- b) in the case of manpower, based on INR component.

6.1.3 The calculation of LC of the combination of several kinds of goods shall be based on the ratio of the sum of the multiplication of LC of each of the goods with the acquisition price of each goods to the acquisition price of the combination of goods.

### **6.2 LC of service**

6.2.1 LC of Service shall be calculated on the basis of the ratio of service cost of domestic component in service to the total cost of service.

6.2.2 The total cost of service shall be constituted of the cost spent for rendering of service, covering:

- a) cost of component (material) which is used;
- b) manpower and consultant cost; cost of working equipment/ facility; and
- c) general service cost.



6.2.3 The criteria for determination of cost of local content in the service shall be as follows:

- a) in the case of material being used to help the provision of service, based on country of origin;
- b) in the case of manpower and consultant based on INR component of the services contract;
- c) in the case of working equipment/facility, based on country of origin; and
- d) in the case of general service cost, based on the criteria as mentioned in clauses a, b, and c above.
- e) Indian flag vessels in operation as on date.

### **6.3 LC of the EPC Contracts:**

6.3.1 LC of EPC contracts shall be the ratio of the whole cost of domestic components in the combination of goods and services to the whole combined cost of goods and services.

6.3.2 The whole combined cost of goods and services shall be the cost spent to produce the combination of goods and services, which is incurred on work site. LC of the combination of goods and services shall be counted in every activity of the combination work of goods and services.

6.3.3 The spent cost as mentioned in paragraph 6.3.2 shall include production cost in the calculation of LC of goods as mentioned in clause 6.1.1 and service cost in the calculation of LC of services as mentioned in clause 6.2.2.

### **6.4 Calculation of LC and Reporting**

LC shall be calculated on the basis of verifiable data. In the case of data used in the calculation of LC being not verifiable, the value of LC of the said component shall be treated as nil.

## **7 Certification and Verification**

7.1 Class I/Class II Local suppliers are eligible to bid only if they meet the local content norms, therefore whether or not they want to avail PP-LC benefit, it will still be mandatory for them to give adequate documentation as follows to establish their status as class-I or class-II local supplier:

7.1.2 At bidding stage:

- a) Price Break-up:
  - The bidder shall provide the percentage of local content in the bid.

b)

- The bidder shall submit an undertaking from the authorised signatory of bidder having the power of Attorney alongwith the bid stating the bidder meets the mandatory minimum LC requirement and such undertaking shall become a part of the contract.
- In cases of procurement for a value in excess of Rs 10 crores, the undertaking submitted by the bidder shall be supported by a certificate from the statutory auditor or cost auditor of the company (in case of companies) or from a practicing cost accountant or practising chartered accountant (in respect of other than companies) giving the percentage of local content.
- However, in case of foreign bidder, certificate from the statutory auditor or cost auditor of their own office or subsidiary in India giving the percentage of local content is also acceptable. In case office or subsidiary in India does not exist or Indian office/ subsidiary is not required to appoint statutory auditor or cost auditor, certificate from practising cost accountant or practising chartered accountant giving the percentage of local content is also acceptable.

#### 7.1.3 After Contract Award:

- The bidder shall submit an undertaking from the authorised signatory of bidder having the power of Attorney alongwith the bid stating the bidder meets the mandatory minimum LC requirement and such undertaking shall become a part of the contract.
- In cases of procurement for a value in excess of Rs 10 crores, the undertaking submitted by the bidder shall be supported by a certificate from the statutory auditor or cost auditor of the company (in case of companies) or from a practicing cost accountant or practising chartered accountant (in respect of other than companies) giving the percentage of local content.
- However, in case of foreign bidder, certificate from the statutory auditor or cost auditor of their own office or subsidiary in India giving the percentage of local content is also acceptable. In case office or subsidiary in India does not exist or Indian office/ subsidiary is not required to appoint statutory auditor or cost auditor, certificate from practising cost accountant or practising chartered accountant giving the percentage of local content is also acceptable.



- 7.2 Each supplier shall provide the necessary local-content documentation to the statutory auditor, which shall review and determine that local content requirements have been met, and issue a local content certificate to that effect on behalf of procuring company, stating the percentage of local content in the good or service measured. The Auditor shall keep all necessary information obtained from suppliers for measurement of Local Content confidential.
- 7.3 The Local Content certificate shall be submitted along with each invoice raised. However, the % of local content may vary with each invoice while maintaining the overall % of local content for the total work/purchase of the pro-rata local content requirement. In case, it is not satisfied cumulatively in the invoices raised up to that stage, the supplier shall indicate how the local content requirement would be met in the subsequent stages.
- 7.4 As regards cases where currency quoted by the bidder is other than Indian Rupee, exchange rate prevailing on the date of notice inviting tender (NIT) shall be considered for the calculation of Local Content.
- 7.5 The Procuring Company shall also have the authority to audit as well as witness production processes to certify the achievement of the requisite local content.

## **8 Governance and Supervision**

- 8.1 A Steering Committee will be constituted by MoPNG to provide effective guidance and to oversee the effective implementation of the Policy including review and amendments required therein. The Steering Committee may consider representations on target Local Content in goods, services and EPC and modify the policy accordingly.
- 8.2 The Steering Committee shall annually conduct a review of the policy implementation which shall specifically cover the issue of whether there has been adequate competition, and whether the policy has resulted in any reduction in competition/ exclusion of non-local bidders or any cost increase to the purchasing PSU, particularly in respect of services & works contracts.

## **9 Sanctions**

- 9.1 The Procuring companies shall impose sanction on manufacturers/ service providers not fulfilling LC of goods/ services in accordance with the value mentioned in certificate of LC.

- 9.2 The sanctions may be in the form of written warning, financial penalty and blacklisting.
- 9.3 In the event that a manufacturer or supplier of goods and/or provider of services does not fulfil his obligation after the expiration of the period specified in such warning, the procuring company can initiate action for blacklisting such manufacturer/supplier/service provider.
- 9.4 A manufacturer and/or supplier of goods and/or provider of services who has been awarded the contract after availing Purchase Preference is found to have violated the LC provision, in the execution of the procurement contract of goods and/or services shall be subject to financial penalty specified in clause 9.4.1.
- 9.4.1 The financial penalty shall be over and above the PBG value prescribed in the contract and shall not be more than an amount equal to 10% of the Contract Price.
10. **Clarification on Goods/ Services:** Any issue regarding the coverage of a particular good/ service under the proposed policy would be referred to the Steering Committee for clarification.
11. **Powers to grant exemption and to reduce minimum local content:** Wherever proper justification exists, Ministry of Petroleum and Natural Gas may by written order, for reasons to be recorded in writing,  
a) Reduce the minimum local content below the prescribed level; or  
b) Reduce the margin of purchase preference below 20%; or  
c) Exempt any particular item or supplying entities from the operation of this Order or any part of the Order.
12. **Time Period:** The Policy shall be applicable for 5 years. Except for 2017-18, the Policy shall not be continued unless, the Steering Committee by September 30th of each year, concludes a review as per para 8.2 of the Policy and recommends continuation of the Purchase Preference.

## **PROCEDURE FOR AWARD OF CONTRACTS**



### **Procedure for award of contracts under this policy shall be as follows:**

1.1. In procurement of all items which are divisible in nature, the 'Class I local supplier' shall get purchase preference over 'Class II local supplier' as well as 'Non Local Supplier' as per following procedure:

- i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class I local supplier', the contract for full quantity will be awarded to L1.
- ii. If L1 bid is not a 'Class I local supplier', 50% of the order quantity shall be awarded to L1. Thereafter, lowest bidder among the 'Class I Local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class I local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such 'Class I local supplier' subject to matching the L1 price. In case such lowest eligible 'Class I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class I local suppliers, then such balance quantity may also be ordered on the L1 bidder.



1.2. In the procurement of all items which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract will be awarded to L1.
- ii. If L1 is not 'Class-I local supplier', the lowest bidder among the 'Class-I local supplier', will be invited to match the L1 price subject to Class-I local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price.
- iii. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local supplier' within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.

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### 39.0 Special Tender Clause on Procurement from a Bidder from a country which shares Land Border with India

- I. The Department of Expenditure ( Ministry of Finance) of the Govt. Of India through OM's no. 6/18/2019-PPD dated 23rd July and 24th July'2020 has issued guidelines regarding procurement from bidders from a country or countries which share land boundary with India. The detail guidelines are available on the website of DoE (<https://doe.gov.in/>).
- II. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority specified in Annexure I of the DoE OM dated 23.07.2020 (attached for reference). The Competent authority for the purpose of registration shall be the Registration Committee constituted by the Department of Promotion of industry & internal Trade (DPIIT) of Govt. of India.
- III. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
- IV. "Bidder from a country which shares a land border with India" for the purpose of this Order means:-
  - a) An entity incorporated, established or registered in such a country; or
  - b) A subsidiary of an entity incorporated, established or registered in such a country; or
  - c) An entity substantially controlled through entities incorporated, established or registered in such a country; or
  - d) An entity whose beneficial owner is situated in such a country; or
  - e) An Indian (or other) agent of such an entity; or
  - f) A natural person who is a citizen of such a country; or
  - g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

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V. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

**Explanation-**

- a) "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company,
- b) "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or votings agreements.



2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

VI. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

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VII. In tenders for Works Contracts, including Turnkey contracts - The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

VIII. Bidder mandatorily requires to submit "Certificate of Compliance" in the enclosed Form : A. This certificate need to be submitted in the Company's Letter Head and should be sealed and signed by the authorized signatory on behalf of the bidder. None submission of Form A may lead to disqualification for Techno- Commercial evaluation of the submitted bid. (Refer Form B in case of Works Contract).

In case at any stage pre or post order placement it is found that that the certification furnished is false their bid shall be summarily rejected or order terminated as applicable. MRPL may at its discretion initiate penal action against such bidders which may include Black Listing Holiday Listing the party /encashment of EMD or PBG submitted as per contractual provision etc.



IX. Compulsory submission of Valid Registration Certificate from Competent Authority is required as and when a party claims to have registered themselves with the Competent Authority or else bid shall be rejected without evaluation.

X. Wherever Tenders are floated Registration with Competent Authority should be valid at the time of submission of Bid and at the time of acceptance and evaluation of bids / LOA or Order Placement. In case where tender is not floated registration should be valid at the time of placement of Order. A Bidder who is validly registered at the time of acceptance / placement of order in such cases valid registration will not be a relevant consideration during contract execution.

**Note I:** For better clarity and to obtain information in detail bidders are requested to go thru the Govt Circular issued by the Department of Expenditure Govt of India to this effect.

**Note II:** For information on Exclusion from restriction under Rule 144 (xi) of the GFR, 2017 and Special Cases for exemption under the purview of this policy, bidders are requested to refer to the Govt Circular & Annexures therein accordingly.

**Special Note:** It is the responsibility of the Bidders to keep themselves updated over any revisions or changes in conditions mentioned in this circular. For all practical purpose the latest applicable circular will be considered for this tender as published by the Govt time to time.

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## FORM A

### BIDDER's UNDERTAKING (On Company's Letter Head)

To,  
Mangalore Refinery & Petrochemicals Limited  
Mangaluru, Karnataka.

Sub: Certificate of Compliance

Bidder's Details :

Name of the Tender : \_\_\_\_\_

Tender No : \_\_\_\_\_

We/ I have read carefully the clause regarding restrictions on procurement from a bidder of a country which shares land boundary with India attached with this Tender Document and hereby certify that M/s. \_\_\_\_\_ (Name of the Company/ Bidder) is :-

A. Not from such a country and is eligible to be considered for evaluation : YES / NO (\*)

B. (i) If from such a country but is registered with the Competent Authority : YES/NO (\*)

B. (ii) If from such a country valid Registration Certificate from Competent Authority is submitted with the bid : YES / NO (\*)

I as the authorized signatory on behalf of the bidder certify that the company fulfils all the criteria stipulated in the Govt OM and is eligible to be considered for this tender.



(\*) : Tick Yes / No whichever is applicable.

Place : Signature :

Date : Name :

Designation :

Seal of the Company :

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**FORM B**

**BIDDER's UNDERTAKING IN CASE OF WORKS CONTRACT**

(On Company's Letter Head)

To,  
Mangalore Refinery & Petrochemicals Limited  
Mangaluru, Karnataka.

Sub: Certificate of Compliance

Bidder's Details:

Name of the Tender : \_\_\_\_\_

Tender No : \_\_\_\_\_

We / I have read carefully the clause regarding restrictions on procurement from a bidder of a country which shares land boundary with India attached with this Tender Document and on sub-contracting to contractors from such countries and hereby certify that M/s. \_\_\_\_\_ (Name of the Company/ Bidder) is :-

B. Not from such a country and is eligible to be considered for evaluation : YES / NO (\*)

B. (i) If from such a country but is registered with the Competent Authority : YES/NO (\*)

B. (ii) If from such a country valid Registration Certificate from Competent Authority is submitted with the bid : YES / NO (\*)



M/s. \_\_\_\_\_ (Name of the Company) certify that we will not sub-contract any work to a party/ contractor from such countries unless they are registered with the Competent Authority.

I as the authorized signatory on behalf of the bidder certify that the company fulfils all the criteria stipulated in the Govt OM and is eligible to be considered for this tender.

(\*) : Tick Yes / No whichever is applicable.

Place : \_\_\_\_\_ Signature : \_\_\_\_\_  
Date : \_\_\_\_\_ Name : \_\_\_\_\_  
Designation : \_\_\_\_\_  
Seal of the Company : \_\_\_\_\_



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**FORM C**

**BIDDER's UNDERTAKING (For Transitional Cases)**

(On Company's Letter Head)

To,  
Mangalore Refinery & Petrochemicals Limited  
Mangaluru, Karnataka.

Sub: Certificate of Compliance

Bidder's Details:



Name of the Tender : \_\_\_\_\_

Tender No : \_\_\_\_\_

We/I have read carefully the clause regarding restriction on procurement from a bidder of a country which shares land boundary with India attached with this tender document and hereby certify that M/s. \_\_\_\_\_ (Name of the Company) is not from such a country and is eligible to be considered.



We/I do solemnly resolve to submit valid registration certificate from Competent Authority as applicable in case any such requirement arises for evaluation and acceptance of bid purpose.

Place :	Signature :
Date :	Name :
	Designation :
	Seal of the Company :

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#### 40.0 DEFINITIONS

- 40.1 For the purpose of the Contract, unless otherwise specified or repugnant to the subject or context, the following terms shall be deemed to have the following meanings. These are in addition to the defined words appearing in General Conditions of Contract (GCC) and wherever there are contradictions, the definitions appearing in the SCC shall take precedence.
- 40.2 "CONTRACTOR"/ "VENDOR" "means any person, Vendor, company, firm or body who may be engaged by OWNER for works and services connected with construction, installation, erection and commissioning of the facilities for the Project with supply of equipment/material.
- 40.3 "Consultant"/ "PMC" means service provider for Consultancy / PMC services for this Project. MRPL has appointed **thyssenkrupp Industrial Solutions (India) Pvt. Ltd (tkIS India)**, as Project Management Consultant (PMC), herein after referred as "PMC", who shall be responsible for Overall Project Management of the Project.
- 40.4 OWNER /MRPL/Client means **Mangalore Refinery & Petrochemicals Limited. Mangaluru**
- 40.5 "Engineer – In –charge" means PMC /CONSULTANT of the project.
- 40.6 "Project" means **LSTK PACKAGE FOR PFCC UNIT FLUE GAS WET GAS SCRUBBER AT MRPL. MANGALURU - Tender No 3200000481.**
- 40.7 "SITB" means Special Instructions to Bidders
- 40.8 "EMD" means Earnest Money Deposit.
- 40.9 "GCC" means General Conditions of Contract.
- 40.10 "SCC" means Special Conditions of Contract.5
- 40.11 "SOP/ SOR" means Schedule of Prices/ Schedule of Rates..
- 40.12 "Bidder/ Tenderer" means any person, Vendor, company, firm or body who are issued the Bidding Document by OWNER for submission of bid.
- 40.13 "Bidding Document/ Tender Document" means document to be issued to Bidder based on which Bid is to be submitted.
- 40.14 "Bid/ Offer" means the documents/proposal submitted by Bidder.
- 40.15 "CD" means Compact Disc.

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## TIME SCHEDULE



**[ANNEXURE- I TO SPECIAL CONDITIONS OF CONTRACT]**

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### TIME SCHEDULE

TABLE A		
Sl. No.	DESCRIPTION OF WORK	TIME OF COMPLETION
1	LSTK PACKAGE FOR PFCC UNIT FLUE GAS WET GAS SCRUBBER AT MRPL. MANGALURU, as per Tender No. 3200000481	<u>Mechanical Completion: -</u> Before <b>30.04.2023</b> from the date of Issue of Letter Of Acceptance (LOA) for MECHANICAL COMPLETION of WET GAS SCRUBBER FOR PFCC UNIT.  <u>Commissioning: -</u> Within 2 months from the date of Mechanical Completion).  <u>PGTR and Close Out: -</u> Within 5 months from the date of Mechanical Completion.



(STAMP & SIGNATURE OF BIDDER)

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### TIME SCHEDULE



#### (CONTRACTOR DELIVERABLES TIMELINE TENTATIVE DETAILED BREAK-UP)

Sr. No.	Activity	Time of Completion
1	EPC Kick-Off Meeting (KOM)	Within 15 days from the date of LOA Placement to LSTK CONTRACTOR
2	Geotechnical Investigation and Topographic Survey	Within 1 Month from the date of LOA Placement to LSTK Contractor
3	Start of Detail Engineering	Within 1.5 Month from the date of LOA Placement to LSTK Contractor
4	Site mobilization & start of enabling work	Within 3 Month from the date of LOA Placement to LSTK Contractor
5	Start of construction	Within 4 Months from the date of LOA Placement to LSTK Contractor
6	30% Model Review & release of 1st MTO	Within 5.5 Months from the date of LOA Placement to LSTK Contractor
7	60% Model Review & release of 2nd MTO	Within 7.5 Months from the date of LOA Placement to LSTK Contractor
8	90% Model Review & release of 3rd MTO	Within 10 Months from the date of LOA Placement to LSTK Contractor
9	95% Engineering completion (Isometrics Issue Completion)	Within 15 Months from the date of LOA Placement to LSTK Contractor
10	Material supply completion (All Tagged Equipment)	Within 20.5 Months from the date of LOA Placement to LSTK Contractor
11	Mechanical Completion (incl. Pre-Commissioning)	Within 30.04.2023
12	Commissioning	Within 2 Months from Mechanical completion
13	Dismantling of Existing Old Stack	Within 1 Month after Commissioning
14	Performance Guarantee Test Runs (PGTR) & Close-out	Within 5 Months from Mechanical Completion
<b>Note:</b> Bidder shall submit resource mobilization (man-power & machinery) plan for EPC Phase along with BID.		

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## TERMS OF PAYMENT

**[ANNEXURE- II TO SPECIAL CONDITIONS OF CONTRACT]**

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## PAYMENT TERMS



### 1.0 MOBILISATION ADVANCE

MRPL do not entertain Advance payment. In case, Mobilisation advance is insisted by successful bidder, the same shall be decided on need basis only. The advance payment is recoverable proportionately from the progressive bills duly certified by the Engineer-in charge. Full advance will be recovered against payments due on Final Completion / Commissioning & PGTR of WET GAS SCRUBBER FOR PFCC UNIT / completion of supply as applicable. Such recovery shall be time based, but not essentially linked with progress of work. Interest free advance payment is not allowed for any cases.

CONTRACTOR, if requested, shall be paid recoverable interest bearing Mobilization Advance up to a maximum of 10% (Ten Percent) of awarded Contract Value. The mobilization advance will attract an interest @ SBI lending rate prevailing at the time of release of payment plus 2%.

Interest bearing Mobilization advance payment shall be released in 2 or more instalments / Stages as mutually agreed, based on progress of the work / Mobilization, in the following manner:

- 1.1. **First Instalment:** 5% (Five percent) of awarded Contract value shall be payable as the first instalment of mobilization advance after fulfilling the following formalities by the Contractor:
  1. Signing of contract agreement by the Contractor.
  2. Submission of a separate bank guarantee towards Contract Performance from an Indian Nationalised / Scheduled Bank / Indian branch of International Bank in approved proforma towards due performance of contract.
  3. Submission of a separate Bank Guarantee from an Indian Nationalised / Scheduled Bank / Indian branch of International Bank as stipulated in approved proforma equivalent to 10% of 110% of the awarded contract value covering mobilization advance which shall be kept valid till completion of work. However, contractor may submit Bank Guarantee of 10% as above in two stages of 5% each for availing advance against sub-clauses 1.1 & 1.2.
- 1.2. **Second Instalment:** The next / subsequent instalment of such advance shall be released only after submission of utilization certificate for the previous advance instalment paid and satisfy the PMC/OWNER/ Engineer-in-charge in this regard. However, release of 2nd Instalment will at the discretion of EIC / PMC/OWNER.

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- 1.3. Part BG's based on advance instalments are also allowed.
- 1.4. The advance payment is recoverable proportionately from the progressive bills duly certified by the Engineer-in-charge. Full advance will be recovered against payments due on Commissioning of the WSS Unit completion of supply as applicable. Such recovery shall be time based, but not essentially linked with progress of work
- 1.5. Interest free advance payment is not allowed for any cases.

## 2.0 SECURED ADVANCE ON MATERIALS

**Secured advance on materials is not applicable.**

## 3.0 ON ACCOUNT PAYMENTS



Progressive payments shall be released to Contractor against running account bills as per the approved billing schedule duly certified by Engineer-in-charge after affecting the necessary deductions/recovery, if any within 15 days of receipt of duly certified invoice forwarded by PMC.

### 3.1 TERMS OF PAYMENT

#### 3.1.1 Payment terms for Supply portion:

- I. **10 %** of total Supply value as quoted in SP-2 shall be paid progressively on placement of PO/Sub-Orders and submission of equivalent amount of Bank Guarantee valid till completion period plus three months claim period. However, the bank guarantee shall be released after receipt and acceptance of material at SITE.
- II. **60%** of total Supply value as quoted in SP-2 shall be paid progressively on pro rata basis against receipt and acceptance of materials at site.
- III. **15%** of total Supply value as quoted in SP-2 shall be paid progressively on pro rata basis against erection / installation, alignment and grouting as required including testing wherever involved and required as certified by PMC/OWNER.
- IV. **5 %** of total Supply value as quoted in SP-2 shall be paid on pro rata basis against issue of Mechanical Completion certificate.
- V. **2 %** of total Supply value as quoted in SP-2 shall be paid on pro rata basis against issue of commissioning certificate.



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- VI. **3%** of total Supply value as quoted in SP-2 shall be paid on completion of PGTR test.
- VII. **5%** of total Supply value as quoted in SP-2 shall be paid on completion of all activities and on submission of as built drawings/final documents to MRPL.

**Note :** Supply value shall be as per Supply price Breakup of Total lumpsum Price as quoted in price bid FORM SP-2.



### 3.1.2 Payment terms for Site services:

- I. **85 %** of total Site charges as per SP-3 value shall be paid on pro rata basis every month on physical progress of work certified by PMC/OWNER in accordance with the break-up of prices as per the approved billing schedule.
- II. **5 %** of total Supply value as quoted in SP-3 shall be paid on pro rata basis against issue of Mechanical Completion certificate.
- III. **2 %** of total **Supply** value as quoted in SP-3 shall be paid on pro rata basis against issue of commissioning certificate.
- IV. **3%** of total Supply value as quoted in SP-3 shall be paid on completion of PGTR test.
- V. **5%** of **total** Supply value as quoted in SP-3 shall be paid on completion of all activities and on submission of as built drawings/final documents to MRPL.

**Note:** Site charges value shall be as per Site charges Breakup of Total lump sum Price as quoted in price bid FORM SP -3.

### 3.1.3 PAYMENT AGAINST DESIGN & ENGINEERING SERVICES

- (i) 30% (thirty percent) on pro-rata basis on approval of Engineering Drawings in Code-2 and P & IDs in Code-2 and completion of First 3D Model review-30%.
- (ii) 30% (thirty percent) on pro-rata basis on approval of Engineering Drawings in Code-1 and P & IDs in Code-1 and completion of Second 3D Model review-60%.
- (iii) 10% (ten percent) on pro-rata basis on completion of Third 3D Model review-90%.
- (iv) 15% (ten percent) on submission of the followings on pro-rata basis:
  - a. All Certificates and documents pertaining to the equipments;
  - b. Operating and Instructions Manuals with respect to the UNIT;

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c. Finalized 3-D model.

- (v) 5% (five percent) on submission of as built Drawings along with Electronic files for all documents as per MRPL/tkIS Documentation Procedure.
- (vi) 5% (five percent) on successful Mechanical Completion of the UNIT.
- (vii) 2% five percent) on issue of Commissioning Certificate against the CONTRACTOR's certified Running Account Bill(s).
- (viii) 3% (five percent) on completion PGTR and Completion of all jobs in all respect and approval of all Final Documentation and issue of Completion Certificate.

**Note:** Design and Engineering Value shall be as per Design & Engineering Breakup of Total lump sum Price as quoted in price bid FORM SP -1

### **3.1.3 Payment terms for The Recommended Spares for the Two Years Operation & Maintenance:**

Payment terms for the Recommended Spares for the Two Years Operation & Maintenance shall be decided at the time of Ordering. Breakup of Price shall be as quoted in price bid FORM SP-07.

## **3.2 PENALTIES**



Payments are subject to deductions towards the Penalties as per various penalties mentioned elsewhere in the tender.

## **3.3 SUBMISSION OF INVOICES**



The contractor on completion of milestone activity as explained above shall submit invoice in triplicate to CONSULTANT along with proof of completion for claim of payment against completion of milestone activity or part thereof. CONSULTANT after scrutinizing the same shall recommend to MRPL for release of payment against the same. The contractor shall also submit payment status schedule updated along with the invoices.

### **NOTE:**

1. The above payment terms commensurate with the work executed.
2. The above progress payments are subject to deductions towards income tax and other deductions as applicable as per terms of the Contract.
3. Withholding Tax at the prevailing rate shall be deducted as per the Indian Income Tax Act. TDS certificate shall be issued by the PMC/OWNER.

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4. Unless otherwise specified, 100% Payment will be made for the actual work done / supply of materials/Job/services performed and bills duly certified by Engineer In-charge / PMC (subject to submission of SD/PBG, if applicable). Such payment will be made within 15 days of receipt of duly certified invoice forwarded by PMC.
5. Retention money, if specified, will be withheld before releasing all payments i.e either monthly or progressive/ stage-wise payments.
6. Bills can be submitted after completion of work on monthly basis against progressive work completion/as per milestones specified as per Tender and Approved Billing Schedule.
7. All payments shall be through electronic mode (RTGS/NEFT). Therefore, vendors are requested to furnish the information as per attached format on issue of order to successful bidder. Any change in the particulars shall be immediately informed to MRPL.
8. Completion certificate is the certificate issued after attending the defects prior to taking over as specified in the General Conditions of Contract. In case separate nomenclature is provided for Completion certificate in GCC for various clients, the same shall be replaced by that certificate accordingly.
9. Wherever milestone payment has been recommended on receipt and acceptance of material, the same shall be released against "Incoming Material Inspection Report". Engineer-in-charge shall release the progressive payment towards supply in such a way ensuring that the total quantity against which the payment is released towards supply shall not exceed the final installed quantity of the item.
10. The above mile stone or progress payments are subject to submission of **CPBG/Security deposit to MRPL and Signing of contract agreement.**

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## FORMAT FOR



### SUB-CONTRACTOR'S APPROVAL

**[ANNEXURE– III TO SPECIAL CONDITIONS OF CONTRACT]**

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**(APPROVAL OF SUB-CONTRACTOR)**

- 1) NAME OF MAIN CONTRACTOR : \_\_\_\_\_
- 2) NAME OF WORK, LOCATION : \_\_\_\_\_
- 3) NAME OF PROPOSED SUB-CONTRACTOR : \_\_\_\_\_
- 4) SCOPE OF WORK PROPOSED TO BE SUB-CONTRACTED (BRIEF): \_\_\_\_\_
- 5) ESTIMATED VALUE OF THE PROPOSED WORK TO BE SUB-CONTRACTED (INR): \_\_\_\_\_
- 6) QUALIFYING CRITERIA FOR SUB-CONTRACTOR:
  - i) Similar Work experience: Sub-Contractor shall have experience of having carried out and completed similar work during the last 10 years ending last day of the month previous to the one in which applications are invited, should be either of the following:
    - 1 (one) similar completed work costing not less than the amount equal to 80% of estimated Value of proposed work to be sub-contracted:
    - Or
    - 2 (two) similar completed work(s) each costing not less than the amount equal to 50% of estimated value of proposed work to be sub-contracted:
    - Or
    - 3 (three) similar completed work(s) each costing not less than the amount equal to 40% of estimated value of proposed work to be sub-contracted:
  - ii) Annual Turnover: The average annual Financial Turnover during the last 3 years ending 31st March of the previous financial year should be at least 30% of the estimated cost.
  - iii) Net worth: The Net worth of the Sub-Contractor as per the immediate preceding year's audited financial results should be positive.
  - iv) Working Capital: Sub-Contractor should have minimum working capital equal to 10% of the annualized estimated cost of works as per the immediate preceding year's Audited financial results. In case Sub-Contractor is unable to meet the working capital requirement as above, the Sub-Contractor can supplement the working capital with a fund based line of credit from any scheduled bank in India or a commercial bank having Net worth more than equivalent INR 1000 Million. In such a case, Sub-Contractor shall furnish a declaration from the bank for availability of unutilized fund based line of credit for the shortfall in working capital below 10% of the estimated annualized value of work, in the format enclosed in the Tender Document.
- 7) EXPERIENCE AND FINANCIAL DETAILS OF PROPOSED SUB-CONTRACTOR:

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i) Contract Value of similar work executed (as evidenced by work Order & Completion Certificate): During the last 10 years ending last day of the month previous to the one in which applications are invited:

\_\_\_\_\_

ii) Average annual Financial Turnover during the last 3 years ending 31st March of the previous financial year (as evidenced by Balance Sheets) : \_\_\_\_\_

iii) Net worth of the Sub-Contractor as per the immediate preceding years audited financial results:

\_\_\_\_\_.

iv) Working Capital of the Sub-Contractor as per the immediate preceding year's Audited financial results:

\_\_\_\_\_

#### 8) CRITERIA FOR QUALIFICATION OF SUB-CONTRACTOR:

i) Sl.No. 7(i) > 6 (i) : YES / NO

ii) Sl.No. 7 (ii) > 6 (ii) YES / NO

iii) Sl.No. 7 (iii) > 6 (iii) YES / NO



iv) Sl.No. 7 (iv) > 6 (iv) YES / NO

9) Based on above information, we M/s\_\_\_\_\_ (Name of Main Contractor) propose M/s.\_\_\_\_\_ (Name of proposed subcontractor) as our sub-contractor for the above mentioned works. We understand that notwithstanding above approval, we shall remain fully responsible for the performance of the said sub-contractor and any failure of the sub-contractor shall not absolve/relieve us of our responsibility to complete the works as per the terms and conditions of the Contract.

**NOTE:** Bidders to fill all the details in the above proforma. Further Bidder shall also fill-in the Details at Sl.No.5 above based on the estimated value of the proposed work to be subcontracted.

**(STAMP & SIGNATURE OF CONTRACTOR)**



#### 10) QUALIFICATION STATUS (TO BE STAMPED BY):

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## QUALIFICATION & EXPERIENCE REQUIREMENT OF

### KEY CONSTRUCTION PERSONNEL

#### [ANNEXURE- IV TO SPECIAL CONDITIONS OF CONTRACT]



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### 1. QUALIFICATION & EXPERIENCE (POST QUALIFICATION)

CATEGORY	QUALIFICATION & EXPERIENCE (POST QUALIFICATION) REQUIRED			
Resident Construction Manager/ Resident Engineer/Site-In-Charge	Degree or Diploma in Engineering with minimum following relevant experience in construction:			
	Contract value (Rs) →	< 5 Cr. works	5-20 Cr. works	> 20 Cr. works
	Degree holders	5 yrs	8 yrs	10 yrs
	Diploma holders	8 yrs	10 yrs	12 yrs
Lead Discipline Engineer (Mechanical, Civil, Electrical, Instrumentation)	Degree or Diploma in relevant Engineering discipline with following minimum experience in Construction:			
	Contract value (Rs)→	≤20 Cr. works	> 20 Cr. works	
	Degree holders	4 yrs	8 yrs	
	Diploma holders	6 yrs	10 yrs	
Lead Welding/ NDT Engineer	Degree or Diploma in Mechanical Engineering/ Metallurgy with the following experience in Welding & NDT (Non Destructive Testing) and possessing valid Level-II certificate in the relevant NDT methodology (RT/UT)			
	Contract value (Rs)→	≤20 Cr. works	> 20 Cr. works	
	Degree holders	4 yrs	8 yrs	
	Diploma holders	6 yrs	10 yrs	
Lead QA/QC Engineer	Degree in Engineering with following experience (refer Note 1 also):			
	Contract value (Rs)→	≤20 Cr. works	> 20 Cr. works	
	Experience	5 yrs of construction Experience of which 2 years in QA/QC	10 yrs of construction Experience of which 3 years In QA/QC.	
Lead Planning Engineer	Degree in Engineering with following experience in Planning & Scheduling:			
	Contract value (Rs)→	≤20 Cr. works	> 20 Cr. works	
	Experience	4 yrs	6 yrs	





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Safety Officer/ Supervisor	As per specification for HSE Management at construction sites enclosed elsewhere in the bid.		
Warehouse- In- Charge/ Materials Manager	Diploma in Engineering or Diploma in Materials Management or Graduate in any stream with min. following experience in Warehousing/ Stores Management:		
	Contract value (Rs)→	≤20 Cr. works	> 20 Cr. works
	Experience	4 yrs	6 yrs
Quantity Surveyor	Degree or Diploma in Engineering with minimum following experience in quantity estimation, field measurement , rate analysis, bill preparation etc. in Construction field:		
	Contract value (Rs)→	≤20 Cr. works	> 20 Cr. works
	Degree holders	2 yrs	4 yrs
	Diploma holders	4 yrs	8 yrs
Discipline Engineer (Including welding/ NDT, QA/QC and Planning)	Degree in relevant Engineering Discipline with minimum 2 years of relevant experience in construction or Diploma in relevant Engineering Discipline with minimum 4 years of relevant experience in Construction. Welding /NDT engineer shall possess valid Level-II certificate in the relevant NDT methodology (RT/UT)		



**Notes: (for Table on previous page)**

1. For Mechanical, Composite, EPC or EPCC Contracts of value more than Rupees 20 crores, the Lead QA/QC Engineer shall be a qualified internal auditor for ISO 9001.
2. CVs of key construction personnel proposed to be deployed shall be submitted to PMC/OWNER/Engineer-in-Charge prior to their mobilization at site. The mobilization of key personnel shall be done at site subject to prior approval of their CVs by PMC/OWNER/Engineer-in- Charge.

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## MRPL CONTRACT WORKERS SAFETY POLICY



### ANNEXURE–V TO SPECIAL CONDITIONS OF CONTRACT

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## CONTRACT WORKER'S SAFETY POLICY

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### **CONTRACT WORKER'S SAFETY POLICY**

#### **1. SCOPE:**



This policy is applicable to all the contractors and their employees working in MRPL. This is also applicable to sub-contractors, suppliers, vendors and visitors. All the contractors are required to ensure that they and their employees comply with relevant safety requirements as mentioned in this Safety Policy depending on the nature of work. This policy is not a substitute to the statutory rules and regulations and also the prevailing MRPL Safety Requirements. This is to further reinforce the existing Safety Standards in Refinery.

#### **2. REFERENCE :** This document should be read in conjunction with following :

- General Conditions of contract (GCC)
- Special Conditions of Contract (SCC)
- Job specifications

#### **3. SAFETY REQUIREMENTS FOR CONTRACTORS:**

- Contractor shall furnish Safety policy and Safety Manual of their Company and his track record in safety for past three years to the Engineer Incharge.  
Contractor shall furnish details of their safety department with CVs of safety officers in his bid document to Engineer Incharge.
- The contractor MUST employ Qualified Safety Officers as per the table below, having about 5 years of relevant experience in chemical units or Petrochemical Plants or refineries, as per The Factories Act 1948 / Building and other construction workers (Regulation of Employment and conditions of service) Act 1996 and Central Rules 1998 / The Karnataka Factories Rules 1969. Contractor shall ensure that all his workmen are aware about the nature of risk involved in their work and have adequate training for carrying out their work safely. Such Safety Officers appointed shall be dedicated and responsible only for safety. They should not be given any other responsibility. The contractor and his sub-contractor, if any, shall comply with the instructions given by MRPL Engineer In- Charge or his authorized nominee regarding safety precautions, protective measures, house-keeping requirements etc. Engineer-In-Charge from MRPL shall have the right to stop the work of the contractor, if in his opinion, proceeding with the work will lead to an unsafe and

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dangerous condition. Engineer-In-Charge shall get the unsafe condition removed or provide protective equipment at the contractors cost, whichever is applicable.

### **Table**

Max. no. of employees < 30	One discipline (Engr. / Supervisor) with safety experience can function as Safety Staff on part time basis.
No. of employees: 30 – 100	One Safety Supervisor on full time responsibility.
No. of employees: 101 – 250	For Manpower Supply – Oriented Maintenance contract One Safety Supervisor on full time responsibility.  For Service – Oriented Maintenance / Project contract One Safety Engineer on full time responsibility + One Safety Supervisor on full time responsibility
Upto 250 Persons deployed by him at site	Deploy one Safety Officer and additionally deploy Three Safety Supervisors
For 251 to 500 Persons	Two Safety Officers, Six Safety Supervisors and Ten Safety Stewards
For more than 500 persons	Three Safety Officers, Ten Safety Supervisors and Twenty Safety Stewards

Qualification criteria of safety officer:



BSc (Physics Chemistry only)/Diploma (Mech/Elect/Civil only) with post graduate Diploma in Industrial safety with min of 5 years experience in supervisory cadre.

OR

BE/BTech (Mechanical/Electrical/Civil only) with post graduate Diploma in Industrial safety with min of 2 years experience in supervisory cadre.



Qualification criteria of safety supervisor:

BSc (Physics Chemistry only)/Diploma (Mech/Elect/Civil only) with qualification in industrial safety with relevant experience.

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#### 4. **PERSONNEL:**



- Personnel / workmen (age 18 years & above) deployed at site should be physically / medically fit. Labours/workers shall not bring children/babies inside the refinery.  
SMOKING IS STRICTLY prohibited inside the refinery.
- Contractors and their workmen should restrict their activities to the site allocated to them.
- All contract men shall wear IS make PPEs like gloves, goggles, face shields, full body safety harness, safety belt, Safety Helmets, Safety Shoes etc during the work. They will not be permitted to enter the Refinery without wearing Safety Helmet, Safety Goggles & Safety Shoes. Damaged PPEs shall be taken out from use and disposed off properly.
- The contractor shall ensure that their men do not tamper with the facilities in operation. They shall not operate any Valves/ Switches etc.
- The contractor shall ensure that his workmen do not move around freely inside refinery premises other than the assigned place of work & also do not sleep anywhere (Below piperacks / equipments / trucks / etc.) inside refinery premises.
- The personnel engaged by the Contractor shall maintain good conduct and discipline commensurate with Industrial standard. If in the opinion of the Engineer-in-charge any of the personnel have not maintained good conduct and discipline, the Contractor shall remove such personnel immediately from MRPL premises and provide alternate personnel.
- The contractor Supervisors and Engineers must get themselves conversant with MRPL's Standard Operating Procedures (SOP), safety norms, Rules and Regulations that are in force. They must also be conversant with the MRPL's Emergency Procedures and Emergency telephone numbers and should ensure display of same at prominent place.
- Special safety precautions to be taken by the contractor or their personnel working in an operating refinery are given below. The safety procedure may undergo a change from time to time, which will be intimated to the contractor to follow and implement them.
- In addition to the following minimum safety requirements, the contractor must comply with the safety requirements, norms, rules and regulations as per the Factories Act 1948 and Karnataka Factories Rules 1969, OISD Guidelines 207 and other OISD standards / guidelines and Indian Standards.
- The contractor must prepare a detailed "Safety Programme" and submit it to Engineer In-charge of MRPL immediately after the finalization of contract / placing of LOI / order. This will include Safety Policy, Safety Responsibilities at various levels, Formations of Safety Committees and meetings, Method statements, Job Safety Analysis (JSA), Safety inspections, various pre-

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inspection checklists, Safety manuals, Safety Audits, Emergency Plans, Safety procedures to be implemented for all the activities, deputation of Safety Officers, enforcement of safety practices.



- Contractor shall devise a procedure on Accident Reporting. All accidents including Near Misses and property damages to be reported as per the MRPL's Accident Reporting Procedure in force. All Accidents including Near Misses to be communicated immediately to Engineer Incharge over telephone / verbally / and later submit the accident report. All accidents must be investigated, classified, analysed & comply with the recommendations to avoid its recurrence. Monthly Accident statistics must be developed and circulated. Contractor shall maintain a register of all such accidents.
- During the mobilization, equipments, machines, tools, tackles etc. to be inspected at the site from where it is being mobilized. Damaged ones should be discarded and ensured not mobilized at MRPL site. The statutory checks, inspections and certification is carried out before mobilizing at MRPL site. Necessary repairs and maintenance to be carried out and equipment, machine, tools, tackles etc. is mobilized at MRPL site in working condition. The previous records of maintenance and the competent person's certificates to be made available during mobilization and submitted to MRPL Engineer Incharge. The equipments, machines, tools, tackles, etc to be tagged and mobilized.
- A Safety Committee must be formed to discuss accidents, Unsafe Acts and Unsafe conditions. This should be chaired by the High ranking Official / Site-In-Charge with equal participation both from supervisory and non-supervisory cadres of employees. Engineer In-Charge of MRPL also should be involved in such meetings as an observer. The frequency of meetings shall be once in a month minimum and actions taken to avoid recurrence of Nearmiss, Minor injuries etc.
- Circular of the meeting must also be issued to MRPL Engineer Incharge at least one-week in advance. Minutes of the meetings to be prepared on the same day and submitted on next day of the meeting.
- The contractor shall take all safety precautions during the execution of awarded work and shall maintain and leave the site safe at all times. At the end of each working day and at all times when the work is temporarily, suspended, he shall ensure that all materials, equipment and facilities will not cause damage to existing property, personal injury or interfere with other works of the Refinery. The contractor shall comply with all applicable provisions of the safety regulations, clean up programme and other measures that are in force at the site.
- Safety Inspections of the site to be conducted daily and Safety Audits to be conducted once in three months by a team of Senior Officials of the contractor. Report on findings of such Audit to



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be submitted to the Engineer Incharge and compliance report of the suggestions on findings to be submitted weekly to Engineer Incharge.

- Daily Safety Inspection of jobs and safety audit to be conducted every month and the report and protocol signed by all parties, Contractor's safety officers with signatures of Site Incharges of contractor shall be part of subsequent RA bill.
- Method statement along with Job Safety Analysis to be submitted at least 15 days in advance before starting of any activity.
- Prior information of high risk jobs as planned shall be informed with short details of the work, job safety analysis report to the Engineer Incharge at least 48 hours before starting of such jobs.
- High risk jobs like fabrication at height, lifting and shifting, erection of equipments etc shall be video recorded by the contractor.
- The contractor shall provide and maintain all lights, guards, fencing, warning sign, caution boards, other safety measures and provide for vigilance as and where necessary or as required by the Engineer-In-Charge or by any duly constituted authority for the protection of workers or for the safety of others. The caution boards shall also have appropriate symbols visible during night also.
- Adequate lighting facilities, including emergency lighting, such as floodlights, hand lights and area lighting shall be provided along with ELCBs by the contractor at the site of work with isolation switch known to all at site with proper display, storage area of materials and equipment and temporary access roads within his working area. The contractor shall obtain written approval of the Engineer-In-Charge to the lighting scheme and place of tapping prior to its installation.
- Use of devices like Distress alarm system for all personnel entering into confined space to be mandatory. Biometric attendance of personnel entering confined space should be maintained. Necessary Biometric punch machine to be arranged by the contractor at his own cost for this purpose. Staircases shall have temporary hand rail and guard till permanent handrails are fabricated and installed.
- The contractor shall plan his operations so as to avoid interference with the other departmental works, other contractors or sub-contractors at the site. In case of any interference, necessary coordination shall be sought by the contractor from the Department for safe and smooth working.
- The contractor shall be held fully responsible for non-compliance of any of the safety measures, procedures and delays, implications, injuries, fatalities, property damage and environmental degradation and compensation arising out of such situations or incidents. The contractor should device a procedure to maintain head count of his personnel manually or with an installation of



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punching machine at site and ensure evacuation of his personnel through defined emergency exit in case if situation demands and also during confined space entry.

- Smoking is prohibited in the Refinery / work site / offices.  
Consumption of alcohol and any other intoxicating material shall be also treated as safety violation and heavy penalty shall be levied on the main contractor.
- Radiography source and also the Explosives used for controlled blasting will not be permitted to be stored at site. Detailed accident report with photographs to be submitted to factory manager and Engineer In-charge from MRPL immediately.
- Contractor's Vehicles/Engines and approved electrical / mechanical equipments & lifting tools / tackles, welding generator that are to be used inside refinery are to be certified by competent authority. Statutory checks are to be carried out and records are to be maintained by contractors to ensure healthiness. These certificates will be regularly checked by MRPL engineer in-charge.
- The Contractor shall ensure that all industrial consumables such as Oxygen, Acetylene, Argon, Nitrogen, welding electrodes etc. are approved by MRPL, tested and records maintained by the contractor as per Gas Cylinder Rules before they are used for the job. LPG for gas cutting purpose is not allowed.
- The Fire prevention / protection and safety equipments (including Personal Protective Equipments) should be certified by MRPL engineer in-charge.

##### 5. **HEALTH AND HYGIENE:**



- Sufficient number of toilets shall be provided by the contractor for its workmen and hygiene standard should be maintained.  
Contractor to ensure no water stagnation at site.  
Potable water facility for all workers shall be provided and maintained by the contractor.  
Inspection of drinking water, sanitation, shall be done by MRPL. Availability of dust masks shall be ensured by the contractor at site.  
Contractor to maintain affordable hygienic canteen for the workers.
- The contractor must maintain record of medical examinations of its employees as per The Factories Act 1948 and The Karnataka Factories Rules, 1969 and The Building and other construction workers (Regulation of Employment and conditions of service) Act 1996 and Central Rules 1998. This will include eye test of crane operators, vehicle drivers and all others. Also

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- Fitness certificate by the Medical Officer for working at height to be produced for each employee requiring to work at height.
- Adequate means and personnel for rendering first aid should be readily available at site and during working hours at places where work is carried out.
- Medical aid for First-Aid should be available.
- First Aid kits or boxes, as appropriate, should be provided at the workplaces and on motor vehicles, cranes, etc. and be protected against contamination by dust, moisture, etc.
- When workers are employed underground or beneath structures or pits or other conditions in which they may need to be rescued, suitable rescue equipment like tripod with pulley and safety belt should be readily available at site at or near the work site along with trained rescue workers.

#### 6. **VEHICLE MOVEMENT:**



- The contractor shall conduct his operation so as not to interfere with the use of existing roads at or near locations where the work is being performed.
- Speed limit inside the refinery is 16 KMPH which should be strictly followed. For heavy machinery like cranes / forklift / RMC trucks, etc. the speed limit is 5 KMPH maximum.
- Special precautionary measures should be taken during transportation of long sized cargo, route as defined should be followed and for safety of personnel (with proper escort) and damages to the facilities should be avoided. Procedure for vehicle entry and Speed limits in Refinery should be strictly followed. Vehicles and cargos passing through refinery should have PESO approved spark arrestor fitted.
- When interference to traffic is inevitable, notice of such shall be given to the Engineer - In-Charge of MRPL well in advance with the details of start of the work and time required, storage of materials, and details of the proposed methods of providing the required facilities for safe and continuous use of roads and obtain his clearance.
- The contractor shall exercise full care to ensure that no damage is caused by him or his workmen, during the operation, to the existing water supply, sewerage, power or telecommunication lines or any other services or works. The contractor shall be required to provide and erect before starting of the work, substantial barricades, guardrails and warning signs. He shall furnish, place and maintain adequate warning lights, signals etc, as required by the Engineer-In-Charge.

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- Vehicles must have green red flags and whistles for the cleaner to guide driver. All vehicles entering MRPL premises shall have cleaner / helper.
- The vehicles must be maintained as per the preventive maintenance schedule of the manufacturer / supplier. Only Drivers that are trained in Defensive Driving shall be deployed inside Refinery.
- Vehicles to be inspected fortnightly by trained technicians as per the inspection checklist.
- Pre-inspection checklist to be formed to that effect.
- All vehicles to bear a sticker. "If you notice this vehicle is over speeding then please inform on telephone no 08242882192 / 2191 / 2194 / 2771 / 2731".
- Tractors and trucks / cranes / forklift should not be used for transporting personnel.
- Every vehicle should have the contractor's name prominently displayed on Tractor Trolleys, trucks, jeeps, cranes, JCBs, Poclains, trailers. The display board should be put on front and rear side of each of the vehicle.
- Tractor trolleys must have independent brake systems both on tractor as well as on trolleys.
- All vehicles must be fitted with PESO approved spark arrestors.
- Tippers/trucks carrying debris and soil/mud/sand shall ensure that there is no spillage of material on road. If any such spillage observed the same need to be cleaned and cleared by the contractor immediately. Wheels of the trucks and vehicles shall be clean and free from mud.
- Contractor to maintain Inspection and maintenance logs for every vehicle.
- Any kind of repair work on contractor's vehicle is to be carried out only inside the work shop or designated place and not allowed inside the battery area or anywhere at on road or at site.

#### 7. SAFE MEANS OF ACCESS:

- The contractor must possess adequate numbers of self retractable type fall arrestors (of different sizes viz. 6m, 20m, 40m, and 60m), Safety nets and Safety Belts (Full Body Safety Harness) (ISI approved).
- Adequate and safe means of access and exits shall be provided for all work places, at all elevations. Using of scaffolding members (avoiding a ladder) for approach to high elevation shall not be permitted.
- Suitable scaffolds shall be provided for workmen for all works that cannot be done safely from the ground, or from solid construction except such short duration work as can be done safely from ladders. Ladder shall be of rigid construction having sufficient strength for the intended loads and made of metal and all ladders shall be maintained well for safe working condition. If the ladder is



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used for carrying materials as well, suitable foot holds and handholds shall be provided on the ladder. Ladders shall not be used for climbing carrying materials in hands. While climbing both the hands shall be free. Ensure positioning of person at base / grade level while it is in use. All ladders, platforms, full body safety harness and safety nets should be inspected regularly and records should be maintained. Damaged items shall immediately be taken out of service and disposed off.

- Scaffolding staging more than 1.5 m above the ground or floor, swung or suspended from an overhead support or erected with stationary support and ladder shall conform to relevant IS specification. Timber bamba scaffolding is not allowed inside the Refinery.
- Working platforms of scaffolds shall have toe boards 15cms in height to prevent materials from falling down.
- A sketch of the scaffolding proposed to be used shall be prepared and approval of the contractor's Mechanical Engineer obtained prior to start of erection of scaffolding. All scaffolds shall be examined and certified with proper display of tags by contractor's Mechanical Engineer before use.
- Safe means of access shall be provided to all working platforms and other elevated working places. Every ladder shall be securely fixed. No single portable ladder shall be over 9m in length. For ladders upto 3m in length the width between side rails in the ladder shall in no case be less than 300mm. For longer ladders this width shall be increased by at least 20mm for each additional metre of length. Step shall be uniform and shall not exceed 300mm.
- Working platform and gangway along the side of pipe racks shall be provided. Under no circumstance the contractor employees should step on pipes at pipe racks.

#### 8. EXCAVATION, TRENCHING AND EARTH REMOVAL:

- A Work Permit must be taken for any excavation or earth removal inside the existing refinery premises from Engineer In-Charge MRPL, as the area of work has underground pipelines, cables etc.
- All trenches 1.2m or more in depth shall at times be supplied with at least one ladder for each spacing of 3.0m in length or fraction thereof. Ladder shall be extended from bottom of the trench to at least 1m above the surface of the ground.
- The sides of the trench which are 1.2m or more in depth shall be stepped back to give suitable slope (angle of repose) or securely held by timber bracing (i.e. shoring of the excavated trench or pit should be done), so as to avoid the danger of sides from collapsing. The excavated material

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shall not be placed within 2m of the edges of the trench or half of the depth of the trench, whichever is more. Cutting shall be done from top to bottom. Under no circumstances under-cutting shall be done.

- The contractor shall ensure the stability and safety of the excavation, adjacent structures, services and the works.
- Open excavations shall be fenced off by railing (ledger pipes) and warning signals installed at well-lit places so as to prevent persons falling into the excavations.
- All blasting operations shall be carried out on the basis of procedures approved by Inspector of explosives. All works in this connection shall be carried out as per IS code of practice. Barricades, Warning signs etc. shall be placed on the roads / open area. Prior approval of such operation shall be obtained from Engineer-In-Charge of works. The blasting procedure being followed by the contractor must be submitted with MRPL engineer in-charge.
- The contractor must submit the methodology, safety aspects, schedule, License and other relevant features of control blasting operations.
- Wherever manual removal of earth is involved, earth shall be removed from the top by maintaining the proper slope equal to the angle of re-pose of the earth. Manual removal of earth / lowering of person in a pit should be done with tripod and pulley besides use of Full body Safety Harness by person.
- Such work shall be constantly supervised by the contractor's responsible persons.

#### 9. **DEMOLITION:**

Before any demolition work is commenced and also during the progress of the work:



- Proper approvals shall be taken from Engineer in-Charge MRPL before commencing demolition.
- Area around shall be barricaded with cautionary signs and posting of security guards or supervisors for preventing unauthorised entries of personnel.
- All roads and open area adjacent to the work site shall either be closed or suitably protected. Appropriate warning signs shall be displayed for cautioning approaching persons.
- No floor, roof or other part of the building shall be overloaded with debris or materials as to render it unsafe.
- Entries to the demolition area shall be restricted to authorized persons only.
- Contractor to place separate collection facility of waste like metal, on metal non degradable and bio degradable wastes and shall dispose to designated place daily basis.

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- Contractor shall be responsible to clear dry grass and wooden items etc from and around his working site/storage/fabrication yard etc to prevent any fire accidents.

#### 10. **PERSONAL PROTECTIVE EQUIPMENTS:**

- All proper “ISI” marked Personal Protective Equipments (PPEs) as considered necessary by the Engineer-In-Charge shall be kept available by contractor for the use of the persons employed on the site and maintained in a condition suitable for immediate use. Also the contractor shall take adequate steps to ensure proper use of equipment by those concerned. The PPEs are to be provided by the contractor.
- All persons employed at Refinery shall use safety helmets, safety shoes and safety goggles as minimum safety gears. For other types of works, persons working in that area shall also use the required PPEs, as advised by the Engineer-In-Charge of MRPL.
- Workers employed on mixing asphaltic materials, cement and lime mortars shall use Gumboots, safety goggles, hand gloves and proper respirator.
- Persons engaged in welding and gas-cutting works shall use suitable welding face shields with welder’s helmet. The persons assisting the welders shall use suitable goggles. Protective goggles shall be worn while chipping and grinding.
- Stonebreakers shall use protective goggles. They shall be seated at sufficiently safe intervals or distance.
- Persons engaged in or assisting in shot blasting (Sand blasting is prohibited) operations and cleaning the equipment after shot blasting shall use suitable gauntlets, overalls, dust mask, dust proof goggles, safety shoes and protective hood supplied with fresh air.
- All persons working with 3M lifeline and hook at height above ground or floor and exposed to risk of falling down shall use safety belts (Full Body Safety Harness with double life line and scaffolding hooks, ISI marked) which should be properly secured to solid object unless otherwise protected by cages, guard railings, etc. In places where the use of full body safety harness is impractical, suitable safety net of adequate strength fastened to substantial supports shall be employed under proper valid permit.
- When workers are employed in sewers and inside manholes, which are in use, the contractor shall ensure that the manholes are opened and are adequately ventilated at least for an hour. The atmosphere inside the space shall be checked for the presence of any toxic gas or oxygen deficiency and recorded in the confined space entry permit, availability of standby person at



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manhole must be ensured before the personnel are allowed to get into the man-holes. The manholes opened shall be cordoned off with suitable railing and provided with warning signals or caution boards or barricade tape to prevent accidents. There shall be proper illumination in the night.

#### 11. **PAINTING:**

- Respirators shall be provided by the contractor for use when paint is applied, safety of personnel in vicinity also should be considered while painting.
- Overalls shall be supplied by the contractor to the workmen and adequate facilities shall be provided to enable the painters for decontamination at the cessation of work.
- All solvent-based paints, thinners shall be stored in separate well ventilated storage kept under proper surveillance.
- Smoking, open flames or sources of ignition / hot work shall not be allowed in places where paints and other flammable substances are stored, mixed or used. A caution board, with the instructions written in national / regional language, "SMOKING / HOT WORK – STRICTLY PROHIBITED" shall be displayed in the vicinity where painting is in progress or where paints are stored. Symbols shall also be used for caution boards.
- Suitable IS marked First Aid Fire Fighting equipments shall be kept available at a place where flammable paints are stored, handled or used.
- When painting work is done in a closed room or in a confined space, adequate ventilation shall be provided. Workers shall wear suitable supplied air type breathing apparatus. Work shall be carried out under a valid work permit.
- Epoxy resins and their formations used for painting shall not be allowed to come in contact with the skin. The workers shall use PVC gloves and / suitable barrier creams.
- Adequate ventilation shall be provided especially when working with hot resin mixes.
- Increased personal hygiene shall be practiced to control inadvertent contact with the resin and eliminate its effects.
- Workers shall thoroughly wash hands and feet before leaving the work. Work clothes shall be changed and laundered frequently.
- Care must be taken while carrying out painting inside confined space. There shall be safety devices to monitor the personnel working inside confined space like vessels during painting of internal surface. Suitable painting methods shall be adopted as specified elsewhere. It should not be



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clubbed with hot work and proper ventilation should be available to draw out the solvent vapours.  
Manual painting is to be adopted instead of spray painting.

## 12. **LIFTING MACHINES TOOLS AND TACKLES:**



- Supplier's / Manufacturer's manual for operations / safety / periodical maintenance of all Cranes, winches, JCBs, Poclains, Excavators, Trucks, tractors, Vehicles, etc. MUST be made available at site from the moment it is brought at site and the same should be strictly adhere to.
- Lifting machines, tools and tackles shall be of good mechanical construction, sound material, adequate strength, free from any defects and shall be kept in good working condition.
- Lifting machines, tools, tackles, equipments etc. to have identification tags of steel plate of size 2"x 2" tied to it using steel wire of 4 mm size. The details like reference number, Safe Working Load (SWL), date of testing, next due date of testing, etc. to be punched on this plate.
- Contractor must produce Competent Authority's (Authorised by The Directorate of Factories, Karnataka state) Certificate of testing in the prescribed form of Lifting Machines, Chains, ropes and lifting tackles well in advance. Only valid Lifting Machines, tools etc. to be used and to be re-certified before expiry of certificate. Also, these equipments will be inspected by Engineer In-Charge of MRPL as and when required. The same procedure is applicable for all other Electrical Equipments, tools, machines, D.G sets, compressors, etc.

Lifting equipments for testing by competent authority to include JCB, Poclain, Excavators, etc.

The ringer crane to be tested and certified every time by Competent Person it is dismantled and reassembled. This certification must also include stability of soil on which it is assembled.

Use of Hydra is not permitted inside refinery/construction premises. Hydraulically jacked lifting machines to be used.



- Lifting machines, tools, tackles, equipments etc. to be inspected in addition to the Competent Authority's certification. This should be done fortnightly by experienced trained mechanical foreman and technicians and record of such inspection to be maintained.
- Every rope and sling used in hoisting or lowering of materials or as a means of suspension shall be of good quality and adequate strength and free from any defect.
- Every crane operator or lifting appliance operator shall have a driving License for Heavy Vehicle, proper physical fitness such as eye sight etc. and with adequate experience. No persons under the age of 21 years shall be in charge of any hoisting machine or give signal to operator of such machine.

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- In case of every lifting machine (and of every chain, ring, hook, shackle, swivel and pulley block used in hoisting or as means of suspensions) the safe working load shall be ascertained and clearly marked. In case of a lifting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load.
- The contractor shall notify the safe working load of the machine to the Engineer-In- Charge whenever he brings any machinery to site for work and get it verified by the Engineer-In-Charge, supported by a valid test certificate by the competent person.
- Motors, gearing transmission, couplings, belts, chain drives and other moving parts of hoisting appliances shall be provided with adequate safeguards. Hoisting appliances shall be provided with such means as to reduce to the minimum risk of any part on a suspended load becoming accidentally displaced or lowered.
- The contractor must have a team of Experienced Mechanical Personnel (having minimum of 5 yrs. experience in carrying out safety inspection and testing of Lifting machines, Tools and Tackles etc.), to conduct periodical (Daily, fortnightly, monthly and quarterly) inspection and testing of Lifting machines, Tools and Tackles and to maintain its records.
- Crane shall not be used as hoist. Incase cranes are used as hoist then factory Inspector's permission to be taken in advance and to be subject to biannual testing by competent person as required for hoist under Factories Act 1948. Also, the design of cage to be got approved by the competent person well in advance. Two ropes or chains to be provided to the cage, separately connected with the cage, suspended independently and capable of carrying the whole weight of the cage.
- Contractor to maintain operation, inspection and maintenance logs for every lifting equipment, tool and tackle.

13. **TEMPORARY SHEDS:**



- Before erecting temporary shelters like sheds or tents anywhere at site, written permission of the concerned Engineer In-charge must be obtained.
- Temporary sheds for site office should be avoided. Instead contractor shall arrange for portal cabins for site office / stores.

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- Temporary shed should not be erected using scaffolding pipes. The shed should be made of safe construction material.
- The temporary shed should be erected after proper designing following engineering design practices in conformance with normal safety standards to ensure the stability and safety.
- Temporary shed should bear the contractor's name.
- Temporary piping, hose connections and electrical wiring to these temporary sheds must be laid in such manner that they do not cause tripping, hitting or electrocution hazards.

#### 14. **ERECTION:**



- At the planning stage consideration should be given, by those responsible for the design, to the safety of the workers who will subsequently be employed in the erection of such structures. A detailed erection scheme / schedule shall be furnished well in advance for all the critical erections.
- Care should be exercised by design engineers and other professional persons, not to include anything in the design which would necessitate the use of unwarrantably dangerous structural procedures and undue hazards, which could be avoided by design modifications.
- Facilities should be included in the design for such work to be performed with the minimum risk.
- Detailed Safety Procedure should be submitted as a part of Heavy Equipment erection scheme. Heavy Equipment erection scheme must be submitted at least one month in advance.
- Erection engineer to conduct training on rigging before every heavy lift / erection for crane operator, foreman and riggers.
- Erection of structural platforms, gratings and hand rails to be done on priority. The procurement of gratings, structural members for hand rails to be done on priority.
- Prefabricated parts should be so designed and made that they can be safely transported and erected.
- As far as practicable the safety of prefabricated parts while erection should be ensured by appropriate means, such as provision and use of:
  - a) Ladders;
  - b) Gangways;
  - c) Fixed platforms;
  - d) Platforms, Buckets, boatswain's chairs, etc. suspended from lifting appliances;
  - e) Safety belts and lifelines; and
  - f) Safety nets or catch platforms.

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- Ladders to be inspected fortnightly by experienced trained mechanical foreman and mechanical technicians and record of such inspection to be maintained.
- The boatswain's chairs/ platforms used in structural erection to be inspected and checked once in fortnight and record maintained.
- In addition to the conditions of stability of the part when erected, when necessary to prevent danger the design should explicitly take into account:
  - a) The conditions and methods of attachment in the operations of stripping, transport, storing and temporary support during erection; and
  - b) Methods for the provision of safeguards such as railings and working platforms, and, when necessary, for mounting them easily or prefabricated parts.
- The hooks and other devices incorporated in prefabricated parts that are required for lifting and transporting them should be so shaped, dimensioned and positioned as:
  - a) To withstand with a sufficient margin the stresses to which they are subjected; and
  - b) Not set up in the part stresses that could cause failures, or stresses in the building not provided for in the plans.
- Prefabricated parts made of concrete should not be stripped before the concrete has set and hardened sufficiently to ensure the safety of the operation.
- Store places should be so constructed that:
  - a) There is no risk of prefabricated parts falling or overturning; and
  - b) Storage conditions generally ensure stability having regard to the method of storage and atmospheric conditions.
- Prefabricated parts made of concrete should not be erected before the concrete has set and hardened to the extent provided for in the plans.
- While they are being stored, transported, raised or set down, prefabricated parts should not be subjected to stresses prejudicial to their stability.
- Trailers only to be used for transportation of pipes. Crane to be used for erection at site.
- Every lifting appliance should:
  - a) Be suitable for the operation; and
  - b) Be approved by a competent person, or tested under a roof load 20 percent heavier than the heaviest prefabricated part.

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- c) Ringer mode of a heavy crane MUST be inspected, checked and certified by competent person every time it is dismantled and erected. The report must bear the stability of the soil on which it is erected.
- Lifting hooks should have the maximum permissible load marked on them.
  - Tongs, clamps and other appliances for lifting prefabricated parts should:
    - a) Be of such shape and dimensions as to ensure a secure grip without damaging the part; and
    - b) Be marked with the maximum permissible load in the most unfavourable lifting conditions.
  - Prefabricated parts should be lifted by methods or appliances that prevent them from spinning accidentally.
  - The temporary basket cages / Platforms / Buckets / boatswain's chairs, etc. used for lifting / working at height suspended from lifting appliances or suspended from structures or beams MUST be certified by competent person and provisions or conditions as stipulated during certification to be adhere to.
  - While prefabricated parts are being lifted measures should be taken to prevent workers from being struck by objects falling from a height and area around such site should be barricaded with cautionary signs.
  - When necessary to prevent danger, before they are raised from the ground, prefabricated parts should be provided with safety devices such as railings and working platforms to prevent falls of persons.
  - If workers are exposed to danger when releasing prefabricated parts from lifting appliances, adequate safety measures should be taken.
  - At workplaces adequate instructions should be given to the workers on the methods, arrangements and means required for the construction, storage, transport, lifting and erection of prefabricated parts.
  - When it is not practicable to install protective guardrails and toe boards the workers should be provided with and use safety belts and lifelines to limit the height of the fall.
  - Overhead screens to be provided to prevent workers from being struck by falling objects.
  - The safety devices (guard-rails, toe-boards, safety belts and lifelines) should not be removed so long as the risk remains.
  - Precautions should be taken to prevent fires being caused by rivet-heating equipment.
  - Rivet heaters should extinguish their fires before leaving work.
  - Extra care should be taken to prevent fall of objects, tools, etc. from height.



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- Before structural steel parts are lifted, care should be taken that any object that could fall is fastened or removed.
- Structural steel parts should not be dragged while being lifted if that could cause danger.
- Steel trusses that are being erected should be adequately shored, braced or guyed until they are permanently secured in position.
- While structural members are being moved into place the load should not be released from the hoisting rope until the members are securely fastened in place.
- Structural members should not be forced into place by the hoisting machine while any worker is in such a position that he could be injured by the operation.
- No load should be placed on open-web steel joists until they have been placed in position and secured.
- Erection of pipes to be done using web belts only. Web belts must be inspected and checked fortnightly internally by the contractor and records maintained. Damaged ones to be cut to pieces and record to be maintained.
- Nipples and other accessories used for hydrotest and subject to high pressures to be inspected, checked and tested by experienced trained mechanical foreman and mechanical technicians and records maintained. Damaged parts to be replaced immediately with the new ones.
- Discarding criteria of web belts to be procured from the supplier / manufacturer by the contractor and submitted to MRPL Engineer Incharge.

#### 15. **WORK ON TALL CHIMNEYS:**

##### **SCAFFOLDS:**

- All workmen should be certified medically fit by medical practitioner before working at height. Mock up drills MUST be conducted by the contractor for all these workmen and issue Working at Height passes to only those who has experience of working at height, is declared medically fit and shows confidence during mock up drills.
- For the erection and repair / painting of tall chimneys and vertical structures scaffolding should be provided. Scaffolds after erection should be certified by competent mechanical engineer for its strength before use and be displayed with a tag "Certified for use".
- Scaffolds should conform to relevant Indian Standards. Contractor MUST have a team of trained scaffolders including trained Scaffolding engineer.
- Fixed inside scaffolding should be securely anchored in the chimney wall.

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- The scaffold floor should always be at least 65 cm (26 in) below the top of the chimney.
- Under the working floor of the scaffolding the next lower floor should be left in position as a catch platform.
- Suspended outside platform (inspection scaffolds) should be provided as per the relevant standards as stated above.
- Use of Catch platforms, stairs, ladders and Iron rung, lifting tools, tackles and work with hot asphalt, tar should be carried out as per the procedures outlined in relevant ILO manual.
- Full Body Safety Harness (Safety Belt) with lifelines (of various sizes 2', 5' and 9' double lanyards) and safety nets being used should confirm to relevant standards and are to be inspected, tested, periodically and records be maintained. Damaged safety belts and nets should be discarded, taken out of service and disposed off.
- Safety belts must be used while working at height. The life lines (lanyard) MUST be tied to firm support. Incase of absence of firm support provision of wire rope of adequate size tied with lifting tackles to be made to tie the safety belt life line (lanyard).
- All Safety belts to be inspected once in a month and damaged ones to be discarded. Suppliers /Manufacturers Discarding criteria of safety belts to be submitted to MRPL. The record of inspection and the results to be maintained. And a copy to be submitted to Engineer Incharge.
- The scaffolds to be inspected and certified by the competent mechanical Engineer before use and subsequently, at least once in a week.

#### 16. **SAFETY OF ELECTRICAL WORKS:**

Before starting work in live electrical panels, proper electrical isolation shall be ensured. The same to be inspected by the electrical in charge and necessary isolation tag shall be attached. Proper electrical isolation permit system along with LOTO (Locking Out / Tagging Out) system shall be maintained by the contractor. Triplicate copy of such permits shall be submitted to MRPL.

#### 17. **CATCH NETS:**

- Where workers cannot be protected against falls from heights by other means they should be protected by catch nets.
- Catch nets should be made of good quality fiber cordage, wire or woven fabric or material of equivalent strength and durability.

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- The perimeter of catch nets should be reinforced with cloth-covered wire rope, manila rope or equivalent material.
- Catch nets should be provided with adequate means of attachment to anchorage.
- Catch nets to be inspected fortnightly, tested and records maintained. Damaged safety nets should be discarded and record maintained.

#### 18. **PROTECTION AGAINST MOVING VEHICLES:**

Workers who are regularly exposed to danger from moving vehicles should wear;

- a) Distinguishing clothing, preferably bright yellow or orange in colour; or
- b) Devices of reflecting or otherwise conspicuously visible material.

Light Vehicle shall have reverse horn and Heavy Vehicles shall have trained helpers with whistle and red and green flags for directing the driver.

#### 19. **HANDLING MATERIALS:**

- Mechanical means should be provided and used for lifting and carrying loads.
- Personnel should have knowledge of safe ways of material handling.



#### 20. **STACKING AND PILING:**

- Materials and objects should be so stacked and unstacked that no person can be injured by materials or objects falling, rolling, overturning, falling apart or breaking.
- Area earmarked for stacking and piling should be barricaded and only authorised personnel be allowed to carry out stacking and piling jobs.
- Proper stacking and piling should be done as per the guidelines of ILO.

#### 21. **WELDING AND GAS CUTTING:**

- Welding and gas cutting operations shall be done only by qualified and authorised persons and as per IS specification and code of practice.
- All the hoses used on compressed gas cylinders (Acetylene, Oxygen etc.) to be as per IS.





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- Welding and gas cutting shall not be carried out in places where flammable or combustible materials are kept and where there is danger of explosion due to presence of flammable / gaseous mixtures. Contractor shall continuously monitor the area with Explosimeter / H2S meters.
- Welding and gas cutting equipments including hoses and cables shall be maintained in good condition. It should be checked daily by the user and fortnightly by the supervisor and recorded.
- Barriers shall be erected to protect other persons from harmful rays from the work. When welding or gas cutting is done in elevated positions / on trenches / inside refinery units, precautions shall be taken to prevent sparks or hot metals falling on persons or flammable materials (Welding booths shall be constructed).
- Use of proper PPEs by personnel involved in Gas cutting / Electric Arc welding should be ensured. Use of Welders Helmet with face shield by the welders is a MUST.
- Fire extinguisher shall be available near the location of welding operations. Valid permit shall be obtained before flame cutting / welding is taken up & comply with all the permit requirements.
- Contact of personnel with the electrode or other live parts of electric welding equipment shall be avoided.
- Extreme caution shall be exercised to prevent accidental contact of electrodes with ground.
- The welding cables shall not be allowed to get entangled with power cables. It shall be ensured that movement of materials does not damage the cables.
- Oxy-Acetylene cylinders must be mounted on trolley with chain holding the compressed gas cylinders. The compressed gas cylinders must have pressure gauges fitted over it and Oxy-Acetylene Gas cutting set should be fitted with flash back arrestor at both the torch and cylinder ends.
- Under no circumstance the compressed gas cylinder should be taken inside the confined space or excavated pits. Hydraulic test certificates of all compressed gas cylinders should be maintained and furnished as and when required.

## 22. GRINDING:

- All portable grinders shall be used only with their wheel guards in position to reduce the danger from flying fragments should the wheel break during the use.
- Grinding wheels of specified diameter only shall be used on a grinder – portable or pedestal- in order not to exceed the prescribed peripheral speed.

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- Helmet with face shield shall be used during grinding operation.



### 23. **HOUSE KEEPING:**

The contractor shall at times keep his work spot, site office and surroundings clean and tidy from rubbish, scrap, surplus materials and unwanted tools and equipment.

- Welding and other electrical cables shall be routed as to allow safe traffic by all concerned.
- No materials on any of the sites of works shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The Engineer-In-Charge may require the contractor to remove any materials which, are considered to be of danger or cause inconvenience to the public.
- At the completion of the work, the contractor shall have removed from the work premises all scaffoldings, surplus materials, rubbish and all sheds and sanitary arrangements used / installed for his workmen on the site.
- House keeping of the workplace shall be done strictly by the Contractor on daily basis or as required by the Engineer-in-charge. Contractor to collect all debris/ scrap and dump at designated Scrap Yard as defined by MRPL authorities.
- A separate housekeeping team to be formed and made available round the clock.

### 24. **FIRE SAFETY:**

- Adequate number of duly calibrated Explosimeters, Oxygen meters, Hydrogen Sulphide detectors (Portable / Fixed) or any other multiple gas detector should be made available at site by the contractor.
- Combustible materials like timber, bamboos, paints etc. shall not be used at MRPL site for scaffolding or for supports.
- Containers of paints, thinners and allied materials shall be stored in a separate room, which shall be well ventilated, and free from excessive heat, sparks, flame or direct rays of the sun. The containers of paint shall be covered or properly fitted with lid shall not be kept open except while using.
- Fire extinguishers as approved by Engineer-In-Charge shall be located at the work site at appropriate places.

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- Adequate number of contract workmen shall be given education and training in fire fighting and extinguishing methods.

## 25. **WORK PERMIT SYSTEM:**



- MRPL's Work Permit system (As per MRPL Safety Manual) to be strictly followed.
- All jobs within refinery should be executed with a safety work permit only. These will be issued by the concerned operating personnel of MRPL (Refinery Shift Manager or any authorised person). However, he can withdraw the permit when the stipulated conditions are not complied with at the work spot.
- Area is safe for performing the Work. Job is continuously supervised by qualified supervisor.

### Responsibility of Performing Authority:

- To obtain an approved Work Permit duly filled and signed by authorities as per the MRPL's Work Permit System before starting the work in the area.
- To visit job sites and ensure that it is prepared accordingly.
- The person performing the job shall be in possession of the permit till the completion of the job. The permit should be produced for inspection at any time. The Work Permit shall be displayed at job site in the plastic folder.
- To understand the scope of the work and implications involved.
- To restrict the work to the area / equipment specified in the work permit.
- To comply with the instructions given on the Work Permit.
- To follow Plant Safety Rules and Procedures.
- To be alert at all times for the development of unexpected situations.
- To stop the work immediately on detecting any unsafe condition and promptly inform the Issuing Authority. Follow MRPL's Onsite Disaster Management Plan (DMP).
- To return the Permit duly signed after completion of the job to the Issuing Authority. Contractor must adhere to work permit system and other safety regulations.

## 26. **WORK IN AND AROUND WATER BODIES:**

When the work is done near any place, where there is a risk of drowning, all necessary rescue equipment such as life buoys and life jackets shall be provided and kept ready for use and all necessary

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steps taken for prompt rescue of any person in danger and adequate provision shall be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work. Persons who do not know swimming shall not be engaged alone for any work where risk of drowning exists. Sufficient number of life buoys or life jackets shall be provided.



## 27. **PUBLIC PROTECTION:**

The contractor shall make all necessary provisions to protect the public. He shall be bound to bear the expenses for defense of every action or other proceedings of law that may be brought by any person for injury sustained owing to neglect of any precaution required to be taken to protect the public. He shall pay the damage and cost which may be awarded in any such suit, action or proceedings to any such person, or the amount which may be fixed as a compromise by any such person.

## 28. **OTHER STATUTORY PROVISIONS:**

Notwithstanding the above clauses there is nothing in these to exempt the contractor from the provisions of any other Act or Rules or Indian Standards or OISD standards or OISD guidelines in force in the Republic of India. In particular, all operations involving the transport, handling, storage and use of explosives shall be as per the standing instructions and conform with Indian Explosives Act, 1884 and the explosives Rules, 1983. The Factories Act 1948 and The Karnataka Factories Rules, 1969, Handling, transport, storage and use of Compressed gas cylinders and Pressure vessels shall conform with the Gas Cylinders rules 1981 and Static and Mobile Pressure Vessels (Unfired) Rules 1981. In addition, The Building and other construction workers (Regulation of Employment and conditions of service) Act 1996, The Indian Electricity Act, 1910 and Indian Electricity Rules 1956, The Atomic Energy Act 1962, The Radiation Protection Rules 1971, Radiation Protection Manual of Nuclear Facilities and the Atomic Energy (Factories) Rules 1988 and various rules and Act relevant to the activities being performed shall also be strictly complied with.

- No Child labour should be brought in for work.
- MRPL holds the right to issue warnings / Heavy penalties (monetary fine) / suspend work at any time or terminate the contract for a loss / damage and a pattern of frequent failure to adhere to Safety Laws, regulations and Onsite Safety procedures. In general, a heavy monetary fine will be deducted straight from the contractor's bill for each violation of Safety Rules / Unsafe Act / Unsafe



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Condition observed, for each First-Aid injury, for each Lost Time injury / Near Miss Accident and for each fatality.



## 29. **GUIDELINES AND GENERAL PROCEDURES FOR SUPPLY AND USE OF ELECTRICITY AT SITE:**

Following safety requirements shall be complied with before the contractor uses the power supply.

- The contractor shall submit a list of licensed electrical staff to be posted at site.
- It shall be the responsibility of the contractor to provide and maintain complete installation on the load side of the supply point with regard to the safety requirements at site. All cabling and installation shall comply with the appropriate statutory requirements given below and shall be subject to approval of the Departmental Engineer-In-Charge / Electrical Engineer.
  - a) Indian Electricity Act, 1910
  - b) Indian Electricity Rules, 1956
  - c) National Electric code, 1985
  - d) Other relevant rules of Local bodies and Electricity Boards.
- Where distribution boards are located at different places the contractor shall submit schematic drawing indicating all details like size of wires, overhead of cable feeders, earthing etc. The position and location of all equipment and switches be given.
- The contractor shall make his own arrangements for main earth electrode and tapings thereof. The existing earth points available at site can be used at the discretion of the Departmental Electrical Engineer with prior permission. Method of earthing, installation and earth testing results shall conform to relevant I.S. Specifications.
- Overhead High Tension (HT) cable routes to be marked and physically barricaded to prevent crane coming in contact with it.
- All three-phase equipment shall be provided with double earthing. All light fixtures and portable equipment shall be effectively earthed to main earthing.
- All earth terminals shall be visible. No gas pipes and water pipes shall be used for earth connection. Neutral conductor shall not be treated as earth wire.
- Every electrically operated machine or equipment to be independently earthed.
- Earth pits to be provided near DG sets, electrically operated machines, equipments etc.
- DG sets used in Refinery shall be installed inside acoustic enclosure to minimize noise pollution.
- Exhaust of DG sets shall be routed to safe height.



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- Continuity and resistance of all earth connections to be inspected and checked and tested fortnightly and records to be maintained.
- The contractor shall not connect any additional load without prior permission of Departmental Electrical Engineer.
- Joints in earthing conductors shall be avoided. Loop earthing of equipment shall not be allowed. However, tapings from an earth bus may be done.
- The entire installation shall be subjected to the following tests before energisation of installation including portable equipment:
  - a) Insulation resistance test
  - b) Polarity test of switches
  - c) Earth continuity test
  - d) Earth electrode resistance
- The test procedures and their results shall conform to relevant IS specifications. The contractor shall submit a test report for his complete installation every 2 months or after rectifying any faulty section in the specimen test report. One such test report for the complete installation shall be submitted before onset of monsoon.
- Only persons having valid wireman's license shall be employed for carrying out electrical work and repair of electrical equipment installation and maintenance at site. The job shall be supervised by a qualified licensed supervisor.
- Electricians to be provided with red helmet for easy identification.
- Electrical equipment and installations shall be installed and maintained as to prevent danger from contact with live conductors and to prevent fires originating from electrical causes like short circuits, overheating etc. Installation shall not cause any hindrance to movement of men and materials.
- Materials for all electrical equipment shall be selected with regard to working voltage, load and working environment. Such equipment shall conform to the relevant Indian Standards.
- The minimum clearance to be maintained for all overhead lines along roads and acrossroads shall be as per the statutory requirements.
- Grounding conductor of wiring system shall be of copper or other corrosion-resistant material. An extra grounding connection shall be made in appliances / equipment where chances of electric shock is high.
- Electric fuses and / or circuit breakers installed in equipment circuits for short circuit protection shall be of proper rating. It is also recommended that high rupturing capacity (HRC) fuses are used

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in all circuits. The Earth Leakage Circuit Breaker (ELCB) of 30mA max capacity shall be provided in the circuits. (ELCB) of 30mA max shall be provided on each Extension board.

- Wherever cables or wires are laid on poles, a guard wire of adequate size shall be run along the cables / wire and earthed effectively. Metallic poles as a general rule, shall be avoided and if used shall be earthed individually. Anticlimbing guards and danger notices shall be provided on poles. Each equipment shall have individual isolating switches.
- Wires and cables shall be properly supported and an approved method of fixing shall be adopted. Loose hanging of wires and cables shall be avoided. Lighting and power circuits shall be kept distinct and separate.
- Reinforcement rods or any metallic part of structure shall not be used for supporting wires and cables, fixtures, equipment, earthing etc.
- All cables and wires shall be adequately protected mechanically against damages. In case the cable is required to be laid underground, it shall be adequately protected by covering the same with bricks, Plain Cement Concrete (PCC) tile or any other approved means and provided with cable markers.
- All armored cables shall be properly terminated by using, suitable cable glands. Multistranded conductor cables shall be connected by using cable lugs/sockets. Cable lugs shall preferably be crimped. They shall be of proper size and shall correspond to the current rating and size of the cable. Twisted connections will not be allowed.
- All cable glands, armoring and sheathing of electric cables, metal circuits and their fittings, metallic fittings and other non-current carrying parts of electrical equipment and apparatus shall be effectively grounded.
- All the Distribution Boards, switches, fuse units, bus bar chambers, ducts, cubicles etc. shall have MS enclosures and shall be dust, vermin and water proof. The Distribution Boards, switches etc. shall be so fixed that they shall be easily accessible, change shall be done only after the approval of the Departmental Electrical Engineer. Distribution Boards used inside the process units shall be of Flame Proof type (Intrinsically safe type).
- Each Distribution Board shall have ELCB of 30mA max capacity.
- The contractor shall provide proper enclosures / covers of approved size and shape for protection of all the switchboards, equipment etc. against rain. Exposed live parts of all electrical circuits and equipment shall be enclosed permanently. Crane trolley wires and other conductors which cannot be completely insulated shall be placed such that they are inaccessible under normal working conditions.



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- Iron soclad industrial type plug outlets are preferred for additional safety.
- Open type Distribution Boards shall be placed only in dry and ventilated rooms; they shall not be placed in the process units, vicinity of storage batteries or otherwise exposed to chemical fumes.
- Isolating switches shall be provided close to equipment for easy disconnection of electrical equipment or conductors from the source of supply when repair or maintenance work has to be done on them.
- In front of distribution boards a clear space of 90cm shall be maintained in order to have easy access during emergency.
- Adequate working space shall be provided around electrical equipment, which require adjustment or examination during operation.
- As far as possible electrical switches shall be excluded from a place where there is danger of explosion. All electrical equipment such as motors, switches and lighting fittings installed in workroom where there is possibility of explosion hazard shall be explosion proof.
- All connections to lighting fixtures, starters or other power supplies shall be provided with PVC insulated, PVC sheathed twin/three/four core wires to have better mechanical protection for preventing possible damage to equipment or injury to personnel. Taped joints shall not be allowed. Electric starter of motors, switches shall not be mounted on wooden boards. Only sheet mounting or iron framework shall be used.
- All the lighting fixtures and lamp holders shall be of good quality and in good condition. Badly repaired or broken holders, etc. shall not be used.
- Only PVC insulated and PVC sheathed wires or armoured PVC insulated and sheathed cables shall be used for external power supply connections of temporary nature. Weatherproof rubber wires shall not be used for any temporary power supply connections.
- Taped joints in the wires shall not be used. In case joints are required on electrical cables then only heat shrinkable PVC sleeves will be allowed.
- The bulbs/lamps used for illumination and testing purpose shall have cover or guard to protect them from accidental breakages. Only 24V supply system shall be used for hand lamps etc. while working inside metallic tanks or conducting vessels (Confined spaces).
- After installation of new electric system and or other extensive extensions to existing installations, thorough inspection shall be made by Contractor's Electrical Engineer before the new system or new extension is put in use.



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- All persons who work with electrical installation/equipment shall be aware of the electrical hazards, use of protective devices and safe operational procedures. They shall be given training in fire fighting, first aid and artificial resuscitation techniques, location of isolation switches, etc.
- The supervisor shall instruct the workers in the proper procedure, specify and enforce the use of necessary protective equipment such as adequately insulated pliers, screw drivers, fuse pullers, testing lamps and similar hand tools. Only wooden ladders shall be used to reach the heights in electrical work.
- No material or earthwork shall be allowed to be dumped below or in the vicinity of the bare overhead line conductors.
- Separate work permits shall be issued for individual group leaders working on the same system which shall be returned after the completion of the work to the Engineer-In-Charge.
- Before any maintenance work is commenced on electrical installations/equipment, the circuits shall be de-energised and ascertained to be dead by positive test with an approved voltage testing device. Switches shall be tagged or the fuse holders withdrawn before starting the work. Adequate precautions shall be taken in two important aspects viz. LOTO system to be followed.
- That there shall be no danger from any adjacent live parts and
- That there shall be no chances of re-energisation of the equipments on which the persons are working. (Tag out and lock out LOTO system to be strictly followed).
- While working on or near a circuit, whenever possible the use of one hand may be practiced even though the circuit is supposed to be dead. The other hand may preferably be kept in pocket.
- When it is necessary to touch electrical equipment (for example when checking for overload of motors) back of the hand may be used. Thus, if accidental shock were to cause muscular contractions, one would not "freeze" to the conductor.
- Operation of electrical equipment shall be avoided when standing on wet floor or when hands are wet. Rubber mats should be placed in front of Panels / Distribution Boards as per Indian Standards.
- Before blown fuses are replaced, the circuit shall be locked out and an investigation shall be made for the cause of the short circuit or overload.
- When two persons are working within reach of each other, they shall never work on different phases of the supply.
- When structural repairs, modification or painting work are to be undertaken, appropriate measures shall be taken for the protection of persons whose work may bring them into the proximity of live equipment / circuit.

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- It shall be ensured that the insulation and wire size of extension cords is adequate for the voltage and current to be carried.
- While tapping electricity from the socket, plug top must be used. It shall be ensured that no extension boards are over loaded while tapping. Only standard three pin plugs (Naked Wire is prohibited) shall be used for tapping electricity. Broken sockets/plugs shall be replaced immediately with good ones. Only joint free cables shall be used for connecting equipment/Use of apparatus.
- Floors shall be kept free from trailing electrical cables to avoid tripping hazard.
- Power supply to all the machines and lighting fixture shall be switched off when not in use.
- Temporary electrical connections shall be removed as soon as the stipulated work is over. After completion of the works, the contractor shall dismantle the distribution boards and the other facilities he may have erected.
- Unauthorised tapping of power by others from distribution boards under the control of the contractor shall be prohibited at all circumstances.
- No flammable materials shall be stored in any working area near the switchboards.
- Safety work permits shall be used for switching off the main feeder and equipment by the contractor.
- "MEN ON LINE" "DO NOT SWITCH ON" "DANGER" or "CAUTION" boards as applicable shall be used during maintenance works on the electrical equipment.



### 30. **PORTABLE ELECTRICAL EQUIPMENT:**

- Portable electrical tools must be examined, maintained and tested daily, fortnightly and quarterly so that the equipment and its leads are in good order. Register shall be maintained for inspection recording the testing dates and results of the equipments. Inspection checklists to be formed to that effect. The recertification of lifting tools, tackles, equipments etc. must be carried out well before the expiry of its validity period.
- All portable appliances shall be provided with three core cable and three pin plugs. The third pin of the plug shall invariably be earthed. It shall be ensured that the metal part of the equipment shall be effectively earthed.
- All connections to portable equipment or machines from the panel/distribution board/extension board shall be taken using 3 core double insulated PVC flexible copper wire in one length. No joints shall be allowed in this flexible wire. In case length of wire is not sufficient for a particular location

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then the supply can be tapped by providing another extension board comprising of switch, socket and ELCB of 30mA max.

- Flexible cables for portable lamps, tools and apparatus shall be regularly examined, tested periodically and maintained to ensure safety.
- For excavations, one-time clearance from electrical is required for a particular area.
- Contractor shall get their welding machine / Stress Relieving (SR) electrical equipment / all portable machine certified by MRPL / MRPL authorized contractor and seal will be fixed on machine to that effect. Certificate from third party mentioning the checks carried out, repairs carried out and safe to use to be submitted to Engineer Incharge.
- Revalidation to be done once in 4 months. Incase contractor does not comply, it will be done by MRPL and four times the cost of repair will be back charged to contractor.
- Incase of welding, separate return cable from job piece to welding machine to be connected. Wires not to be used. PVC insulated cables only to be used.
- All lighting circuits/temporary connections for portable machine should have ELCB's of 30mA capacity max.
- All ELCBs to be tested once in 15 days using ELCB testers (and not by the lamp with open wires) and record maintained. Also separate register for ELCB trips (TRIP REGISTER) shall be maintained. It shall be daily signed by the site Incharge of the contractor.
- Earthing of Neutral, which will act as return path, is not allowed.
- Electricians should have wireman license.
- During monsoons, monsoon protection for electrical equipment to be done.
- All feeders in contractor distribution panel to be clearly lettered with load details for isolation in case of emergency.
- Insulated tools like screwdriver, cutting plier, tester to be used.
- Each contractor should have one set of multimeter, ELCB tester and tong tester.
- First aid kit to be available.
- The contractor must have a team of Experienced Electricians (having minimum of 10 yrs. experience in carrying out safety inspection and testing of Electrical Equipments, tools, portable electrical machines and appliances etc.). to conduct periodical (Daily, fortnightly, monthly and quarterly) inspection and testing of Electrical Equipments, tools and portable electrical machines, tools and appliances and to maintain its records.
- All power cable ends should have industrial plug on one side and other end directly into the machine. (No naked end pinning into will be permitted).

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- For any job within MCC / SRR a work permit will be issued by MRPL operation. Job should not be started without these permits.

**31. ROLE OF CONTRACTOR INCASE OF EMERGENCY AND SIREN:**



- Contractor shall instruct his workers to follow instructions strictly in case of fire siren / emergency or if advised or felt necessary by Engg. In-charge. If evacuation is ordered they must leave the work site and proceed towards the nearest designated assembly point. The contractor and its employees MUST follow specific instructions (Roles and Responsibilities in case of fire / onsite emergency) that will be given during training from time to time. All contractor employees MUST undergo such training, before their deployment at the work site. Contractor shall arrange & conduct such trainings for his employees and also employees of sub-contractors.
- Contractor shall instruct his workers to stop all jobs immediately incase release of liquid/gas/toxic/hazardous chemicals etc, and inform the concerned MRPL personnel available at site.

**32. TRAINING:**

- The contractor to conduct Induction training of all employees and record maintained.
- The contractor will have to depute all his employees (including Engineers, supervisors and workmen), before they commence work for the first time at MRPL site and subsequently once in a year, to undergo Safety training. They will get photo gate passes only after the completion of the training. Contractors MUST have and get conversant with Material Safety Data Sheets of all the Chemicals in MRPL. It is a MUST for them to carry the photo passes with them and produce it when demanded at site.
- Tool box talks to be conducted every day before starting of each shift and before commencing of work after lunch break by the concerned Engineer.

**33. LIST OF PERSONAL PROTECTIVE EQUIPMENTS:**

- The contractor must possess the following minimum safety Items cum Personal Protective Equipments. All Personal Protective Equipments used at site to be of approved make.

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34. **MANDATORY FOR THE CONTRACTOR EMPLOYEES WHILE WORKING INSIDE REFINERY:**

- \* Deployment of adequate nos. of safety officers as per table above and making available the mandatory items as per the minimum list below is a MUST as a part of mobilization activity.
1. Safety Helmet.
  2. Safety shoes (Conforming to IS standards with ankle protection, steel toe and anti-skid / acid, alkali and water proof soles).
  3. Hand gloves (Leather impregnated cotton hand gloves).
  4. Spectacle type goggles with toughened glass lenses, plain face shields with and without chin guards.

The contractor must use the “ISI” marked Personal Protective Equipments specific to the job.

It is mandatory to have minimum backup stock of all the PPEs in addition to what is already in use at site.

35. **SPECIFICATIONS FOR SAFETY HELMETS-HDPE:**

1. Helmet Safety Industrial HDPE white colour.
  2. Contractor’s Logo at front side.
  3. Conforming to IS 2925, ISI marked & DGMS approved.
  4. Nape strap type adj. type 6-point adj. head band & sweat band with 3/4" Cotton Chin strap.
- \*Green helmets for Safety Personnel and Red helmets for electricians to be provided and used by them.

36. **SPECIFICATION FOR FULL BODY SAFETY HARNESS) SAFETY BELT**



Full Body Safety Harness (Safety belts) must be double lanyard type with scaffolding hook having self closing latch (spring type).

Different type of hooks to be available based on the nature of job / type of support. Safety belts should be ISI marked and should conform to IS 3521 and DGMS approved and stamped.

Safety belts, safety straps, lifelines, permanent anchors and connections should both separately and when assembled:

- a) Be capable of supporting safely a suspended load of at least 450 kg (1,000 lb) ; and
- b) Have a breaking strength of at least 1,150 kg (2,500 lb).

If hooks are used for attaching safety belts to fixed anchors, they should be self closing safety hooks of various types and sizes.

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When a lifeline or safety strap is liable to be served, cut, abraded or burned, it should consist of a wire rope or a wire-cored fiber rope.

Safety straps should be so fastened to safety belts that they cannot pass through the belt fittings if either end comes loose from its anchorage.

Metal thimbles should be used for connecting ropes or straps to eyes, rings and snaps. Safety belts, safety straps and lifelines should be so fitted as to limit the free fall of the wearer to 1m (3ft 3in).

37. **SPECIFICATION FOR FALL ARRESSTOR DEVICE:**

Fall arrestor device with self-retracting cable integrating locking mechanism combined with an energy deception element fully automatic having cables of various lengths, ISI and DGMS and or any international approval. Only Poly Amide rope shall be used.

38. **SPECIFICATION FOR DUST MASK:**



Dust Mask made of superior quality non-aging chemical-resistant rubber half face piece with reflex sealing flaps for protection against nuisance dust, (<0.5 micron) toxic dusts, gases and vapors with replaceable filters.

39. **SPECIFICATION FOR REPLACEABLE FILTERS**

For protection against nuisance dust, toxic dusts, gases and vapours upto a concentration of 500 ppm. To be fitted on aforesaid Dust Mask.

40. **SPECIFICATION FOR SAFETY SHOES**

1. Safety Shoes, Jodhpury style- as per is 11226- 1985 with guarantee for 1& 1/2 years (all weather).
2. Acid/ alkali/ waterproof heat resistant, antiskid green PVC Nitrile sole.
3. Steel toe cap as per relevant "IS".
4. Upper plain leather, high ankle, with metallic 4 eyelets.
5. ISI marked.
6. The supplier should give guarantee of use of safety shoes during rainy season.

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41. **STANDARD SPECIFICATION FOR PVC HAND GLOVES**

Hand contoured for greater comfort & feature an embossed nonslip grip for handling wet or greasy objects  
cotton flock lining absorbs perspiration maximises easy on/off black with straight cuff each pair pack.

42. **SPECIFICATION FOR ELECTRICAL PPE (SHOCK PROOF)**

Hand gloves used for live electrical works shall be of proper electrical rating.

Electrical (shock proof) Safety Shoes (Jodhpury type) with acid/ alkali/ water proof, heat resistant, antiskid sole with guarantee for 1&1/2 years (all weather).

1. Upper plain leather.
2. ISI marked & latest certificate of testing from any of the govt. recognized institution for electrical resistance.

GUMBOOTS with steel toe should be used by personnel during rainy season.



The aforesaid guidelines are the minimum safety requirements and the contractor should exceed them so as to achieve "ZERO ACCIDENT" which is our MOTO.

43. **TYPE SAFETY VIOLATIONS AND PENALTY SYSTEM:**

All the contractors working for MRPL shall strictly follow the safety norms as per the rules and regulations of MRPL. Contractors who violate safety norms while executing the jobs will be penalized financially.

The details of penalty amount against each safety violations is enclosed as Annexure-B.



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### Annexure B

SL No	Type of Safety Violations	Amended/New penalty
1	No Lost Time Incident (NLTI) – Reporting back to duty within 48 hrs	First occasion Rs 2,500/- Second occasion Rs 5,000/- Third occasion Rs 10,000/- In addition to other expenses borne by contractor towards treatment. Existing Policy: none
2	Reportable Lost Time Incident (RLTI) – No reporting to duty within 48 hrs	First occasion Rs 10,000/- Second occasion Rs 25,000/- Third occasion Rs 50,000/- In Addition to other expenses borne by contractor towards treatment. Existing Policy: none
3	Disability	Rs 1,50,000/- per person Existing Policy: none
4	Fatal	Rs 5,00,000/- per person Existing Policy: none
5	Vehicle Accident – Vehicle damaging Property or Vehicle to Vehicle Accident.	Rs 25,000/- and Repairs/damage/restoration Existing Policy: none
6	For not using Personal Protective Equipment like (Safety Helmet, Safety Goggles, Safety Shoes, Hand gloves, Boiler suit, etc)	Rs 500/- Per day/ per item/ per person for first violation. Rs 1,000/- for second onwards.
7.	Working without permit/ Clearance (Cold Work)	Rs 5,000/- per occasion After 3 violations, holiday listing for 6 months.
8	Hot work without proper permit/ Clearance	Rs 10,000/- per occasion. After 3 violations, holiday listing for 6 months
9	Non-use of safe electricity at work site (non installation of ELCB, using poor joints of cables,	Rs 3,000/- per item





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SL No	Type of Safety Violations	Amended/New penalty
	using naked wire without top plug into socket, laying wire/ cables on the roads, etc.	
10	Working at heights without safety belt (Full Body Safety Harness), using non-standard scaffolding and not arranging fall protection arrangement as required	First occasion Rs 2,500/- Second occasion Rs 5,000/- Third occasion Rs 10,000/- After three occasions, holiday listing for 6 months
11	Unsafe handling of compressed gas cylinders (No trolley, jubilee clips, double gauge regulator, Improper storage/ handling).	Rs 500/- per occasion
12	Non fencing/ barricading of excavated areas	Rs 1,000/- per occasion
13	Use of domestic/ commercial LPG cylinder for cutting purpose	Rs 1,000/- per occasion.
14	Non-display of name board, permit, etc at site	Rs 500/- per occasion
15	Not providing shoring/ strutting/ proper slope and not keeping the excavated earth at least 1.5m away from the excavated area	Rs. 2,000/- per occasion
16	Wrong parking of vehicles or parking the vehicles at non-designated places inside refinery	Rs 1,000/- per occasion
17	Absence of contractor representative in refinery safety meetings whenever called	Rs 3,000/- per meeting
18	Non-deployment of safety supervisor/ supervisor responsible for safety at work site required as per Special Safety Conditions	Rs 3,000/- per day
19	Failure to maintain safety register and records by contract Safety Supervisor or the Supervisor responsible for safety	Rs 1,000/- per day
20	Failure to have daily safety site inspection/ audits, monthly safety meetings and maintain records (by contractors themselves)	Rs. 1,000/- for each occasion
21	Failure to submit monthly safety report by the 5th of the next month to the Engineer-In-Charge	Rs. 1,000/- per occasion



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SL No	Type of Safety Violations	Amended/New penalty
22	Poor Housekeeping	Rs 1,000/- per site/ per day
23	Failure to follow injury reporting system	Rs 10,000/- per occasion
24	Violation of safety condition as per Job Safety Analysis (JSA)	Rs 10,000/- per occasion
25	Over-Speeding of vehicle i.e speed > 16 KMPH while driving inside refinery	The driver will be removed and gate pass will be withdrawn. Contract will be cancelled upon repeated three violations
26	Overtaking of vehicles while driving inside refinery	The driver will be removed and gate pass will be withdrawn Contract will be cancelled upon repeated three violations
27	Driving of vehicle without valid license	First occasion Rs 1,000/- Second occasion Rs 2,000/- The driver will be removed and gate pass will be withdrawn. Contract will be cancelled upon repeated three violations.
28	Driving vehicle without PESO approved or PESO approved but damaged spark arrester	The driver will be removed and gate pass will be withdrawn. Contract will be cancelled upon repeated three violations.
29	Driving vehicle on "NO ENTRY ROADS"	The driver will be removed and gate pass will be withdrawn. Contract will be cancelled upon repeated three violations.
30	Denying to produce the photo Gate Pass on demand	Rs 500/- per person per occasion
31	Contract worker found drunk/intoxicated state inside the refinery	Rs 15,000/- per person per occasion



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**Standard Operating Procedure for Social Distancing at MRPL**

Sl. No.	Procedure	Action plan
1	<p>All areas in the premises including the following shall be disinfected completely using user friendly disinfectant mediums</p> <p>a. Entrance Gate of building, office etc.</p> <p>b. Canteens and pantries</p> <p>c. Meeting room, Conference halls / open areas available/ veranda/ entrance gate of site, bunkers, porta cabins, building etc.</p> <p>d. Equipment and lifts.</p> <p>e. Washroom, toilet, sink, water points etc.</p> <p>f. Walls/ all other surfaces</p>	Disinfection of all the areas and Refinery Township on regular intervals is being strictly followed.
2.	For workers coming from outside, special transportation facility will be arranged without any dependency on the public transport system. These vehicles should be allowed to work only with 30-40% passenger capacity.	Being followed.
3	All vehicles and machinery entering the premise should be disinfected by spray mandatorily	All vehicles hired by MRPL are being disinfected at regular intervals.
4	Mandatory thermal scanning of everyone entering and exiting the work place to be done	Body temp monitoring all who are entering and exiting through all the gates in all the shifts being done.
5	Medical insurance for the workers to be made mandatory.	Medical insurance is available for MRPL employees. Term insurance is available for contract workers apart from ESI.
6	Provision for hand wash & sanitizer preferably with touch free mechanism will be made at all entry and exit points and common areas. Sufficient quantities of all the items should be available	Hand wash and sanitisers are kept in all the places. Sufficient stock is available.
7	Work places shall have a gap of one hour between shifts and will stagger the lunch breaks of staff, to ensure social distancing	Shift/ General shift timings are staggered to ensure social distancing.

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Sl. No.	Procedure	Action plan
8	Large gatherings or meetings of 10 or more people to be discouraged. Seating at least 6 feet away from others on job sites and in gatherings, meetings and training sessions.	Awareness through circular and office orders. Necessary care is taken in seating to maintain distance.
9	Not more than 2/4 persons (depending on size) will be allowed to travel in lifts or hoists.	Awareness through circular and intranet.
10	Use of staircase for climbing should be encouraged	Awareness through circular and intranet
11	There should be strict ban of gutka, tobacco etc, and spitting should be strictly prohibited.	Awareness through circular and intranet
12	There should be total ban on non-essential visitors at sites.	Awareness through circular and intranet
13	Hospitals/clinics in the nearby areas, which are authorised to treat COVID-19 patients, should be identified and list should be available at work place all the times.	List prepared and available in Hospital.

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**(ANNEXURE - V TO SPECIAL CONDITIONS OF CONTRACT)**

<p><b>TKIS - India / Vendor</b></p> <table style="width: 100%;"> <tr> <td rowspan="8" style="writing-mode: vertical-rl; transform: rotate(180deg);">Category Codes (Submission Purpose)</td> <td><input type="checkbox"/></td> <td>1</td> <td>For Approval</td> </tr> <tr> <td><input type="checkbox"/></td> <td>2</td> <td>For Review / Comments</td> </tr> <tr> <td><input type="checkbox"/></td> <td>3</td> <td>For Information</td> </tr> <tr> <td><input type="checkbox"/></td> <td>4</td> <td>For Engineering</td> </tr> <tr> <td><input type="checkbox"/></td> <td>5</td> <td>For Enquiry</td> </tr> <tr> <td><input type="checkbox"/></td> <td>6</td> <td>For Order Placement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>7</td> <td>Final &amp; Approved</td> </tr> <tr> <td><input type="checkbox"/></td> <td>8</td> <td>Released for Construction</td> </tr> </table> <table style="width: 100%;"> <tr> <td rowspan="6" style="writing-mode: vertical-rl; transform: rotate(180deg);">Acceptance Codes (Approval Codes)</td> <td><input type="checkbox"/></td> <td>1</td> <td>Approved</td> </tr> <tr> <td><input type="checkbox"/></td> <td>2</td> <td>Approved for Manufacturing / Fabrication with Comments as marked</td> </tr> <tr> <td><input type="checkbox"/></td> <td>3</td> <td>Not Approved / Resubmit</td> </tr> <tr> <td><input type="checkbox"/></td> <td>4</td> <td>Retained for Information / Records</td> </tr> <tr> <td><input type="checkbox"/></td> <td>5</td> <td>Reviewed</td> </tr> <tr> <td><input type="checkbox"/></td> <td>6</td> <td>Reviewed as Noted / Resubmit</td> </tr> </table> <p><b>Remarks for AC2 :</b> This marked-up drawings is hereby approved for fabrication / manufacturing and shall be re-submitted after revision. This drawing should be revised only to the extent of TKIS - India / Owner / Client comments. Any other changes made by you will not be considered unless clearly highlighted in covering letter asking for approval.</p> <p><b>This approval / review does not absolve the supplier from the full responsibility for design and fabrication.</b></p> <p>Date : ____/____/____ Name : _____</p>	Category Codes (Submission Purpose)	<input type="checkbox"/>	1	For Approval	<input type="checkbox"/>	2	For Review / Comments	<input type="checkbox"/>	3	For Information	<input type="checkbox"/>	4	For Engineering	<input type="checkbox"/>	5	For Enquiry	<input type="checkbox"/>	6	For Order Placement	<input type="checkbox"/>	7	Final & Approved	<input type="checkbox"/>	8	Released for Construction	Acceptance Codes (Approval Codes)	<input type="checkbox"/>	1	Approved	<input type="checkbox"/>	2	Approved for Manufacturing / Fabrication with Comments as marked	<input type="checkbox"/>	3	Not Approved / Resubmit	<input type="checkbox"/>	4	Retained for Information / Records	<input type="checkbox"/>	5	Reviewed	<input type="checkbox"/>	6	Reviewed as Noted / Resubmit	<p><b>TKIS - India / Owner / Client</b></p> <table style="width: 100%;"> <tr> <td rowspan="8" style="writing-mode: vertical-rl; transform: rotate(180deg);">Category Codes (Submission Purpose)</td> <td><input type="checkbox"/></td> <td>1</td> <td>For Approval</td> </tr> <tr> <td><input type="checkbox"/></td> <td>2</td> <td>For Review / Comments</td> </tr> <tr> <td><input type="checkbox"/></td> <td>3</td> <td>For Information</td> </tr> <tr> <td><input type="checkbox"/></td> <td>4</td> <td>For Engineering</td> </tr> <tr> <td><input type="checkbox"/></td> <td>5</td> <td>For Enquiry</td> </tr> <tr> <td><input type="checkbox"/></td> <td>6</td> <td>For Order Placement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>7</td> <td>Final &amp; Approved</td> </tr> <tr> <td><input type="checkbox"/></td> <td>8</td> <td>Released for Construction</td> </tr> </table> <table style="width: 100%;"> <tr> <td rowspan="6" style="writing-mode: vertical-rl; transform: rotate(180deg);">Acceptance Codes (Approval Codes)</td> <td><input type="checkbox"/></td> <td>1</td> <td>Approved</td> </tr> <tr> <td><input type="checkbox"/></td> <td>2</td> <td>Approved for Manufacturing / Fabrication with Comments as marked</td> </tr> <tr> <td><input type="checkbox"/></td> <td>3</td> <td>Not Approved / Resubmit</td> </tr> <tr> <td><input type="checkbox"/></td> <td>4</td> <td>Retained for Information / Records</td> </tr> <tr> <td><input type="checkbox"/></td> <td>5</td> <td>Reviewed</td> </tr> <tr> <td><input type="checkbox"/></td> <td>6</td> <td>Reviewed as Noted / Resubmit</td> </tr> </table> <p>Date : ____/____/____ Name : _____</p>	Category Codes (Submission Purpose)	<input type="checkbox"/>	1	For Approval	<input type="checkbox"/>	2	For Review / Comments	<input type="checkbox"/>	3	For Information	<input type="checkbox"/>	4	For Engineering	<input type="checkbox"/>	5	For Enquiry	<input type="checkbox"/>	6	For Order Placement	<input type="checkbox"/>	7	Final & Approved	<input type="checkbox"/>	8	Released for Construction	Acceptance Codes (Approval Codes)	<input type="checkbox"/>	1	Approved	<input type="checkbox"/>	2	Approved for Manufacturing / Fabrication with Comments as marked	<input type="checkbox"/>	3	Not Approved / Resubmit	<input type="checkbox"/>	4	Retained for Information / Records	<input type="checkbox"/>	5	Reviewed	<input type="checkbox"/>	6	Reviewed as Noted / Resubmit
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Rev.	Status	Description	Date	Prepared	Date	Checked	Date	Approved	AC
				<h1>Barcode</h1>					Category Code: -
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**CLIENT : MANGALORE REFINERY AND PETROCHEMICALS LIMITED (MRPL)**

**CONSULTANT : THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PVT. LTD.**

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- a) tkIS- India Construction HSE Manual– 62 pages
- b) List of Applicable HSE instructions –
- c) MRPL Workers Safety Policy – 39 pages
- d) Prohibition/ ban on use of Hydra Crane - 4 pages
- e) Guidelines on Personal Protection equipment (PPE) – 50 pages
- f) Guidelines for SOP of COVID19(latest) at Project Construction Sites



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## 1 Purpose

This Construction HSE requirement provide the guidelines to the EPC Contractor on Health, Safety & Environment (HSE) practices to be implemented at construction sites at PFCC UNIT FLUE GAS WET GAS SCRUBBER SYSTEM, for Mangalore Refinery and Petrochemicals Limited (MRPL), at Mangalore.

This HSE requirement will also provide the basis for PMC/Owner to monitor EPC Contractor and control HSE compliance at site. This HSE requirement contains basic HSE requirements to be followed during the execution phase of the project.

## 2 Scope

This document applies to construction work undertaken by EPC Contractor at PFCC UNIT FLUE GAS WET GAS SCRUBBER SYSTEM, for Mangalore Refinery and Petrochemicals Limited (MRPL), at Mangalore.

- This document is applicable to all activities and functions of construction including all disciplines such as materials management, civil, mechanical, electrical, instrumentation etc.
- All construction activities in this project shall be executed in accordance with applicable national laws, HSE regulations, HSE guidelines as mentioned in this plan.
- It applies equally to permanent and temporary works, demolition and site clearance.
- In case of variation in the various documents attached with this HSE plan originated by PMC/Owner , SCC (special conditions of contract) and GCC the more stringent clause shall be applicable as per the discretion of Engineer – in Charge.

## 3 Terms and Abbreviated terms

### Hazard

Source or situation with a potential for harm in terms of human injury or illness, damage to the environment, damage to property, damage to the workplace environment or a combination of these.

### Hazard Identification

Process of recognizing the existing of a hazard and defining its characteristics.

### Maximum tolerable risk

The highest tolerable risk of a specific technical process or condition.



### Risk

Combination of the likelihood and consequence(s).

### Risk Assessment (RA)

Overall process of estimating the magnitude of risk and deciding whether or not the risk is tolerable.

### Safety

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Control of recognized hazards to achieve a tolerable level of risk.

### **Significant Risk**

Risk that is determined to be medium or high.

### **Accident**

An accident is an incident which has given rise to injury, ill health or fatality. An (unplanned and / or undesired) event which causes personal injury, environmental damage, financial loss or liability.

### **Commissioning**

The phase of work carried out under the direction of the Commissioning Manager after hand-over of MC Responsibility from Construction to Commissioning.

### **EPC Contractor's Areas**

Areas related to EPC Contractor 's scope of supply, Areas might be limited by a temporary fence, as indicated on lay out drawings/plot plans, where construction can take place. Lay out drawings/plot plans includes areas for temporary site facilities and lay-down areas.

### **Construction**

Construction activities include direct (prefabrication, assembly, mechanical completion, pre-commissioning, commissioning etc.) and indirect (demolition of existing equipment / buildings, scaffolding, transport at the Company's Site, maintenance of equipment etc.) activities up to hand-over of MC Responsibility from Construction to Commissioning.

### **Hand-over**

The point in time at which responsibility for the plant, area, or system is transferred from the Site manager to the Commissioning Manager; hand-over of MC Responsibility from Construction to Commissioning.

### **Incident**

Work related event in which an injury or ill health regardless of severity or fatality or environment pollution occurred or could have occurred.

### **Notifiable Incident**

An event requiring notification to Statutory Authority as prescribed in the applicable Statutory Act, or Legislation of the Country, State or Territory in which the work is being performed.



In India as per The Building and Other Construction Workers' (Regulation of Employment and Conditions

or service) Central Rules, 1998:

I. "Notice of any accident on the Construction Site which either –

(a) Causes loss of life; or

(b) disables a building worker from working for a period of 48 hours or more immediately

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following the accident, shall forthwith be sent by telegram, telephone, fax or similar other means including special messenger within 4 hours in case of fatal accidents and 72 hours, in case of other accidents involving building worker to –

- the Regional Labor Commissioner (Central), having jurisdiction in the area in which the establishment in which such accident or dangerous occurrence took place is located.

Such Regional Labour Commissioner (Central) shall be the authority appointed under Section.

- The Board with which the building worker involved in accident was registered as a beneficiary;

- The Director General; and

- the next of kin or other relative of building worker involved in accident.

II. Notice of any accident at construction site of a building or other construction work which –

(a ) causes loss of life; or

(b) disables such building worker from work for more than 10 days following the incident, shall also be sent to –

(i) the officer in-charge of the nearest police station;

(ii) the District Magistrate by order so desires to the Sub-Divisional Magistrate.

### **First Aid Case (FAC)**

First Aid case is defined as once-off treatment and /or subsequent observation of minor scratches, cuts, burns, splinters etc., which do not require professional medical treatment however in some instances, a qualified nurse or a medical practitioner or registered professional, as the sole person on site may administer the First Aid and the injured person resumes to his normal work within a maximum of 2 hours following the incident.



### **Medical Treatment Case (MTC)**

Medical Treatment Case is defined as any work-related injury or disease including loss of consciousness requires the treatment of a Registered Medical Practitioner/qualified doctor, or nurse in consultation with a qualified doctor, and the injured person resumes to his normal work within a maximum of 7 hours following the incident.

### **Restricted Work Case (RWC)**

RWC is defined as an injury or occupational illness that does not lead to absence after the day of the accident:

- Because of alternative job assignment.
- Returning to their normal duties with some restriction.
- Returning to their normal duties gradually.
- Being assigned to a different job on a temporary basis.

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- Attending training course's applicable to their work.

### **Lost time injury (LTI)**

Injury / accident at work leading to unfitness for work and absence for 48 hours from the time of incident

### **Lost time injury (LTI) rate**

No. of Lost Time Injuries X1 000 000 / Man-hours Worked.

### **Near Miss**

An (unplanned and / or undesired) event or occurrence which had the potential to cause personal injury or illness, environmental damage, financial loss or liability is called Near Miss.

### **Fatality**

A death resulting from a work-related accident, with no time limit between the date of the accident and the date of death; fatalities are reported for direct employees, contractors/subcontractors and third parties.

### **Occupational injury**

An injury which results from an incident at work.

### **ALARP**

As Low As Reasonably Practicable; For a risk to be ALARP it must be possible to demonstrate that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained.

### **PMC**

Project Management Consultant – ThyssenKrupp Industrial Solution India Pvt. Ltd.

### **Owner**

Mangalore Refinery and Petrochemicals Limited (MRPL)

### **EPC Contractor**

EPC Contractor engaged for Construction /Erection Work.

### **Sub Contractor**



Contractor engaged by EPC Contractor

### **ISBL**

Inside Battery Limits

### **MSDS**

Material Safety Data Sheet - a document that contains information on the potential health effects of exposure to chemicals, or other potentially dangerous substances, and on safe working procedures users should adhere to when handling chemical products.

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## **OSBL**

Outside Battery Limits – Outside normal process units of plants; e.g. Tank farms, Shops, offices, etc.

## **PTW**

Permit to Work – Written authorization for work; includes responsible Persons names, describes tasks, hazards, controls, date, time, location, duration of work etc.

## **4 Standards & Specifications**

What hereinafter described is in compliance with:

National and local Laws and Regulations regarding Occupational Health, Safety, Environment HSE requirements as indicated by the contract.

For topics not fully covered by the above by this Site HSE Plan and associated project documents, Project management shall consider the most relevant international regulations or recognized standard as agreed by Project Management.

## **5 HSE Policy**

The purpose of the project HSE Policy is to clearly and concisely communicate Project Management's commitment to HSE to all EPC Contractor's and vendors.

## **6 Project HSE Organisation**

EPC Contractor shall identify their organization for HSE in all stages of the work, and submit to PMC/Owner for review and approval, supported by key responsibilities.

The EPC Contractor Site HSE Department shall be managed by the Site HSE Manager, who reports to the Site Manager on functional issues.

Both Site Manager and Site HSE Manager shall monitor HSE compliance and advise project supervisors and engineers in regard to HSE policy and compliance issues.



## **7 Sub-Contractor Evaluation & Control**

Where work is sub-contracted, EPC Contractor shall ensure that the HSE requirements for the work are cascaded to the Sub-Contractor in full.

## **8 The EPC Contractor's shall implement HSE norms in the following manner**

EPC Contractor's site specific HSE Plan shall show how EPC Contractor will monitor the HSE compliance by vendors and Sub Contractor to project standards and specifications.

EPC Contractor shall submit appropriate site specific HSE Plan covering all requirement as mentioned in this document.

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**Following routine activities shall be performed by EPC Contractor but not limited to:**

**Daily HSE activities at site:**

- HSE induction/mandatory PPE for the new entrants to site/job specific PPE (As and when required).
- Reflective Jacket is mandatory for the workers.
- Full Body Harness of five D-ring and double lanyard shall be used (CE certified as per EN 361:2002, EN 358:2004, EN 13 standards).
- Name of the person along with blood group shall be mentioned on the helmet. Appropriate Color coding (as per Owner existing plant requirement) of helmet shall be maintained for clear identification
- Daily tool box meeting (attendance sheet for work groups in their respective area of work)
- Pre job discussion for the workmen.
- Relevant Work permit for the jobs at site.
- Inspection of work platforms for work at height. (Scaffold, tags, ladder inspection.)
- Confined space, atmospheric monitoring and preparation of documents and permits (As per requirement).
- Lifting plan for critical lifts.
- Lock out tag out procedures wherever needed.
- Electrical isolation/energisation permits wherever needed.
- Road closure permits as per requirement.
- Site monitoring, daily HSE observations.
- Daily inspection of construction equipment by operators. (Inspection checklist).
- Daily Reports for HSE Statistics
- Daily inspection of scaffolding and work at height
- Tool Box training

**Weekly HSE activities:**

- Weekly inspections of ELCB/GFCI.
- Weekly HSE meeting with the EPC Contractor's.
- Weekly Site inspections with site in charge of tkIS and EPC Contractor's.
- Inspection of welfare facilities/ hygiene for workmen at site.
- Weekly Reports for HSE updates
- Weekly inspection of sites
- Weekly inspection of cranes, lifting and construction equipment
- Training reports

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### Monthly HSE activities:



- Inspection of lifting tools and tackles.
- Inspection of cranes and construction equipment, service vehicles.
- Inspection of fire extinguishers.
- Inspection of power tools.
- Inspection of fall protection equipment.
- Inspection of electrical installations and DGs etc.
- Preparation of monthly HSE statistics and KPI for the site.
- MOM of monthly HSE committee meeting.
- Monthly incentives by Sub Contractor's to encourage the workers/supervisors.
- Monthly HSE/Incident Statistics.
- HSE Performance Indicators - Construction Activities.
- Inspection of first aid boxes. (List of First aiders shall be displayed near First Aid Box)
- Monthly HSE Report
- Monthly Improvement plan against the EPC Contractor Evaluation
- Monthly HSE activity plan to be submitted every month in advance and submitted for approval and witnessing the activities by Owner.

### Annual HSE Inspections:

- Third party Inspection of lifting tools and tackles.
- Third party Inspection of cranes, lifting equipment, Mobile elevated work.
- Platforms, Man Lifter, man baskets, pressure vessels etc.
- Annual inspection of fire extinguishers by authorised service agency.
- Annual incentives by EPC Contractor's to encourage the workers/supervisors and
- Observation of important events such as National Safety day, National Fire Safety Day, World Environment Day and conducting competitions during such events.

### Other activities/Documents:

- Emergency procedures, Mock drill - every six months - if not possible table top
- Discussion by emergency response team shall be held and recorded.
- Housekeeping checklist every fortnight.
- Near miss incident report.
- Work place incident report.
- List of documents of external origin.
- Safe Work Method Statement, OH & S Hazard Identification and Risk Assessment.
- Environmental Aspects Impacts Evaluation Register.
- Evidence of disposal of hazardous material through authorised party at designated place.
- Check List for Compliance to HSE Legal / Other Requirements of project.

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- List of applicable HSE Legal / Other Requirements.
- Site HSE objectives and targets.
- Achievement against HSE Objectives & Target.
- Medical check-up certificate of the workmen engaged by the EPC Contractor.
- Competency certificates for special trades, e.g. Electricians, crane operators, vehicle drivers, radiography technicians, first aiders etc.
- Tie up with local hospital.
- MSDS for chemicals and hazardous material at site.
- Disciplinary action records for HSE violations.
- Record of internal and external audits and close out status.
- Identification and Trainings for the target groups.
- Medical Insurance is mandatory and shall be submitted to Owner/Engineer-in-charge.



## 9 EPC Contractor HSE Roles & Responsibilities

- EPC Contractor shall be responsible for the development of the Site HSE Plan for their phase of the project (Construction) which shall be in compliance with local regulations and HSE requirements as indicated in the contract.
- EPC Contractor shall be responsible for the adherence to the specified HSE norms while performing the work scope defined in their contracts and that the constructed product achieves the level of safety inherent in its design.
- EPC Contractor shall be required to provide the necessary resources, systems, equipment and materials to execute work safely and ensure that the HSE requirements are fulfilled.
- EPC Contractor shall be required to prepare a project specific HSE Plan in line with this guideline which fully addresses their work scope, identifying the plans, procedures and instructions that are to be observed in controlling HSE implementation during the activity in their work scope.
- EPC Contractor shall be responsible for the management of their vendors and suppliers to ensure the HSE compliance during the construction.
- EPC Contractor shall be responsible for the management of all project HSE aspects at site during the construction phases. EPC Contractor shall take the overall responsibility for project HSE requirements and for the achievement of project HSE objectives as per HSE policy and commitments. It shall be their duty to assure sufficient resources, human and material, are allocated for all HSE requirements.

### 9.1 EPC Contractor Site Manager:

- Providing inputs for updating HSE Plan for site specific requirements
- Develop site specific emergency plan.



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- Coordinate the field HSE activities, and effective implementation of Site specific HSE plan
- Ensure conducting of HSE Training and Awareness programs at site.
- Forms HSE Committee at site.
- Conduct periodic safety meetings.
- Authorize disciplinary action, as required.
- Participate in incident/accident analysis.
- Coordinate with the client/owners, EPC Contractor's & Head Office.
- Review/approval of erection plan for Critical Lift
- Each EPC Contractor and Sub Contractor Site Manager is responsible, and will be held accountable, for the safety of their sub- Contractor's and work crews and for ensuring that all equipment, materials, tools and procedures remain in compliance with job site requirements, including:
- Holding supervisors accountable for safety and actively promote safe work performance on the part of all employees.
- Participate in and cooperate with all safety program requirements to be implemented for the project.
- Provide timely reporting of safety performance and incidents Maintain information regarding training and education in safety required by such programs.
- Stopping unsafe work (acts and/or conditions) immediately until corrective action can be taken.

## 9.2 EPC Contractor Area/Discipline Managers/Engineers



- Assist HSE personnel for effective implementation and promotion of safe work practices.
- Interact with HSE personnel and implement corrective measures wherever required.
- Be aware of the hazards associated with the activities and the necessary control measures.
- Participate in HSE meetings, as required.
- Be aware of the work permit system and ensure compliance with the same.

## 9.3 EPC Contractor Site HSE Manager:

Site HSE manager reports to RCM and shall assist site management to effectively implement this site specific HSE plan.

The EPC Contractor site HSE manager shall:

- Assist RCM in preparation of site specific emergency plan.
- Co-ordinate with EPC Contractor's for implementation of project HSE Plan, objectives and targets.
- Co-sign site specific emergency plan, necessary work permits as per requirements of job.
- Ensure compliance and in case of violations, initiate disciplinary action, as required.
- Ensure that HSE induction programs/awareness programs and Toolbox meetings are conducted regularly.

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- HSE promotion at site through various slogans, boards, orientation sessions etc.
- In case of any accident/incident, conduct analysis and suggest corrective measures.
- Liaison with Owner and Consultant representatives on HSE matters on behalf of EPC Contractor to Verify and maintain the statistical data as required.
- Performing periodic inspections to ensure compliance with tkIS HSE standards and requirements of project specific HSE plans.
- Conducting periodic inspection of equipment, required by regulations and/or tkIS HSE requirements.
- Participate in construction meetings, in order to be able to forestall any new risks/ Environmental aspects.
- Organize periodic meetings with EPC Contractor's representatives, to discuss typical problems and particularly important aspects of HSE.
- Taking particular care whenever EPC Contractor is to undertake a new type of work that may involve special risks. Such special risks, if any, shall always be well communicated and special procedures shall be instituted.
- Maintain HSE statistics and records as per HSE requirements.

#### 9.4 EPC Contractor HSE Officer

- The inspection of HSE performance of the workers on site on daily basis
- The preparation of observation notifications
- To ensure that all work equipment meet the established HSE requirements
- To ensure that HSE equipment, firefighting facilities and emergency escape and access ways are readily available all time
- Monitoring the correct use of work permits
- Stop construction works in case of imminent danger to the workforce or materials, record it and ensure the correction to be done by the concern person at the earliest.

#### 9.5 EPC Contractor HSE Supervisors

- The HSE Supervisors are responsible for providing HSE advisory support to construction supervisors and HSE officers within their assigned area of responsibility.
- They will promote co-operation in HSE matters on all levels.
- They will participate in hazard recognition reviews with supervisors and crews.
- They will monitor regular implementation of safety controls required by project procedures and regulatory requirements.
- They will participate in HSE site inspections, audits and incident investigations.
- They will provide information, instruction and training on HSE issues in field locations.
- Considering extensive scaffolding during construction- Scaffolding expert to be deployed at sites.

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## 10 Site Safety Committee

- The Site Safety Committee, consisting of Company, EPC Contractor's and main site management and construction personnel, shall meet once a month to review the implementation of the HSE Program.
- This committee shall Organize periodic, HSE Committee Meetings to effectively manage all activities throughout the duration of the construction phase.

## 11 HSE personnel

The EPC Contractor's shall include with their manpower:

- One (1) Safety supervisor per fifty (50) workers. (HSE Supervisor-Recognised Degree in Science/Diploma in Engineering and Diploma in Industrial Safety with min. 1 year Experience)
- One (1) Safety officer for every 100 workers in addition of Safety supervisor (HSEO-Recognised Degree in Science/Diploma in Engineering and Diploma in Industrial Safety with min. 5 years' experience for diploma holder and 3 years' experience with degree)
- HSE manager for every 500 workers in addition of Safety supervisor and officer (HSE Manager-Recognised Degree in Science/Diploma in Engineering and Diploma in Industrial Safety with min. 15 years' experience)



Please find the criteria below

Site HSE Professionals qualification and experience requirement is detailed below:

HSE PROFESSIONAL	QUALIFICATION	MINIMUM YEARS OF EXPERIENCE IN CONSTRUCTION SAFETY
Site HSE Manager	Recognized Degree in Engineering with recognized Diploma in Industrial Safety	8
	Recognized Diploma in Engineering with recognized Diploma in Industrial Safety	10
Site HSE Officer / Site HSE Engineer	Recognised Degree in Engineering with recognized Diploma in Industrial Safety	5
	Recognized Diploma in Engineering with recognized Diploma in Industrial Safety	7
	Recognized Degree in Science with recognized Diploma in Industrial Safety	10
Site HSE Supervisor	Diploma in Engineering with Diploma in Industrial Safety	2
	Recognized Degree in Science with recognized Diploma in Industrial Safety.	3

**Note:** 1. If more than one HSE Officer is working at site, one HSE Officer among them shall be nominated as Site HSE Representative / Manager.

2. Site HSE Officer / Engineer / Supervisor CV is to be approved by tkIS India.

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## 5.2 Site HSE Personnel deployment

Contractor, as a minimum requirement shall deploy the following HSE Personnel at Site:

Sr. No.	Number of persons at Site	HSE Professional
1	Up to 50 persons deployed by contractor at Site	Deploy one HSE Supervisor
2	For 51 to 500 persons deployed by contractor at Site	Deploy one qualified & experienced HSE engineer/ HSE officer in addition to one HSE Supervisor for every 50 workmen subject to net ratio of HSE personnel: workmen is 1: 50.
3	For more than 500 persons deployed by contractor at site	Deploy one HSE Manager in addition to one HSE engineer/ HSE officer for every 500 and one HSE Supervisor for every 50 workmen subject to net ratio of HSE personnel: workmen is 1 : 50.
4	Ratio	1:50 ( One HSE supervisor per 50 workmen) 1:500 ( One HSE officer per 500 workmen) 1: 1000 ( One HSE manager per 1000 workmen)

No work shall be started at site until above HSE personnel are mobilized and physically present at site. The contractor shall submit a safety program clearly indicating the line of responsibility and reporting. Contractor shall furnish CV of the site HSE personnel he intends to mobilize, for tkIS India approval.



However for this project contractors to follow MRPL HSE Guideline for Contractor Workers.

## 12 Medical Services/First aid facility

A dedicated medical service /First aid facility inclusive of medical Ambulance fitted with all lifesaving equipment's and accessories with qualified staff and male nurse shall be established at site on 24X7 basis by EPC Contractor. The Medical Services staff/male nurse shall be responsible for maintaining a medical facilities logbook on which all the relevant details of the injury and illness evaluation and treatment have to be registered. The log-book shall include all "Medical" and all "Industrial" Incidents cases. The Medical staff shall notify their respective HSE Manager immediately to report the occurrence of an injury treatment case. The respective HSE manager shall then respond in an appropriate method to control the incident at site as well as notify the Site Manager (verbal notification immediately). Emergency transport shall be described in the EPC Contractor's Emergency Preparedness Plan.

## 13 Training

- All employees shall receive ongoing HSE induction and training to develop and maintain HSE skills for works they are requested to perform, supervise or manage.
- EPC Contractor shall develop a training schedule and outline of the training programs. EPC Contractor shall be responsible, that training sessions are held by a competent and qualified person. Records of given training shall be compiled by means of training card and attendance sheet, individually related to every employee.

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### 13.1 Induction

- EPC Contractor shall provide basic induction training covering overall HSE issues, to all employees prior to being allowed to start work.

### 13.2 Risk Management (Hazard Identification and Risk Assessment):

- Supervisors and employees will be given an overview of Project HSE Procedures during Orientation Training. They shall also review specific Project Procedures which provide information and instructions on project procedures where exposure to risk is high, (e.g. Fall prevention and protection, Confined space awareness, Basic Electrical Safety, Basic Vehicle safety, Hazard recognition, Hazard Communication and Emergency Preparedness and response.
- Safe Work Method Statement to be prepared for each activity and Risk assessment to be identified as per the job steps. All Risk mitigation steps needs to be communicated to all workmen working on site

### 13.3 HSE procedures and instructions



- Detailed instructions shall be provided to individual Work/ Craft groups involved in specific tasks; e.g. confined space entry, Permit to Work.

### 13.4 Supervisor training

- All supervisors shall receive training on relevant project procedures to be used in carrying out their scope of work, including their responsibilities in the implementation of the procedure. They are responsible for reinforcing training and monitoring their employees to ensure their employees conducts their work in a safe manner.

### 13.5 Tool Box Talks (TBT)

- Daily Toolbox talks will be used to reinforce HSE issues addressed during induction and new issues arising as the project develops. They shall be conducted on a daily schedule, and are intended to be delivered to groups of workers composed of several work crews working in the same area. HSE topics will be supplemented by information on the general status of HSE and recent incidents, near misses and Lost Time Observations. Area Supervisors shall lead, attend and participate in the presentations. The same platform will be used to check personal protective equipment of each and every individual prior to start the job. Defective PPE needs to be replaced by proper one.
- Apart from Daily Tool Box talks, Mass Tool Box Talks to be conducted every fortnight.
- Arrangements for conducting Monthly safety day on various safety themes to be done and to be celebrated.

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### 13.6 Safe driving:

The EPC Contractor shall implement safe driving training programs for their drivers. The training shall include but not limited to the following:

- Providing information concerning project requirements and defensive driving.
- Incentives shall be given to drivers to maintain or establish a record of no accidents
- The mandatory use of seat belts and observing project maximum speed limits will be stressed during training.
- Weekly HSE Briefing to be done for Drivers on safe driving practices inside refinery premises.
- TPI test reports of all heavy equipment to be obtained from competent persons identified by The Directorate of Odisha Factory & Boilers

### 13.7 Hazard Management:

EPC Contractor shall ensure the management of hazards and risks will include, as a minimum:

- Identification and categorization of hazards associated with the Project work scope.
- Development of hazard control, mitigation and recovery measures to deliver for safe completion of job.
- Application of codes and standards and sound engineering/construction practices.

All discipline engineers shall participate in hazard identification and mitigation as part of their daily activities.

In addition, Formal hazard identification activities shall be undertaken through means of structured processes.

### 13.8 Hazard Assessment

A record shall be produced of HSE related hazards each shall also receive a risk rating and risk reduction methods which are acceptable for work activities on the project.



- Frequency of exposure.
- Degree of harm likely to result from the exposure.
- Probability of occurrence.
- It shall be documented in HIRA (Hazard Identification and Risk Assessment)

## 14 Emergency Response Plan

### 14.1 Introduction

- EPC Contractor shall provide a system and resources on the project site to allow for timely response to unexpected situations or occurrences which present an acute threat to personnel and/or COMPANY assets.



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- EPC Contractor shall identify and assess the potential emergencies and enter findings on the HIRA, control measures shall be identified which will reduce risk to acceptable levels.
- EPC Contractor shall provide for an organization whose duties include the management and response re-sources to deal with emergencies.

## 14.2 Training



EPC Contractor shall provide for all workers and visitors to be trained on what they should do in case of emergency, this will normally occur during site induction.

Training shall include:

- Overview of potential emergencies
- Emergency communication and alarms
- Safe shut down of equipment/vehicles
- Muster procedures
- Training drills shall be conducted to prepare employees for response to site emergencies.
- Response planning may include any one or any combination of the following;
  - Medical response
  - Fire/Explosion
  - Rescue
  - Environmental
  - Mutual Help
- Practical arrangements for imparting training on work at height shall be made available at site and workers shall be issued competency cards & stickers after clearing the test and medical fitness.
- Practical arrangements for imparting training on safe rigging shall be made available at site. Workers shall be issued competency cards and stickers based on the performance in the test.
- Practical arrangements for erecting & dismantling scaffolds to be made available at site and workers on passing the test shall be provided with competency cards & stickers on helmets.
- Qualified electricians shall be deployed for works on electrical equipment as per Odisha Factory Rules

## 14.3 Emergency Communications

EPC Contractor shall establish an audible alarm system at site to notify all employees of an emergency. All employees are to stop work and prepare to leave their task location or provide assistance to the CERT (EPC Contractor Emergency Response Team) if requested. If employees are in the affected area they will be instructed to make their work area safe, leave the affected area and report to Assembly Point.

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EPC Contractor shall provide for a communications system to be established prior to project mobilization which will allow for rapid mobilization of the CERT (EPC Contractor Emergency Response Team) and local response resources. This system should include a manned phone number which can be used to provide information and mobilize a response team.

Emergency Preparedness Plan shall include details on the following;

- Response Organization, including roles, responsibilities and contact information
- Employee Responsibilities
- Site Response resources
- Outside Response resources
- Communication and alarms
- Evacuation
- Government Notification
- Police or Regulatory Agency site visits and investigations
- Reference document
- Hand Operated Sirens to be provided at Work sites for alerting workers in case of any emergency.
- Public Announcement system to be made available at site for safety campaigns & emergency communication
- Letters CERT shall be displayed with reflective material on the cotton overalls of workers identified as EPC Contractor Emergency Rescue Team.
- All the workers shall work donning cotton overalls with the name of the firm written at the back. Reflective jackets shall be provided at the back , front and on hands. Reflective strips shall also be provided on helmets
- For emergency communication, only intrinsically safe mobile phones/ walky talky sets are to be used with approval from EIC and Fire & safety.
- Portable Gas detectors / Area monitoring gas detectors shall be used to detect any gas leaks



## 15 Meetings

All formal meetings including safety-relevant meetings during the execution of the project shall be documented. The activities and conclusions shall be addressed to designated responsible persons and target dates shall be specified for the completion of the items discussed. The corresponding Minutes of Meetings (MOMs) will be prepared and distributed, as per Project requirements.

### 15.1 Kick off Meetings

On mobilisation of EPC Contractor, prior to start of work, EPC Contractor HSE Manager, shall organise a meeting with Sub Contractor's HSE team & Construction Engineers. Owner's representative shall attend the Kick-off meeting as applicable.



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During this meeting, safety, medical, fire protection, and other HSE related aspects of the work under consideration shall be reviewed, so as to ensure that EPC Contractor is fully aware of HSE requirements.

## 15.2 Weekly HSE Meeting

Throughout the construction phase a weekly HSE meeting shall be held. This meeting shall be attended by EPC Contractor's Site Manager and Site HSE Manager and the respective representatives of Sub Contractor's Site and HSE Management. This meeting is chaired by the Site Manager. Past, present and future safety related topics shall be discussed including:

- Milestones achieved
- Incident review
- Near miss (Number / Summary)
- First aid (Number / Summary)
- Medical treatment (Number / Summary)
- LTI (Number / Days without LTI / Summary)
- Incidents
- Fire (Number / Summary)
- Statistics (Hours / Manpower / IR / LTI / HSE Personnel / First Aiders)
- Environmental issues; Waste generated and Recycled / Spills (Numbers / Summary)
- Site Inspection (Number / Summary)
- Site Audits (Number / Summary)
- Updates on action items outstanding from prior incidents or site inspections
- Training completed (Induction / Supervisor / Craft)
- New initiatives

## 15.3 Ad-Hoc Meeting



The purpose of ad-hoc meeting is to ensure the discussion and brainstorming of major, non-routine and hazardous construction activities and operations prior to its actual execution.

The preparation and submission of a detail construction method statement with a hazard and risk assessment shall be prepared.

## 16 Risk assessment report.

A meeting will be organized after all respective personnel involved have thoroughly studied the Construction Method Statement and Risk Assessment report submitted by EPC Contractor s/involved.

The objectives of such ad-hoc meetings are:

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- Discuss and analyse construction method and sequence of work to prevent the occurrence of incident/accident. Such discussions shall include the proposed machinery, plant, equipment and personnel involved their capacity, certification, qualification and experiences etc.
- Identify hazards underlying in activities, the risk of their occurrence, the potential impacts and significant aspects of an activity.
- The mitigations measures proposed to reduce and minimize the potential impacts.
- All first line supervisors for disciplines and area/discipline engineers shall attend these meetings at the start of shift on a daily basis. Records
- All matters discussed in these meetings shall be recorded, kept and filed by EPC Contractor HSE Rep. A copy of the meeting minutes shall be distributed to the Sub Contractor's/ for the incorporation of the matters discussed into the method statement and used subsequently for the supervision of the actual work.
- If a new task is undertaken a new Pre-task meeting is required to be held which shall review the potential hazards of the task as indicated above.
- A new full review should be considered if one or more of the conditions change which changes the hazard exposures, in such cases the entire crew should be made aware of the changes and any new hazards or controls which have been imposed, reduced or removed.



## 17 Site Inspections

### 17.1 Daily Safety monitoring

Daily monitoring shall be conducted to confirm safety compliance onsite. EPC Contractor HSE Representative shall prepare a Safety Inspection Report (Daily Log) to record findings; the Site HSE Manager shall be immediately informed of incidents or near misses which have the potential for a Medical treatment/ lost time incident. If there are minor non-conformances that can be handled by the HSE Supervisor immediately, then immediate corrective action shall take place. Where the situation exposes any individual to an injury or accident and/or generates risk for operating plants (if applicable), the work shall be immediately suspended until the situation is rectified.

### 17.2 Weekly Site Safety Walk

On weekly basis, the EPC Contractor's site management will conduct site inspections on one or more areas of the project, under the lead of the Site Manager. Participation of Site Construction & HSE Management personnel as well as Sub Contractor's counterparts is required. The participation of a COMPANY representative shall be requested.

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Appropriate immediate corrective action shall be taken, if further actions are required deficiencies shall be identified and a responsible person assigned with a target date for finalization of any action items.

### 17.3 Scheduled Inspections of Lifting Tools, Power Tools & Safety Devices

Scheduled inspections of the Lifting Tools, Electrical Equipment other Power Tools shall be undertaken and provided with appropriate colour coding and documentation.

The Welding Machines shall be adequately protected against inclement weather condition, double earthing, VRD and the return earthing at the job shall be as close as possible.

Gas cylinder trolley shall be provided as per design by client, Color coding of cylinder is mandatory, No LPG cylinders shall be used.

Appropriate immediate corrective action shall be taken, if further actions are required deficiencies shall be identified and a responsible person assigned with a target date for finalization of any action items.

## 18 Permit to Work (PTW) System

Owner will issue a "Permit to Work Procedure" (PTW), according and in agreement contractual agreements.



All project and EPC Contractor personnel will abide by the Project Permit to Work System and its affiliate procedures. PTW-covered activities will not commence unless a Permit document is accurately completed and sign by authorized employees.

All personnel participating in Permit to Work activities will receive appropriate training.

Depending on the kind of project and the existence of boundaries to adjacent live facilities, a Permit to Work system will be established for various works, considering all safety aspects covered in the risk assessments.

Examples of activities that may require a Work permit are (not limited to):

- Critical Lifts
- Radiography
- All excavation beyond 500 mm depth
- Chemical, biological, or radiological exposure of significant risk
- Electrical hazards, such as energized conductors or high voltage
- Confined space entry
- Work at height (no rope ladder shall be permitted)
- Hot work
- General work
- Road Blocks & Partial road closure during vehicle movement

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Permit Document(s).

Contractual requirements or agreements may provide that Owner Permits and Permit Procedures be used; if such a requirement exists the PMC/Owner shall provide training to EPC Contractor to enable EPC Contractor to conduct further training to their own project personnel as required.

## HSE Promotion Programs

EPC Contractor shall establish a HSE promotion program for their employees through an appropriate system of recognition; publicity, certificates of appreciation, and/or other awards. The recognition should be provided to employees exhibiting proper and above average safety attitude in carrying out their duties.

- Bulletin boards shall be used to display safety posters, HSE bulletins, information sharing, lessons learned, etc. Information should be changed periodically. Boards shall be placed in offices, field, T rest/break areas, etc.
- The bulletin boards will also contain information such as important telephone numbers, project organization chart, specific HSE subjects, and specific unsafe situations.

## 19 HSE compliance

It is intended to support safety compliance and to eliminate repeated or continuing safety violations by the use of appropriate disciplinary measures.

### Violation of safety requirements

If a EPC Contractor or invitee is found non-compliant to any of the safety requirements, Penalty will be imposed on them for the same as mentioned below:

### 19.1 Penalties for non-observation of safety norms



#### (i) Penalties

a) Violation of applicable Safety, Health and Environment related norm a penalty of Rs.5000/ per occasion.

b) Violation as above resulting in

- Any reportable physical injury, as per Indian Factory Act 1948, a penalty of 0.5% of the contract value (maximum of Rs.2,00,000) per injury in addition to Rs.5000/per occasion as in item (a).
- Fatal accident, a penalty of 1% of the contract value (maximum of Rs.10,00,000) per injury in addition to Rs.5000/per occasion as in item (a).

(ii) The EPC Contractor should be advised to take appropriate insurance policy for the effective implementation of the above penalty provision

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(iii) In case of accidents depending on the seriousness of injury etc. in addition to the hospitalization/ Treatment charges and Group insurance amount, compensation shall be paid by the EPC Contractor to the affected person/ his family members in presence of Engineer-in-charge as per Workmen Compensation Act.

In case of any conflict between the penalties mentioned in this document and special conditions of contract, the more stringent clause shall be followed .

## 20 Monthly reports

EPC Contractor shall prepare a Monthly HSE report summarizing Health, Safety and Environmental issues which shall be provided to client.

EPC Contractor s shall provide monthly summaries of weekly information concerning HSE activities as well as specific information on incident rates, incident trends, and corrective actions (both pro-active and reactive).

## 21 HSE committee Site Inspections



- HSE Committee meetings and inspection schedule shall be drawn as per project requirements at the commencement of site.
- HSE Committee inspections shall be regularly held as per the schedule.
- HSE Committee meetings shall be conducted at least once a month.
- The EPC Contractor shall provide for Site Inspections to be conducted by EPC Contractor HSE personnel and Construction Management for HSE compliance.
- Inspection reports summaries shall be provided during the weekly meetings and monthly meetings on site status and trends.

## 22 Welfare Facilities

- EPC Contractor shall provide Drinking Water facilities and rest shelter (separate for Male & Female Workers) to the workers
- EPC Contractor shall provide Toilet facility for the workers (separate for Male & Female Workers)
- Canteen shall be provided by the client, no local canteen hutments inside the plant premises will be permitted
- No labour hutment inside the plant premises shall be permitted

## 23 Site Audits

- HSE audits shall be conducted very six months or as and when required.
- PMC/Owner shall notify EPC Contractor prior to any external audits or inspections being conducted onsite.

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- Audits shall be conducted by competent person independent of the area or activities being audited.
- Audit findings along with necessary actions shall be recorded.
- EPC Contractor shall make all relevant documents and personnel available to the audit team upon requested. Audits activities can include document reviews, employee interviews and observations on HSE implementation.



## 24 Incident Reporting and Investigation

- Incidents shall be reported and investigated as indicated in HSE instruction PIN-LP-HS-011 (If required, the procedure will be amended to fulfil client requirements.)
- The investigation shall focus on the cause of the accident, and the adoption of corrective actions to avoid a recurrence.
- EPC Contractor shall ensure that an immediate oral report is made to HSE Representative in the case of all Injuries/Incident, property damage and environment impact.

## 25 Disease prevention

- The site shall be maintained in a hygienic condition that promotes a disease free environment.
- Occupational Health inspections will be included as part of the standard Site Safety inspections. In addition, if any unusual condition should arise or should complaints be received, special inspections will be performed.
- The EPC Contractor shall provide information within their HSE plan for providing and maintaining hygienic conditions on the project site including;
  - Monitoring and reporting employees for illness
  - Monitoring and treatment of injuries for infection prevention
  - Infectious employees reporting and isolation
  - Covering wounds
  - Injury/ Incident location isolation and clean-up
  - General Housekeeping
  - Eating area location, inspections and cleaning.
  - Food waste storage and removal.
  - Toilets; number, cleaning schedule, inspections.
  - Drinking water, cleaning schedule, inspections
  - Separation of Food and Construction waste
  - Medical facilities, including medical waste handling, storage and disposal

## 26 Biological Hazards

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EPC Contractor shall implement a Hazard Identification process prior to mobilization to consider local biological exposures posed by bacteria, viruses, insects, plants, animals and humans. Once hazards have been identified the EPC Contractor shall assess if established measures are adequate to control the hazard, make sure the responsible persons are informed of the need for the control implementation and monitor the effectiveness of the controls.

## 27 Biological Waste

Wastewater and solid wastes (including medical wastes) will be properly collected, labelled and stored to prevent disease vectors and will be disposed of in permitted facilities. The EPC Contractor shall maintain copies of transport manifests, hazardous waste transport licenses or certifications and information on the hazardous waste disposal site and a copy of their license or authorization to receive hazardous waste.

## 28 Environmental Protection



The project has been provided for extensive integration of environmental inputs in the conceptual engineering phase of the project and such inputs will continue through the design engineering phase, the construction phase, and the commissioning phase. This has and will continue to result in the avoidance of many potentially significant adverse impacts and the reduction of other effects to less than significant levels. This has and will continue to result in the incorporation of design measures which will prevent or minimize adverse environmental effects to ALARP levels.

Measures which will be taken by the EPC Contractor to avoid environmental impacts include, but are not limited to, the following:

- A consultation and participation process with local communities and NGO's through the Owner's organization that will allow for the identification of issues significant to the affected population.
- Incorporation of drainage, erosion, and sedimentation control measures to protect water resources.
- Incorporation of an Occupational Health and Safety program (HSE)
- Incorporation of sanitation, waste management, housing, vector control, food and water supply and workplace safety Procedures and guidelines for the project.
- The construction camp and site will be fenced to protect the surrounding environment.
- Vibration will be monitored during pile driving to ensure Owner requirements and the levels recommended in the EIA are not exceeded.
- Dust control activities to be made available and ensured daily

### Note –

1. Provision of Batching plant inside plant premises shall be decided in the Apex Safety Committee Meeting and will be communicated to the EPC Contractor

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2. Radiography Source pit room approved by BARC to be made , and shall be duly approved by PMC/Owner.

## 29 Environmental Hazard Register

The EPC Contractor shall maintain the Aspect & Impact (Hazards and Effects ) Register. All known potential hazards to the environment during the execution of the work shall be included in this document.

The EPC Contractor will develop a Waste Management Plan as required by the Contract.

The EPC Contractor shall provide details within the plan on procedures for waste management and disposal of construction waste.

## 30 Management Review

EPC Contractor management shall provide input for HSE reviews to be conducted on a monthly basis for the evaluation of the HSE Management System's effectiveness and to ensure its continuing suitability and where appropriate to implement improvements and corrective actions.

As a minimum this review shall be conducted monthly and information presented in Weekly coordination meetings and site inspections and HSE activities shall be the basis for the review.



The review will be attended by PMC/Owner representatives and EPC Contractor / Sub Contractor management, safety personnel and employee representatives

## 31 HSE Records

Various HSE records, statistics required to be maintained during the project execution at site shall consist of, but not limited to, the following:

- Minutes of various meetings
- Accident/Incident Reports
- HSE inspections / audit reports
- Training Records
- Work permits
- Equipment inspection reports / certificates
- Medical examination records
- Any other record required as per requirements of this manual
- Any records as required by local regulations / project HSE Plan
- Any records as required as per Owner/Client requirement
- Monthly reports to owners.
- HSE activity during the month (meetings, inspections, training etc.)
- Incident data



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➤ Statistical data

## 32 Attachments

The following attached documents are integral part of this requirement and shall be followed at site:

- tkIS- India Construction HSE Manual– 62 pages
- List of Applicable HSE instructions –
- MRPL Workers Safety Policy – 39 pages
- Prohibition/ ban on use of Hydra Crane - 4 pages
- Guidelines on Personal Protection equipment (PPE) – 50 pages
- Guidelines for SOP of COVID19(latest) at Project Construction Sites- 20 pages

**thyssenkrupp Industrial Solutions (India)  
Private Limited  
Construction HSE manual**

07-2019


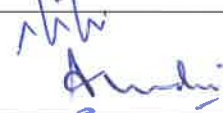

## DECLARATION

This Construction HSE Manual describes the Health, Safety & Environment (HSE) practices implemented at construction sites of tkIS India

It serves as information to our Customers and Business Associates and provides tkIS India employees with an overview of HSE guidelines.

This manual may be made available to our customers and Business Associates on request. However, it may be noted that this HSE Manual is an internal document of tkIS India, solely to act as general guideline for the employees of tkIS India. This HSE Manual shall neither be construed as basis for any contractual or legal obligations of tkIS India nor it shall accrue any right in favour of any person who receives it. Obligations of tkIS India shall arise solely from Contracts entered into with Customers / Business Associates.

**Issued: July 2019**

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## **1. INTRODUCTION**

### **1.1 SCOPE AND APPLICABILITY**

This document defines the Health, Safety and Environmental management system requirements of tkIS India during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India.

Requirements defined in the manual are applicable to all personnel of tkIS India, Contractors and their personnel working for the project. In case for the work carried out within Owner's facilities, Owner's /PMC's contractually specified norms shall prevail provided always that this tkIS India Construction HSE Manual shall be followed wherever it is more stringent or Owner / PMC norms are non-existent.

### **1.2 PURPOSE**

The purpose of this manual is to ensure that all persons concerned with the project carry out effective management of health and safety in all activities in order that people, plant and the environment are not exposed to any undue risks / impacts during site construction activities.

### **1.3 ADMINISTRATION**

The tkIS India SM- Site Manager, Department Heads and supervisory personnel are responsible for the communication and enforcement of the requirements defined in the Manual.

### **1.4 DEFINITIONS**

- a) Owner / Client – is the organisation which retains tkIS India for the purpose of the project.
- b) PMC – is the organisation retained by owner/client for the purpose of managing the project.
- c) tkIS India - thyssenkrupp Industrial Solutions (India) Private Limited in its capacity as Consultant / LSTK Contractor.
- d) Contractor – is the agency appointed by Owner or tkIS India for carrying out specific construction work.

## 1.5 HEALTH, SAFETY AND ENVIRONMENTAL STATEMENT BY EXECUTIVE BOARD

thyssenkrupp Industrial Solutions (India) - Health, Safety and Environment: Statement by the Executive Board

March 2018

### Health, Safety and Environment: Statement by the Executive Board

It is the aim of thyssenkrupp Industrial Solutions (India) Private Limited to provide solutions for engineering, procurement, construction and service of chemical and other industrial plants, which are optimized with regard to plant safety, reliability and sustainability to protect the environment.

We consider safe design of plants to be an integral part of the quality of services to our customers and are committed to our responsibilities towards Health, Safety and Environment (HSE).

We are committed to provide a safe workplace to ensure prevention of accidents, injuries and ill health to our employees and any other persons directly associated with our business, visiting the workplace.

We are committed to comply with relevant Regulatory, Customer and other requirements, applicable to our business.

The Executive Board assumes the responsibility of promoting a culture and atmosphere for development, implementation, effectiveness, evaluation and continual improvement of the HSE Management System.

We therefore set and monitor HSE objectives and provide necessary leadership, commitment and resources.

All our Managerial staff regard HSE as a management responsibility. They are obliged to instruct and motivate their subordinates accordingly, to ensure effective implementation of HSE Management System and awareness of their responsibilities towards HSE.

#### Executive Board



P. D. Samudra  
CEO &  
Managing Director



N.R. Chitre  
CFO &  
Executive Director  
Central Functions



P. G. Waray  
Executive Director  
Engineering &  
Project Execution  
(NoE)



K. S. Rao  
Executive Director  
Industrial Specialties  
& Services

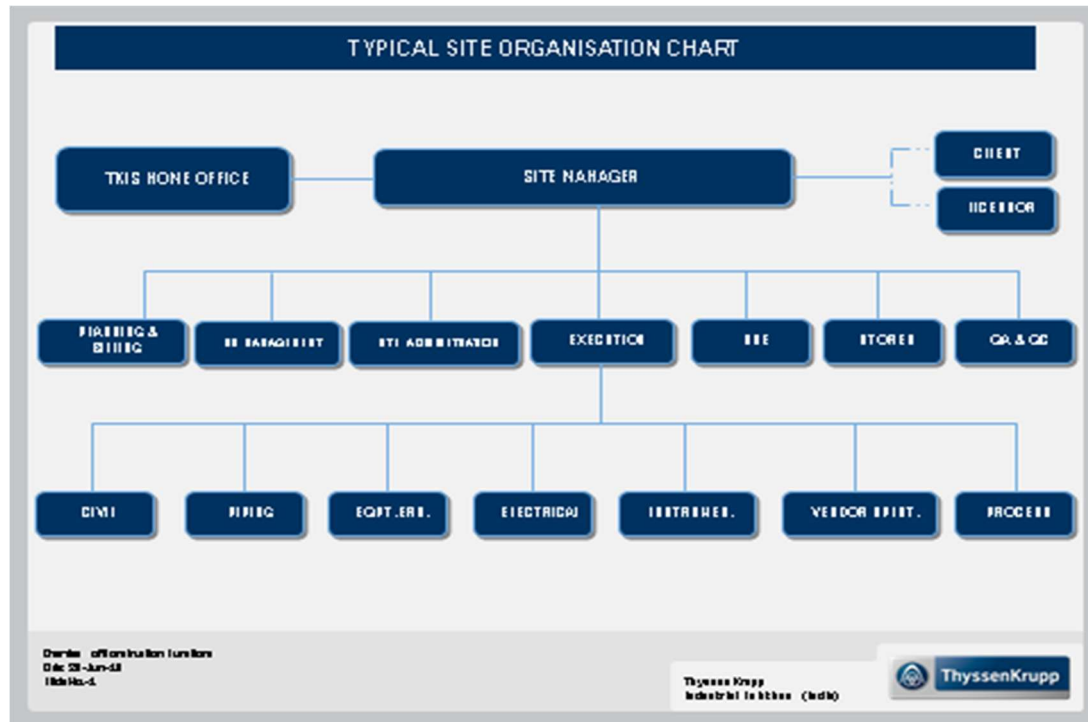


P. V. Chepe  
Executive Director  
Technologies  
(Fertilisers, Electrolysis  
& Polymers)





## 2. Duties and responsibilities



### 2.1 Responsibilities of all personnel working at site (including persons working on behalf of tkIS India and persons directly associated with our business, visiting the work place)

All personnel working at site have responsibility to work safely, prevent pollution and comply with tkIS India policies, plans and procedure. They shall comply with the requirements of tkIS India HSE management System.

They shall take reasonable care of their own health, safety and ensure that their actions do not adversely affect the safety of co-workers, plant and property.

In case any unsafe act is noticed, they shall bring the same to the notice of their supervisor.

### 2.2 Site Manager (SM)/Commissioning Manager (CoM) - tkIS India

Main Responsibilities of SM / CoM with regard to HSE are:-

- Providing inputs for updating Project HSE Plan for site specific requirements
- Develop site specific emergency plan
- Coordinate the field HSE activities, and effective implementation of Project HSE plan & requirement of this construction HSE manual.



- Ensure conducting of HSE Training and Awareness programs for tkIS India. Contractor/Employees at site.
- Form HSE Committee at site.
- Conduct periodic safety meetings.
- Authorize disciplinary action, as required.
- Participate in incident/accident analysis.
- Coordinate with the client/owners, contractors & Head Office.
- Review/approval of erection plan for Critical Lift

*For details refer Procedure no. PIN LP-CHM-022*

### **2.3 tkIS India Site HSE Representative (tkIS India Site HSE Manager)**

Main Responsibilities of Site HSE Manager shall be:-

- Site HSE manager reports to Site Manager and shall assist site management to effectively implement Project HSE plan & requirement of this site HSE manual.
- Assist Site Manager in preparation of site specific emergency plan.
- Liaison with Owner and Contractors representatives on HSE matters on behalf of Site Manager (SM).
- Co-ordinate with contractors for implementation of Project HSE Plan, objectives and requirements of this manual.
- Ensure compliance and in case of violations, initiate disciplinary action, as required.
- Ensure that HSE induction programs/awareness programs and Toolbox meetings are conducted by the contractors for their personnel.
- Verify and maintain the statistical data submitted by contractors.
- In case of any accident / incident, conduct analysis and suggest corrective measures as required.
- Co-sign site specific emergency plan.
- HSE promotion at site through various slogans, boards, orientation sessions etc.
- Preparation of Monthly Statistics, KPIs and other records which is to be sent to relevant heads.

In addition to the above, Site HSE Manager's role and responsibilities during various phases of site activities shall be: -

#### **a) At start of works:**

- Ensure necessary permits/ clearances/approvals from competent authorities are submitted/obtained by the respective contractors.



- Ensuring appropriate fire safety arrangements, as required by local regulations and/or tkIS India Private Limited. HSE requirements are complied with by the contractors.
- Checking suitability of Personal Protective Equipment (PPE) for intended use.

**b) During the execution of the works:**

- Performing periodic inspections to ensure compliance with tkIS India's HSE standards and requirements and requirements of project specific HSE plans.
- Conducting periodic inspection of equipment, required by regulations and/or tkIS India HSE requirements.
- Participate in construction meetings, in order to be able to forestall any new risks / environmental aspects.
- Organise periodic meetings with Contractor's representatives, to discuss typical problems and particularly important aspects of HSE.
- Taking particular care whenever contractor is to undertake a new type of work that may involve special risks. Such special risks, if any, shall always be well communicated and special procedures shall be instituted.
- Maintain HSE statistics and records as required by tkIS India HSE requirements.
- Provide necessary statistical data to Head Office (HO) through Site Manager as required by tkIS India HSE requirements.

**c) End of works:**

- Drawing up an HSE statistical overview of the entire construction period.
- Provide inputs for Project Close out report.

**2.4 Construction Engineer tkIS India Private Limited:**

Construction Engineer shall ensure that: -

- Assist HSE personnel for effective implementation and promotion of safe work practices.
- Interact with HSE personnel and implement corrective measures wherever required.
- Be aware of the hazards associated with the activities and the necessary control measures.
- Participate in HSE meetings, as required.
- Be aware of the work permit system and ensure compliance with the same.

## **2.5 Main Responsibilities of Contractor**

### **2.5.1 General**

- Contractors shall be responsible for any risk and impact associated with their activities, personnel and property on site assigned for their scope of work. They shall also be responsible for identifying and complying with all applicable statutes, rules, regulations and tkIS India's HSE Requirements, as defined in this manual, Project HSE plan and Objectives, and requirements of their own HSE Management System.
- Contractors shall ensure that the requirements are read, understood and implemented by their staff/workmen throughout the duration of the Contract.
- Contractors shall submit site organisation indicating details of their HSE staff along with the offer.
- Site organisation shall have competent HSE officers shall be depending up on the number of workers to be generally deployed by the Contractor.
- Contractor shall carry out, HIRA (Hazard Identification and Risk Assessment) for activities as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities.
- Contractor in addition to working according to their own HSE standards shall meet tkIS India HSE requirements & owners/PMCs HSE requirements.
- Contractor shall arrange for medical examination of employees prior to their starting work at site as per prevailing regulations. Further, periodic re-examination shall be carried out as per regulations.

*For details refer Procedure No. PIN LP-HS-002, PIN LP-CHM-022*

### **2.5.2 Construction Engineers/Supervisors (Contractor):**

Their responsibilities include:

- To be aware of the hazards of their activities and the necessary controls to prevent incidents.
- Ensuring that all personnel on site have undergone the HSE induction/ awareness/ training programs.
- Ensure that all employees are provided with appropriate Personal Protective Equipment.
- Implement and promote safe work practices.
- Ensure that only trained and competent persons operate vehicles, plants and equipment.
- Ensure that cranes, lifting equipment and tackles have valid test certificates.
- Ensure necessary rigging plans for critical equipment erection are submitted for tkIS – India for review / approval.
- Ensure that all employees are given adequate information, instructions to enable them to take care at work.
- Take part in the investigation of accidents and incidents.
- Participate in HSE meetings as required.

### **2.5.3 Construction workers / Employees (Contractor): -**

General responsibility for all construction workers / employees will be:

- Obey all hazard and safety signs
- Implement the requirements of this HSE plan and follow instructions given by superiors.
- Use correct Personal Protective Equipment as directed.
- Ensure that their work activities do not endanger themselves or others.
- Report all incidents /near misses to concerned persons
- Co-operate in maintaining and improve a safe and healthy working environment.
- Attend HSE meetings.
- Follow any site specific owner/client safety instructions

### **2.5.4 Welfare of construction workers**

#### **Drinking Water Arrangement**

- Sufficient supply of Potable water shall be maintained at site. The portability of drinking water source shall be established prior to usage and then checked periodically, specifically in case of change of source.
- Water test report shall be obtained.
- Water storage tanks shall be inspected / cleaned at least once in a month.
- Nearby area shall be kept clean and drained.

#### **Toilets**

- Sufficient number of latrines and urinals shall be provided as per requirements of Building and other Construction Workers Rules or any other applicable statutory requirements.
- Where necessary, separate facilities for male and female construction workers shall be provided.
- Facilities shall be maintained in clean and sanitary conditions at all times. Compliance with requirements of local public health authorities with regards to sewage system should be complied with.

#### **Canteens**

- Canteen facilities shall be provided in the manner as specified in the Building and Other Construction Workers Rules or any other applicable statutory requirements.
- The canteen facilities shall be maintained in a clean and sanitary condition.



- Compliance with local public health authorities with regards to collection and disposal of food waste from canteen shall be ensured.

### **Workers Rest Shelter**

- Rest shelters shall be provided as per requirements of Building and other Construction Workers Rules or other statutory requirements.
- Rest shelters shall be maintained and kept clean.

### **First Aid**

- Sufficient number of first aid boxes shall be provided and maintained for providing first-aid to the workers. Stretcher facility shall be readily available at the construction site.
- Every first-aid box shall be distinctly marked “First Aid” and shall be equipped with the articles as specified in Building and Other Construction Workers Rules or any other applicable statutory requirements.
- Contents of the First-Aid box shall be as per requirements of Rule 231- BOCW Central Rules, 1998 or equivalent applicable regulations. Refer appendix-1.
- First Aid boxes shall be kept in the charge of a person trained in first-aid, clearly identified and readily available during working hours.
- Sufficient number of personnel trained in First-aid shall be available.
- List of such trained First-aiders shall be maintained and displayed near first- Aid box.
- First-aid boxes shall be checked every month for the contents and “Use before Date” and topped up as required.
- Site HSE Manager/ Officer shall be immediately notified for any personnel injury, provided with first-aid.

### **Emergency Vehicle**

A vehicle, with driver shall be available at site as an Emergency standby vehicle as long as work continues at site.

### **Medical Facilities**

Minimum Medical facilities shall be maintained as per applicable statutory requirements. Minimum requirements are as:

- a. Tie-up with local Hospital
- b. Ambulance or dedicated vehicle.
- c. First Aider or Male Nurse as per site requirement.

### **2.5.5 Different organizations operating in the same area**

Contractors shall consider the fact that different organisations (contractors) may be working in the same area.

In such situations, tkIS India / client's intervention and zoning is required and promote the coordination in the field with the construction Contractors through their HSE team.

However, Contractors must co-operate and take into account the necessity to have a safe work place for all other Contractor's personnel working in the area.

## **3. SITE HSE Requirements**

Following are the minimum requirements, but not limited to, with regards to HSE for various aspects at Construction site.

### **3.1 Legal Requirements**

All applicable legal /statutory requirements shall be identified and complied with.

### **3.2 Site Office Safety**

Office equipment and furniture shall be provided and maintained in safe working order.

Awareness of all personnel working in these temporary facilities with regards to following arrangements/requirements shall be ensured.

#### **Fire**

- All personnel shall be familiar with evacuation procedures, escape routes and safety exits.
- Location of safe assembly area.

#### **Electrical**

- No office electrical equipment shall be used in faulty or unsafe conditions.
- Only a qualified licensed electrician should attend to faulty electrical equipment.
- Leads on equipment shall not be routed in such way that they may cause a tripping hazard across walkways, corridors or open spaces.

#### **Furnishings and Fittings**

- Safety shall be the prime consideration when arranging furniture and fittings in any office space.
- No furniture shall block or restrict movements in walkways, corridors, or other escape routes.



### **Flammable Material and Solvents**

- All flammable liquids (such as Diesel, toners for photocopiers) shall be handled and stored with care. Only a minimum quantity for ready use should be stored. They shall be stored in the shade and away from any source of heat, potential ignition or naked flame.

### **First Aid Box**

- First-aid box (with specified contents) shall be available and kept at suitable location, clearly identified.
- List of First-aiders trained shall be maintained and displayed near first-aid box.
- The first aid boxes shall be checked every month for the contents and “Use before Date” and topped up as required.

Site HSE Manager/ Officer shall be immediately notified of any personal injury provided with first aid.

### **Drinking Water**

Sufficient supply of Potable water shall be provided. Portability of water from the source shall be checked prior to usage and then at regular intervals; and specifically in case of change of source. Test certificate of water shall be obtained.

### **Toilets**

Toilets shall be provided according to the regulatory requirements.

### **Exits**

Site offices shall be provided with exits sufficient to permit the prompt escape of occupants in case of emergency.

Exits and the access and egress from exits shall be maintained so that they are unobstructed and are accessible at all times. Exits shall be identified prominently.

All exits shall discharge directly to an open space that gives access to emergency assembly areas.

## **3.3 Control of Visitors**

Concerned tkIS India officer shall ensure that the visitors at work place are made aware of relevant HSE requirements.

Visitors of contractors shall be made aware of HSE requirements by the concerned contractor.





The following shall be ensured:

- Visitor shall be briefed on the safety norms pertinent to the visitor's work.
- Visitor shall be informed of the requirement of use of PPEs depending on the nature of work and work location to be visited.
- Visitor shall be informed of "No Smoking" requirement in the site office premises.
- Requisite PPEs shall be provided to the visitor. The visitor shall ensure that the same are used properly.
- Safe route from the office to site shall be shown to the visitor. The visitor shall be strictly advised not to loiter around the site.
- The visitor shall preferably be escorted by concerned site personnel. He/She shall be made aware of safety route from office to site.

*For details, refer Procedure No. PIN LP-CHM-015*

### **3.4 Vehicles at site & Vehicular Movement**

Following shall be ensured: -

- Vehicle shall be registered as per statutory requirement and has necessary permits, as applicable.
- All necessary statutory requirements are complied with (e.g. Insurance, PUC).
- Vehicle shall be in good condition and fit for purpose, where applicable necessary fitness certificates shall be available.
- Vehicle shall be fitted with flameproof exhaust, if required.
- Vehicle shall be fitted with 'Reverse' horn.
- Only Licensed drivers shall drive the vehicle.
- Speed limits shall be clearly displayed. Speed limits shall be observed strictly.
- Vehicles shall be parked at the designated parking place.
- No vehicle shall be parked under LT / HT power lines.
- Vehicles shall not block emergency evacuation road, escape path, access road for fire tenders / rescue vehicles etc.
- No worker shall take rest / sleep under any vehicle.

*For details refer Procedure No. PIN LP-CHM-17*

### **3.5 Storage of Flammable Liquid**

Flammable liquid at project site include chemicals like Diesel, Lubricating Oil, and construction chemicals etc. The following measures shall be taken:



- Flammable liquid containers should be stored on concreted floor. Dyke wall around the storage tank / drum should be provided to prevent loss of containment.
- Electrical connection in the flammable liquid store should not be provided.
- In the case of storage in tanks, the capacity of the tank should be conspicuously marked on the tank.
- Smoking, fire near the storage area should be prohibited. Caution board to the effect should be displayed.
- Suitable fire extinguishers and Sand buckets should be provided near the storage area.
- No receptacle containing flammable liquid should be repaired unless thoroughly cleaned and freed from the liquid.
- Decanting of flammable liquid from the drums should be carried out using pumps.

*For details refer Procedure No. PIN LP-HS-004.*

### **3.6 Site Stores Management**

- Stacking and lay down areas shall be designated and enforced on suitable racks/ground.
- Loading, unloading and handling areas shall be restricted and controlled by barricades, signage and restricted man movement.
- High standard of housekeeping shall be maintained in stores or storage yards to reduce accidents and risk of fire.
- All floors, steps, stairs, passages and gangways shall be kept free from any obstruction that could cause a person to slip or fall.
- Within stores and storage yards, access ways must be clearly defined and be wide enough for the safe passage of mechanically-propelled equipment.
- Scrap wood shall have all nails removed or hammered flush.
- Stacking of materials shall be properly planned. Method of stacking, route of materials in and out, types of handling methods, loading of storage racks inside buildings, quantity and area of space available, etc. shall be considered while planning the stores/storage yard.
- Material shall be stacked securely to prevent accidental collapse.
- Tubes (pipes) shall be stacked with dunnage between layers and be chocked to prevent movement.
- Safe access and adequate lighting shall be provided in stores/storage yards.
- Materials shall not be stacked near vibrating machinery and near excavations.
- Assessment of the size of the material, the materials to be handled should be done prior to handling so as to judge the use of power operated mechanical equipment or manual handling.
- Materials shall be inspected before any movement for sharp edges, burrs, rough or slippery surfaces. Materials which are greasy, wet, slippery or dirty should be wiped before being handled.



- Flammables, Corrosive and Toxic materials should be segregated and stored separately and clearly marked.
- Material Safety Data Sheets (MSDS) shall be available for all hazardous materials and manufacturers instructions should be followed for storage and handling.
- No smoking, naked flame, or other ignition source should be allowed near flammable liquids storage area.
- Quantities of flammable liquids shall be kept to a minimum.
- Cylinders shall be stored in upright position and in shaded areas. Oxygen cylinders should not be stored near to flammable materials.
- Spillages shall be cleaned up immediately and, if the area is wet/ slippery, cover it with sand or other absorbent material.
- Adequate firefighting equipment shall be placed in stores/storage yards
- Pedestrian access to material handling areas shall be limited to minimum. Unauthorized persons shall be excluded from handling areas. All personnel shall wear suitable PPE while handling materials (Safety helmet, safety shoes, hand gloves, etc.)
- All lifting equipment used such as crane and tackles shall be certified and in good condition. Personnel shall be instructed not to stand under suspended loads and to keep away from swing area of crane.

For details refer Procedure Nos. PIN LP-CHM-015, PIN LP-CHM-005, PIN LP-CHM-004

### **3.7 Storage of Gas Cylinders**

The following safety measures should be taken:

- Gas cylinders shall be stored in areas away from direct sunlight and always be in secured position.
- The LPG, Oxygen and Dissolved Acetylene cylinders shall be stored in upright and secured position.
- Cylinder valve shall be protected using metal cap.
- Electrical connection in the gas cylinder storage area shall be avoided to the extent possible. In case an electrical connection is provided, it shall be as per Class I installation.
- Smoking, fire near the storage area shall be prohibited. Caution board to the effect shall be displayed.
- Oil and lubricants shall not be used on valves or other fittings of cylinders.
- Suitable fire extinguishers and Sand buckets shall be provided near the storage area.
- Trolleys shall be used for moving cylinders.

*For details refer Procedure No. PIN LP-CHM-001.*

### 3.8 Fire Safety Management

Fire Safety Management efforts shall include, but not be limited to, the following:

- Ensuring that storage of gas cylinders complies with the requirements defined in the tkIS India Construction HSE Manual and relevant statutory requirement.
- Welding and cutting equipment shall be maintained in good order and shall be checked periodically.
- Work areas shall be kept clean and free of combustible waste and scrap materials.
- Smoking / fire shall be prohibited throughout the flammable premises.
- Suitable and sufficient firefighting equipment (including fire extinguisher) shall be maintained near all those locations having potential for fire.
- The firefighting equipment shall be inspected and refilled in accordance with manufacturers' recommendations and relevant regulations.
- The list of firefighting equipment, along with their location, type, capacity and inspection / refilling date shall be maintained.
- Access to firefighting equipment shall be unobstructed.
- Personnel working at the site shall be trained on safe working practices in relation to fire prevention and protection.
- Emergency Assembly points shall be identified and prominently marked.

#### Guidelines for Selection of Fire Extinguishers

Type of Extinguisher	Type of Fire			
	General-Paper, wood, carbonaceous material	Inflammable Liquids- HSD, Kerosene etc.	Inflammable Gases- Acetylene, LPG etc.	Electrical Motor, Cable, switchgear installations
Water	Yes			
Chemical Foam		Yes		
Dry Chemical Powder (DCP)		Yes	Yes	Yes
Carbon Di-Oxide (CO2)		Yes	Yes	Yes

For details refer Procedure No. PIN LP-CHM-004



### **3.9 Work Permit System**

A Work Permit System is the most formal method of ensuring safe system of working.

Where work is within the proximity of an existing plant, then the plant's work permit procedure shall be applicable. A project specific work permit procedure shall be developed separately and issued for Owner/Client approval and implemented under the responsibility of tkIS India Site Manager.

Within the Brownfield work areas (existing plant), the existing Client/owner permit to work system will be used and all work within live plant areas must be carried out under strict Owner permit conditions.

Within the Greenfield work areas (fenced off construction area); tkIS India permit to work system will be used.

The scope of application will be continually updated by tkIS India to reflect the different needs of the various construction phases.

Permit to work system will ensure that an authorised person (Issuing Authority) will pre-assess hazardous conditions involved and then prescribe the conditions and limits for the work to take place under the supervision of the authorised person (Performing Authority).

Typical information recorded on a Work permit includes:

- a precise description of the work to be carried out and the hazards involved
- the precautions required
- who will carry out the work
- the limits of the permit to work area or the equipment
- the duration of the permit validity

Typical activities where permit to work may be required are:

- entry into vessels, equipment's or any confined space
- temporary electrical work
- excavations deeper than 1.2 min depth
- radiography
- spray painting and grit blasting
- use of man baskets
- erection or removal of flooring on open steel work and handrails
- hydrostatic or pneumatic testing
- working at height
- steam flushing
- scaffolding

- steel erection
- Hot work –welding, cutting and grinding
- live electrical work
- flushing, blowing and line cleaning
- heavy lifts
- road closure

Project specific requirements on work permit shall be defined in specific HSE plan.

*For various Work Permit formats & details on Work Permit procedure, refer Procedure No.*

*PIN LP-CHM-018, PIN LP-CHM-011.*

### **3.10 Construction Equipment**

#### **a) Acceptance / inspection of construction equipment prior to deployment at site**

Inspection of following construction equipment shall be carried out prior to their deployment at the site by HSE Officer/competent person appointed by the Contractor.

- Piling Equipment
- Portable grinding machines
- Welding machines
- Gas Cutting set
- Cranes / Hydra
- Earth Moving Machinery
- Lifting tools and tackles
- D G Sets
- Pressure Testing appliances
- Radiography Sources
- Any Equipment operating at pressure

Third Part Inspection (TPI) or Competent Person or HSE Officer as applicable of the contractor shall inspect the equipment. Records of inspections shall be maintained.

#### **b) Periodic Inspection of Construction equipment**

Periodic inspection of equipment shall be carried out at least once in a quarter and record shall be maintained.

Additionally, for lifting equipment, inspection shall be carried out prior to use in critical activity, e.g. heavy lift.

Record of inspection shall be maintained.



**c) Statutory Inspection of Construction equipment**

All necessary statutory inspections of construction equipment shall be carried out. Necessary inspection/ job records shall be maintained.

*For details refer Procedure Nos. PIN LP-CHM-002, PIN LP-CHM-008, PIN LP-CHM-010, PIN LP-CHM-017*

**3.11 Hand, Air, and Electrical Tools**

- Tools shall be used only for their intended purpose.
- User's shall report damaged and defective tools to their supervisor or return them to the tool room for proper tagging and repair.
- Damaged or defective tools shall be taken out of service, tagged "Do Not Operate" and stored in a controlled area until appropriate repairs have been made.
- Tools shall not be altered in any way and should be operated in accordance with manufacturers' specifications.
- Tools, such as saws and grinders, shall have guards in place during their operation.
- Persons who operate earth compactors, rollers, chisel impact hammers, and other such tools shall wear appropriate protective footwear.
- Tools shall not be abused and should be kept in good operating condition.
- Tools shall be inspected prior to each use for defects such as cracked handles, damaged cutting edges, splitting or cracked parts, and broken adjusting components. Damaged tools shall not be used.
- All electrically powered tools shall have double insulation or connection to earth (grounding/three pin industrial plug).
- The pressure of compressed air used for component cleaning purposes shall be low pressure to prevent dust and debris from creating hazards. Compressed air shall not be used for cleaning or blowing dust from any part of the body or clothing.
- Only non-sparking tools shall be used if specified in work authorisation permit.
- Airline hoses for tools and other equipment shall be secured together using anti whip lines to prevent uncontrolled whipping in the event hose couplings become separated while under pressure.
- Temporary construction outlets used for 230 V tools shall be protected by an assured connection-to-earth- system.
- Portable grinders shall be provided with hood type guards with side enclosures that cover the spindle and at least 50% of the wheel. All wheels shall be inspected regularly for signs of fracture.
- Bench grinders shall be equipped with deflector shields and side-cover guards. Tool rests shall have a maximum clearance of 3mm between the wheel and grinding stone.



- Air supply lines shall be protected from damage, inspected regularly, and maintained in good condition.
- Tool retainers shall be installed on portable tools, which require them to be fitted.
- Hoses and hose connections used for connecting compressed air shall be designed for the planned pressure and service.

*For details refer Procedure No. PIN LP-CHM-002 & PIN LP-CHM-008*

### **3.11.1 Portable Grinder Safety**

Portable grinders (including angle grinders) are intended for cutting, grinding, sanding or brushing metal, stone and timber materials depending on the type of disc fitted to the machine. In operation, the disc may come in contact with a part of the operator's body or the disc may shatter, throwing off fragments at very high speed. The resulting injuries may range from cuts and abrasions to death.

The following safety guide lines are recommended to be followed:

#### **1. Follow the manufacturer's information.**

Before using portable grinder for the first time, read the manual

#### **2. Ensure operators are trained**

Operators must be trained in selecting, fitting and removing, caring for and inspecting discs, and the safe use of portable grinders.

#### **3. Ensure operators are supervised**

Concerned supervisors/engineers shall carry out checks to ensure grinding operations are being done in a safe manner, and that operators are following the required safety precautions.

#### **4. Fit discs correctly**

Ensure any disc to be fitted to the grinder is:

- the correct type for the material to be worked.
- capable of being safely used at the maximum speed of the machine, stated as revolutions per minute (rpm).



- the correct size for the grinder.
- free of any damage, flaws, warping or distortion that may result in disc shattering.

fitted in accordance with the manufacturer's instructions (discs may be flat or have depressed centres and require different methods

setting up. Refer to the grinding machine manual and relevant standards).

- Always unplug the grinder from the power supply or remove the battery, before fitting or removing disc.
- Expiry date of disc to be checked.

#### **5. Use of personal protective equipment**

When using a grinder, always use personal protective equipment (PPE):

- eye protection, i.e. safety goggles and face shield
- hearing protection
- any other PPE as per specific job requirement
- beware of loose clothing that may be get entangled in the grinder.

#### **6. Ensure guarding is in place**

Never use a portable grinder without the guard in place and correctly adjusted. A properly adjusted guard shall minimise sparks hitting the operator and injury in the event of disc shatter.

#### **7. Hold the grinder correctly**

Never use a portable grinder one-handed. Always have the auxiliary handle fitted, hold the grinder with both hands and have a stable stance.

If it is not possible to use the grinder with both hands in place, then the grinder is the wrong tool for the job.

#### **8. Secure the work-piece**

Ensure that the work-piece is rigidly supported and firmly clamped. Movement of the



work-piece during grinding may result in disc shatter or grinder kickback, with the potential for operator injury.

## **9. Other considerations when grinding**

- Select a grinder (grinding machine) appropriate for the work to be done.
- Ensure that the grinder is turned off before plugging in.
- Apply the grinder to the work-piece only when the grinder has reached operating speed.
- Never put a grinder down while the disc is still rotating.
- Be aware of others in the vicinity of the work area, as sparks and material may be ejected over considerable distance.
- Check to make sure there are no flammable materials that may be hit by sparks and check the area for any smouldering material when the work is completed.
- Never clamp a portable grinder in a vice – a portable grinder is not a bench grinder or a substitute for one.

### **3.12 Electrical Safety**

- Electrical installations shall be highlighted with “Skull & Bone” danger boards.
- All electrical work shall be carried out by a competent person. All such works shall be inspected, tested and tagged by authorised competent person.
- The Contractor shall employ the service of a competent person to inspect, test and tag all electrical equipments.
- At least one competent person shall be available by the contractor at site as long as any construction activities are being carried out at site to attend to the normal / emergency jobs.
- All switch boards / welding machines shall be kept in well ventilated and covered shed. The shed shall be elevated to avoid water logging. No flammable material shall be used for construction of the shed. Similarly, flammable materials shall not be stored in and around.
- Earth Leakage Circuit Breakers (ELCB) shall be provided for all electrical connections.
- Industrial type extension boards and plug sockets shall be used.
- The temporary cables used shall be free from cuts, damaged insulation, kinks or improperly insulated joints.
- All power supply cables shall be laid properly and neatly so that they don't cause hindrance to persons working and is protected to prevent damage during various construction activities.
- Proper grounding shall be ensured for all switch boards and equipment including portable ones prior to taking into service.



- Electricians shall be provided with approved tools and personal protective equipment such as rubber gloves, shoes etc.

*For details refer Procedure No. PIN-LP-CHM-002*

### **3.13 Scaffolds and Platforms**

- All scaffolding and Platforms shall be equipped with toe boards, mid-rails, top rails and access ladders.
- Personnel who are conversant with and competent to perform this work shall only erect scaffolding and Platforms. Scaffolding and Platforms shall be removed according to construction requirements and when work has been completed.
- Where a scaffolds and Platforms are erected in an area where the construction activities may pose hazards to pedestrians or vehicular traffic, from the falling of objects, wire nets or screening nets shall be used to envelope such scaffold and Platforms ( IS 11057 : Industrial Safety Nets).

*For details refer Procedure No. PIN LP-CHM-014*

### **3.14 Ladders**

- All ladders used at the project site shall conform to applicable standards and regulations. Ladders shall be inspected prior to use. Inspections shall be conducted by a competent person and records maintained.
- Manufactured ladders on the project shall comply with the regulations of relevant Safety Code ( IS 3696-1, IS 3696-2, IS 8172, IS 4571)
- Ladders with broken or missing rungs, broken or split side rails, or otherwise damaged, shall not be used.
- All portable ladders shall be equipped with non-skid safety feet and be placed on a stable base. The access areas at the top and bottom of ladders in use shall be kept clear of obstructions.
- The side rails shall extend 1.0 meter above the landing. When this is not practical, grab rails shall be installed. All ladders in use shall be tied, blocked, or otherwise secured to prevent an accidental displacement.
- Site fabricated ladders/homemade ladders are prohibited to be used at tkIS India sites.

*For details refer Procedure No. PIN LP-CHM-014*

### **3.15 Working at Height**

Falling from height is one of the major concerns in the construction industry and many of such accidents are fatal.

- All construction activities involving workers working at height are properly planned, effectively coordinated and executed.



- Persons involved shall be given proper training on safe work system including use and maintenance of fall arresting equipment and life lines.
- All personnel who are required to work at height of 1.8meters and above shall be required to wear and use a full body harness with double lanyard with shock absorbers.
- Working at unguarded locations or where there is no fixed support, shall require the use of full body harness and a lifeline.
- Fall protection equipment shall be inspected on regular basis and record should be maintained.
- All personnel shall follow 100% tie-off while using safety harness, lanyards and lifelines.
- Working at Height permit shall be applied, when working at a height of 1.8m and above.
- Scaffolds, Ladders and Mobile platforms used for elevated work shall conform to the standard procedures and be subjected to periodic inspections.

*For details refer Procedure No. PIN LP-CHM-019*

### **3.16 Excavation**

- All excavation work shall be planned and the method of excavation and the type of support work required shall be decided, in consultation with tkIS India Site Manager / concerned Site Engineer, considering the following:
  - Condition of the soil / ground
  - Excavation will not affect adjoining buildings, structures etc.
  - Presence of underground utilities like pipes, cables etc.
- Site of excavation shall be thoroughly inspected:
  - Daily, prior to each shift and after interruption in work of more than one day
  - After every blasting operation (as applicable)
  - After an unexpected fall of ground
  - After heavy rains / flooding
- Safe angle of repose shall be maintained while excavating trenches exceeding 1.2 metres deep. Slope should, usually be not less than 45°. Suitable bench of 0.5 metre width shall be provided at every 1.5 metres depth of excavation in all type of soil except for hard rock. In case slope/benching is not possible, proper shoring and strutting should be provided to prevent cave-in or slides, as required.
- Hard barricading of 1 metre height shall be provided for all excavations 500 mm meters and above in depth.
- Excavated earth shall not be placed within 1.5 meter of the edge of the trench.
- Vehicles shall not be allowed to operate too close to the excavated area. At least 2 meters distance shall be maintained from the edge of excavation. No load, plant or equipment shall be placed or moved near the edge of any excavation where it is likely to cause its



collapse and thereby endanger any person unless precautions such as the provision of shoring or piling are taken to prevent the slides.

- During rains, the soil becomes loose. Additional precautions shall be taken to prevent collapse of side wall.
- Necessary precautions shall be taken for underground utility lines such as cables, sewers, pipelines etc. Position of buried utilities shall be located by referring to plant drawings, if available. Necessary clearances/permit from the concerned authorities shall be obtained before commencement of the excavation job, as applicable.
- In case of mechanized excavation, precaution shall be taken so as to not allow anybody to come within one metre of extreme reach of the mechanized excavator. The excavator shall be operated by a well experienced operator. While not in operation, the excavator shall be kept on firm ground with excavator shovel resting on the ground. Wheels of excavator shall be suitably protected/guarded to prevent any accidental movement of the excavator.
- Water shall be pumped out if it accumulates in the trench. Necessary precautions shall be taken to prevent entry of surface water in trenches.
- In case of excavation in the vicinity of any existing building / structure, approval shall be obtained on the excavation method.

*For details refer Procedure No. PIN LP-CHM-021*

### **3.17 Rock Excavation by Blasting**

- Storage, handling and carrying of explosive materials and execution of blasting operation shall be carried out as per the provisions of Indian Explosive Act and Rules or equivalent applicable regulations.
- Storage, handling and carrying of explosives shall be done by trained personnel.
- Only authorized personnel shall be allowed to perform blasting operation.
- Smoking and open flames shall not be allowed in the vicinity of blasting area.
- Necessary warning signs shall be erected at conspicuous places to warn personnel of the dangers involved.
- The area of blasting shall be barricaded with red flags. Persons working at the blasting site shall be moved away to a safe area and siren shall be blown before blasting.
- No person shall return to the blasting site for at least 20 minutes or unless announced safe by a designated person.

### **3.18 Piling**

- The pile driving equipment shall be inspected prior to deployment, as per the requirement defined in Section "Construction Equipment". Additionally, piling rigs and pulley blocks shall be inspected before the beginning of each shift.



- Unauthorized access to the area in the vicinity of piling work shall not be allowed to prevent injury from extruding rods / casing.
- As piling operation may cause significant noise, piling operator and others in the vicinity shall use suitable noise protection equipment.
- Cranes shall not be used as pile drivers and shall not be used to drop loads.
- Cranes shall not be used to extract hammer driven piles and only steam, air or electric extractors are to be used.

### **3.19 Reinforcement Work**

- Workers carrying out reinforcement work shall use proper personal protective equipment, such as Safety Helmet, Safety Shoe and Gloves, goggles etc.
- Hand shall not be placed below/between the rods for checking clear distance. Measuring device shall be used for the purpose.
- Loose clothes shall not be worn while checking the reinforcement bars.
- To carry out welding / cutting of rods, safety procedures / precautions as mentioned in Section "Cutting & Welding" shall be followed.
- For supplying of rods at height, proper staging and / or bundling shall be provided.
- For short distance carrying of materials on shoulders, suitable pads shall be used.
- While transporting rods by trucks / trailers, the rods shall not protrude in front of or by the sides of driver's cabin. In case such protrusion can't be avoided behind the deck, then it shall not extend 1/3<sup>rd</sup> of deck length and to be tied with red flags / lights.

### **3.20 Concreting Work**

- Stability of shuttering work shall be checked before starting concreting work.
- Concreting area shall be barricaded, if pouring at height / depth.
- Vibrator hoses, pumping concrete accessories shall be kept in healthy condition.
- Pipelines in concrete pumping system shall not be attached to temporary structures such as scaffolds and formwork support as the forces and movement may affect their integrity.
- Safety cages / guards around moving motors / parts of concrete mixers shall be in place.
- Concrete mixers shall be provided with hoppers.
- Concrete mixers shall be inspected for their condition at start of work.
- Concrete mixers shall not be generating excessive noise.
- Earthing of electrical mixers, vibrators etc. shall be done and verified.
- Personal Protective Equipment such as gloves, safety shoe, safety glasses and safety helmet shall be used while dealing with concrete, and nose mask shall be used while dealing with cement.



- Cleaning of rotating drums of concrete mixers shall be done from outside. Lockout devices shall be provided where workers need to enter the mixer drum.
- Adequate lighting arrangement shall be ensured for carrying out concrete work during night.
- During pouring, shuttering and its supports shall be continuously watched for defects.

### **3.21 Steel Erection**

- Permanent floors / gratings shall be installed as soon as practicable during the erection of the structure. In any event all openings shall be protected and where required boarded out with temporary floors.
- During structural steel assembly, facilities shall be provided to ensure the safety of people working at height e.g., lifelines and safety harnesses.
- When placing structural members, the load shall not be released from the hoisting line until the member is secured by at least two bolts, or the equivalent, at each connection, and drawn up wrench tight.

*For details refer Procedure No. PIN LP-CHM-010*

### **3.22 Underground Construction**

- The Contractor shall provide and maintain safe means of access and egress to all work areas.
- The Contractor shall control access to all openings to prevent any unauthorized entry to underground. Unused chutes, man-ways, or other openings shall be tightly covered, bulk-headed, or fenced off, and shall be posted with signs indicating "Keep Out" or similar language. Complete or unused sections of the underground facility shall be barricaded.
- Stability of the structure under erection shall be ensured throughout erection process. Permanent bracings/ties etc. shall be placed in position at the earliest. In case, should there be any constraint/difficulty in placing these bracings/ties suitable temporary arrangement shall be ensured.
- All associated staircase shall be erected along with main structure.
- Unless underground facilities are sufficiently completed so that the permanent environmental controls are effective and the remaining construction activity shall not cause any environmental hazard or structural failure within the facilities, the Contractor shall maintain a check-in/check-out procedure that will ensure that above ground designated personnel can determine an accurate count of the number of persons underground in the event of an emergency.
- Fresh air shall be supplied to all underground work areas in sufficient quantities to prevent dangerous or harmful accumulation of dust, fumes, mists, vapours, or gases.



### 3.23 Rigging

- Rigging shall be conducted by, or under the supervision of, authorized personnel, who are familiar with all aspects of rigging.
- All lifting tools and tackles shall be inspected prior to deployment and have valid test certificates.
- The load imposed on ropes, chain, slings, and fittings shall not exceed the safe working load recommended by the manufacturer.
- Wire ropes, chains, ropes, and other rigging equipment shall be inspected prior to use and as necessary during use to ensure their safety. Defective gear shall be removed from service.
- Slings constructed from non-metallic fibres shall not be subjected to a temperature above 82°C (180°F).
- Non-metallic fibre slings, showing nicks, cuts, burns, or any damage or defect shall be removed from service.
- Job or shop hooks and links or makeshift fasteners formed from bolts, rods, or other such attachments shall not be used.
- When U-bolts are used for eye splices, the U-bolt shall be applied so that the “U” section is in contact with the dead end of the rope. A minimum of three U-clamps at spacing 6 times diameter of wire rope shall be used.
- When a wedge socket connector is used as a wire rope terminal, means shall be provided to secure the end of the rope to prevent accidental release of the socket or rope slippage at the socket.
- Open hooks shall not be used for hoisting.
- The strength of any single guy-line and its anchor shall exceed the breaking strength of the load-line rigging arrangement.
- Guy-line anchors shall be so placed that the interior angle, between the guy-line and the horizontal plane, shall not exceed 45 degrees.
- Guy-lines shall be arranged to ensure that the strain in any direction is shared by not less than two guy-lines.
- Spreader bars and similar specialized lifting devices shall be designed by qualified persons and are to be clearly marked to indicate their safe working loads. Third party inspection certificates shall be required for such devices.
- Softeners shall be used to protect slings from being damaged on sharp corners.
- Tag lines shall be used to control the movement of any load while suspended.

*For details refer Procedure No. PIN LP-CHM-010.*





### **3.24 Welding & Gas Cutting**

- Dry Chemical Powder (DCP) type fire extinguisher shall be kept ready for instant use in any location where welding/gas cutting is being performed.
- Approved and well maintained welding and cutting apparatus, such as welding machines, torches, manifolds, regulators or pressure reducing valves etc., shall be used.
- Before commencing of welding/cutting operation, it shall be ensured that area is free from any combustible materials.
- Earthing /grounding of welding machine frames of both portable and stationary, shall be provided.
- Earth return cables shall be located/clamped as close to the welding point as possible
- Welding cables and hoses shall not be hung on 'live' pipes.
- Diesel powered welding generators shall be switched off when refuelling.
- When performing overhead welding, fire resistant blankets shall be suspended below the hot work area to capture falling sparks and molten metal slag.
- Diesel powered welding generators shall be fitted with spark arrestors if operating in near live plant areas.
- Electric welding cable leads shall be hung in an elevated position wherever they could create a tripping hazard, and protected from damage by moving equipment or materials.
- Welding leads or cords that cross a pathway or roadway shall be protected from damage by underground routing or otherwise protected with wood, conduit or other such means.
- Welding leads with worn out or broken insulation shall be immediately taken out of service or repaired.
- Compressed gas cylinders shall be properly secured and stored in an upright position.
- Gas cylinders shall be stored in a safe, dry, well-ventilated place prepared and reserved for that purpose.
- When not in the gas storage area, all cylinders shall be kept in a cylinder cart, and properly secured.
- Cylinders shall be returned to the main storage area when they become empty.
- Cylinder keys shall always be kept with cylinder, while in use, so that the cylinder could be turned off quickly in case of emergency.
- Proper spark/flint gun shall be used for the ignition of a gas cutting torch.
- Gas cylinders shall not be taken inside a confined space.
- Cylinders shall be transported in an upright position. Cylinders shall not be hauled in equipment beds or truck beds on their side. Cylinders shall be lifted only in racks or containers designed for that purpose. Slings shall not be used to hoist cylinders.
- Pressure gauges on regulators shall be in good and un-broken condition and any broken/defective gauges are to be immediately taken out of service.



- Compressed gas cylinders shall not be transported with gauge attached. The gauges are to be removed from cylinders and protective caps provided in place, during their transportation.
- Flash back arrestor shall be used to prevent back fire in acetylene / oxygen cylinder on both the side torch and cylinder end.
- The valves of compressed gas cylinders shall be completely closed when not in use.
- Lubricants shall not be used on oxygen line connections and copper fittings on acetylene lines.

*For details refer Procedure No. PIN LP-CHM-020*

### **3.25 Radiography**

Radiography is commonly used in the construction site for the purpose of carrying out non-destructive testing of welds on structures, pipes, pressure vessels, etc. The radiation source and the exposure to such sources can be extremely harmful to health when not properly controlled.

- Before the performance of radiography, a Method Statement listing detailed procedures and emergency plans shall be submitted by the Subcontractor and obtained approval from tkIS India/Owner/Client.
- All radiography jobs including use, transportation and storage shall be carried out by radiation personnel of approved Subcontractor as per BARC (Bhabha Atomic Research Centre) safety regulations or equivalent applicable regulations.
- Radioactive sources shall only be brought to site with prior permission from tkIS India/Client/Owner
- Work Permit shall be obtained before carrying out the radiography work.
- Personnel engaged in radiography work shall hold a valid certificate of registration as a radiation supervisor/worker from radiation controlled agency (BARC).
- All radiography work shall be pre-planned to minimise the exposure of other persons to radiation hazards.
- If the field radiography is to be done at the same location regularly, it is advisable to provide either a wire fencing around or a temporary brick enclosure.
- As far as possible, field radiography shall be done only during night time or outside normal working hours, when there is little or no occupancy there.
- Each area where radiography work is performed shall be barricaded off and posted with radiation warning signs.
- Entry into the restricted area by unauthorized personnel shall be strictly prohibited during exposure.
- Personnel who are involved in, or exposed to radiation shall wear radiation film badges issued by Radiation controlled agency (BARC).



- A radiation survey meter shall be available to measure and ensure that radiation levels are within acceptable limits at the boundary of cordoned off area.
- Radiation source that is brought to site shall be placed in a purpose-designed vault with lock.
- The radiography source shall never be touched or handled directly with hands.
- Radiography sources and cameras, when not in use, shall be stored inside a source pit with lock and key arrangement as required by BARC or applicable regulations.
- The storage room shall preferably be located in an isolated area of minimum occupancy.
- In case of an accident (due to loss or of damage to radiography source), action shall be taken in line with BARC safety rules/guidelines or applicable regulations.

*For details refer Procedure No. PIN LP-CHM-013*

### **3.26 Pressure Testing**

- Test procedure shall be prepared and approval from tkIS India is to be obtained.
- Separate gauges shall be provided at pressurizing pump and piping /equipment.
- All pressure gauges, temperature recorders shall have valid calibration. The same shall be confirmed before use.
- Pressure gauge readings shall be taken at suitable intervals and it shall be ensured that most of them fall between 40 – 60% of the gauge scale range.
- Safety relief valve set at pressure slightly higher than test pressure shall be provided while testing with air / nitrogen.
- Pressure gauge shall be calibrated / certified.
- Ensure necessary precautions, stepwise increase in pressure, tightening of bolts/ nuts, grouting etc. before and during the testing.
- The vents shall be kept open before opening any valve, while draining out water used for hydro testing.
- The gas used as the test fluid, if not air, shall be non-flammable and non-toxic.

*For details refer Procedure No. PIN LP-CHM-007*

### **3.27 Blast Cleaning & Painting**

- Adequate measures, such as enclosing the area of shot blasting or carrying out shot blasting in an isolated area shall be taken.
- Air compressor used for shot blasting / spray painting shall have guard and positioned away from the work place.
- The body of the motor as well as the compressor shall be properly earthed.



- The hoses used for compressed air shall be of proper quality, and health of the same shall be ensured through regular checking / test.
- Adequate ventilation facility shall be provided in case shot blasting / spray painting is carried out in an enclosed area.
- The operator of shot blasting shall be using full body clothing / apron and is to be provided with suitable respirator. During spray painting, full body clothing / apron and suitable nose mask are to be used.
- Care should be taken to ensure that the residual paint content in the paint drums is at a minimum. The residual content shall be removed from the paint drums using thinner, and shall be used for painting purpose.

*For details refer Procedure No. PIN LP-CHM-016*

### **3.28 Insulation**

- The Contractor shall ensure that all personnel are issued with Personal Protective Equipment as specified in the Material Safety Data Sheet issued by the manufacturer.
- Work areas shall be cleaned regularly to prevent a build-up of dust and fibres. Visible wastes are to be removed promptly to avoid being trampled and dispersed throughout the work area.
- Waste shall be placed in plastic bags and the bags sealed prior to disposal.
- On completion of work, or at the end of the shift, the work/work area shall be thoroughly cleaned.
- Materials shall be stored in the designated storage areas in their original packaging

### **3.29 Batching Plant**

- All the transfer points in the batching plant shall be provided with water mist spray arrangement to control dust particles becoming air borne.
- The personnel working in the batching plant shall wear/use suitable nose mask.
- Properly trained operators shall be deployed in batching plants.
- Batching plant equipment shall be maintained in good condition and periodic maintenance is to be carried out.
- The mixer drum and the surrounding area shall be cleaned thoroughly at the end of day's operation.
- Empty Cement bags are to be collected and disposed of at regular intervals during the day and not to be accumulated in the mixer area.
- Personnel shall not be allowed to work under or near the skip unless it is properly secured.
- All chains, pulleys, gears, etc. shall be properly guarded.
- All the statutory requirements to be fulfilled.

### 3.30 Personal Protective Equipment

- Equipment (PPE) complying with relevant IS standards and carrying IS mark or Equivalent applicable regulations shall be used.
- Equipment that has been altered in any way shall not be used.
- Equipment used shall be suitable for the purpose.

**Recommended Matrix for PPE Usage**

PPE / Category of Personnel	Helmet	Safety Shoe*	High Visibility Jackets	Apron	Hand Gloves	Welding Gloves	Welding Screen	Eye Protection Goggles	Safety Belt / Full body Harness	Nose Mask	Ear Plug / Ear Muff
Engineer & Above	M	M	M	R	R	NA	NA	M	AA	AA	AA
Supervisors	M	M	M	R	AA	NA	AA	M	AA	AA	AA
Surveyor	M	M	M	R	NA	NA	NA	M	NA	AA	AA
Welder	M	M	M	M	NA	M	M	Welding Visor M	AA	AA	AA
Grinder	M	M	M	M	M	NA	NA	Face Shield - M	AA	AA	M
Gas Cutter	M	M	M	M	M	NA	NA	M	AA	AA	R
Helpers	M	M	M	R	M	NA	NA	M	AA	AA	AA
Masons	M	M	M	R	AA	NA	NA	M	AA	AA	AA
Riggers	M	M	M	R	M	NA	NA	M	AA	AA	AA
Plant Operators	M	M	M	R	AA	NA	NA	M	NA	AA	R
Construction Equipment Driver	M	M	M	R	NA	NA	NA	M	AA	AA	AA
Painter	M	M	M	R	M	NA	NA	M	AA	M	AA
Shot blaster	M	M	M	R	M	NA	NA	M	NA	& Shot blasting hood - M	M

Legend: M - Mandatory

R - Recommended

AA - As Applicable

NA - Not Applicable



\* - In case of working in mud/water logged area, Steel toe Gum Boot shall be used.

*For details refer Procedure No. PIN LP-CHM-012*

### **3.31 Housekeeping**

Housekeeping is an act of keeping the working environment cleared of all unnecessary waste and materials and in a clean and orderly status.

- Work areas, passageways, stairways, and all other areas shall be kept free of debris, equipment, and materials.
- Appropriate refuse containers shall be placed strategically and used for disposal of scrap materials and other debris.
- Liquids (such as paints, solvents, thinners, oils, and greases) and material or containers which have contained chemicals shall be disposed off in accordance with 'Procedure on hazardous waste management'.
- Storage areas shall be kept clean and materials neatly stacked or placed. Materials are to be stored or placed in an orderly manner.
- Lunch or eating areas are being kept clean and free of all food scraps, wrappers, cups, and other disposable items.
- All scrap timber, waste material, and rubbish shall be removed from the immediate work area as the work progresses.
- All solvent waste, oily rags and flammable liquids are to be kept in fire-resistant containers until removed from the work site.
- Electrical waste is to be collected separately and stored and disposed as per guidelines.
- Electric welding leads, cords, wires, electrical cables, hoses, and other temporary systems shall be kept off the walking surface, in an elevated position.

*For details refer Procedure No. PIN LP-CHM-006*



#### **4. Environmental & Waste Management Practices at site**

##### **4.1 Control of Air Pollution**

###### **4.1.1 Air pollution control during transportation of construction materials**

- Vehicles with open load carrying area shall not be used for moving potentially dust producing materials. Vehicles shall have properly fitting side and tailboards.
- Materials having the potential to generate dust shall not be loaded to a level higher than the side and tailboards, and shall be carried in covered vehicles.
- The haulage road at the construction site, if dusty is to be watered regularly.

###### **4.1.2 Air pollution control during storage of construction materials**

- Excavated materials shall be placed in the designated dumping / disposal area.
- The materials shall be placed in a manner that will minimize dust generation.
- Excavated materials shall be stabilized during summer season, each day, by watering at regular intervals.
- The heights from which materials are dropped shall be limited to 1.5 metres to limit fugitive dust emission.
- Water spray shall be used to prevent dust generation from piles of raw sand, aggregates and similar materials, during dry and windy weather.
- Cement shall not be stored in an open area; it shall always be stored in a covered shed.

###### **4.1.3 Air pollution control during construction activities**

- Water spray shall be used during the unloading and handling of raw sand, aggregates and similar materials, when dust is likely to be created.
- All motorized vehicles on temporary roads on the site shall be allowed a maximum speed of 20 Kmph.
- Concrete batching plant and crushing plant sites and ancillary areas shall be cleaned frequently and water can be sprayed to minimize dust generation.
- Shot blasting and Spray painting shall be done in an enclosed area as per regulation.
- Emissions from DG Sets are to be tested periodically once in every six months for its quality as per requirements of Environment Protection Act or Applicable Local regulations. As minimum tests shall include suspended particulate matter, oxides of sulphur, oxides of nitrogen, CO, HC.

Necessary actions are to be taken based on the results of testing.

- All vehicles and mobile equipment are to be periodically inspected and routinely maintained as per manufacturer's recommendations. All statutory requirements shall be complied.



## **4.2 Control of Water Pollution**

### **4.2.1 Measures for water pollution control during site planning**

- Temporary drainage system shall be constructed to drain off all surface water from the work site into suitable drain outlet.
- Temporary drainage works shall be maintained, removed and reinstated as necessary, and precautions are to be taken for avoidance of damage by flooding and silt.

### **4.2.2 Measures for minimization of waste water generation**

- Bentonite slurries and other grouts used in construction shall be collected in a separate slurry collection system. It shall be reused, to the extent possible. When reuse is not practicable, it shall be disposed off in a controlled manner as per applicable regulations.
- Suitable signages are to be displayed in toilets / canteens etc. to improve awareness towards conservation of water and minimisation of wastage of water.
- For conservation of water usage, water used for pressure / hydro testing shall be reused to the extent practicable.

### **4.2.3 Measures for waste water treatment**

- If waste water discharge is likely to come in contact with surface water body, sedimentation tanks of sufficient capacity shall be provided to prevent silt being discharged in the outlet drain.
- When required, oil separators are to be provided to prevent the release of oils and grease into the drainage system. Oil separator shall be cleaned on regular basis.
- Washout of construction or excavated materials shall be diverted to drainage system.
- Wastewater from toilets shall be disposed off through a closed system or septic tank with soak pit, as per applicable local regulations.

## **4.3 Control of Noise Pollution**

- Noises producing stationary equipment are to be located so as to minimize impact of noise on the neighbouring community.
- Silencers and mufflers shall be fitted and maintained on construction equipment as applicable.
- Equipment and plant shall not be kept idling, when not in use.
- Construction equipment is to be maintained / serviced regularly to control noise and vibration.
- High noise areas and equipment shall be notified as such and required PPE are to be used by the personnel in such areas / near such equipment.





- Noise limits for Diesel Generators shall be as per requirements of Environment (Protection) Rules.

#### **4.4 Waste Management**

##### **Construction Materials:**

Materials like concrete lumps, cement lumps, tested concrete cubes, soil, rock, fibre glass, broken bricks etc. These are to be collected from the site and used as land fill or transported to designated dumping site.

Materials like Paper, Plastics, Rubber and Glass shall be collected in the identified dustbins placed at various points at site / office. These are to be disposed off through authorised source.

##### **Metals:**

Metal pieces and welding rod stubs etc. shall be collected from site and segregated at source. These scrap shall be stored in the scrap yard and disposed off through authorised source.

##### **Waste Lubricating Oil:**

Waste lubricating oils and oil filters shall be stored in closed containers. They shall be disposed off to the authorized recyclers.

##### **Food Waste:**

Food waste is to be collected in food waste containers with lid. They shall be disposed off to municipal collection bins or buried in designated areas.

##### **Domestic waste**

Domestic waste generated at the site shall be buried in deep pit specifically excavated for the purpose.

##### **Waste Lead Acid Battery:**

They shall be disposed through the authorized dealers of battery manufacturers.

##### **Disposal of empty Paint containers:**

Residual paint in the paint containers shall be kept at the minimum, by extracting the maximum paint by use of thinner. The empty paint container, thereafter, is to be disposed off suitably through authorised source.

Empty paint containers shall not be used for storage of materials/liquids.

##### **Electrical waste from site:**

Electrical waste shall be stored at identified location and is to be disposed off through authorised source.



**Packing material:**

Packing material like wood, thermocol, empty cartons etc. shall be segregated and disposed off through authorised source.

## **5. HSE Management At Site**

### **5.1 Accident/Incident Reporting & Investigation**

#### **5.1.1 Definitions**

**Workplace:**

Any physical location in which work related activities are performed under the control of the organization.

**Environment:**

Surroundings in which operations carried out, including air, water, land, natural resources, flora, fauna, humans, and their interrelation.

**Audit:**

Systematic, independent and documented process for obtaining "Audit evidence" and evaluating it objectively to determine the extent to which "Audit criteria" are fulfilled.

**Confined Space:**

A workplace having limited openings for ingress or egress making it difficult for the person inside the confined space to escape freely at will. This workplace could be oxygen deficient (less than 19.5%) or oxygen enriched (more than 23.5%) & could have (i) Restricted flow of fresh air, (ii) or contain (a) inflammable gases / vapours (b) or toxic gases (c) or other specified physical hazards which could overcome those working inside the confined space and physically or mentally immobilize the affected person.

**Environmental aspect:**

Element of an organization's activities or products or services that can interact with the environment.

**Environmental impact:**

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.



**Hazard:**

Source, situation, or act with a potential for harm in terms of human injury or ill health or a combination of these.

**Incident:**

Work-related event(s) in which an injury or ill health or fatality occurred, or could have occurred.

Note 1: An accident is an incident which has given rise to injury, ill health or fatality.

Note 2: An incident where no injury, ill health, or fatality occurs may also be referred to as a “near miss”, “near-hit”, “close call” or “dangerous occurrence”.

Note 3: An emergency situation is a particular type of incident.

**Ill Health:**

Identifiable, adverse physical or mental condition arising from and/or made worse by a work activity and/or work-related situation.

**Dangerous Occurrence:**

An unplanned event, which is NOT resulted in personal injury or disablement, but arising out of –  
Bursting of a plant used for containing or supplying steam under pressure greater than atmospheric pressure.

Collapse or failure of a crane, derrick, winch, hoist, or other appliance used in raising or lowering persons or goods, or any part thereof, or the overturning of a crane / vehicles / equipments.

Explosion or fire or bursting out, leakage or escape of any hot / cold substance (molten metal, liquid or gas) causing injury to any person or any room or place in which persons are employed.

Explosion of a receiver or container used for the storage at a pressure greater than atmospheric pressure of any gas or gases (including air) or any liquid or solid resulting from the compression of gas.

Collapse or subsidence of any floor, gallery, roof, bridge, tunnel, chimney, wall, building, excavation or any other structure or formwork or scaffold.

**Interested Parties:**

Individual or group concerned with or affected by the EHS performances of an organization.

**Man-hour Worked:**

The total number of employee-hours worked by all employees working in the premises. It includes managerial, supervisory, professional, technical, clerical and other workers (including contractor labours, security personnel & other casuals).



Man-hours worked shall be calculated from the pay roll or time office record including overtime. When this is not applicable, the same shall be estimated by multiplying the total man-days worked for the period covered by the number of hours worked per day. The total number of man-days for a period is the product of the number of persons engaged multiplied by the man-days worked.

**Man-days Lost:**

The day on which the injury occurred and the day injured person returned to the work are not to be included as man-day's lost, but all intervening calendar days (including Sundays or days off or days of plant shutdown) are to be included. If after resumption of work, the person injured is again disabled for any period arising out of the injury which caused his earlier disablement, such subsequent disablement is also to be included in the man-day's lost. According to the schedule of charges, a loss of 6000 man-days is taken for death of a person.

**Near Miss Case:**

An incident where no injury, ill health or fatality occurs.

**First Aid Cases:**

First aid cases are where the injured person is given medical treatment and discharge immediately for reporting on duty, without counting any lost time.

**Reportable Lost Time Injury:**

An injury causing death or disablement of the injured person for 48 hours or more excluding the day of the shift on which the accident occurred.

**Reportable Sick cases:**

A sickness case causing disablement of the affected person for 48 hours or more excluding the day of work on which he fell sick.

**Risk:**

Combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s).

**Acceptable Risk:**

Risk that has been reduced to a level that can be tolerated by the organization having regard to its legal obligations and its EHS policy.



**Risk Assessment:**

Process of evaluating the risk(s) arising from a hazard(s), taking into account the adequacy of any existing controls, and deciding whether or not the risk(s) is acceptable

**Restricted work case (RWC):**

Restricted work activity occurs when, as the result of a work related injury or illness, an employer or health care professional keeps, or recommends keeping, an employee from doing the routine functions of his or her job or from working the full workday that the employee would have been scheduled to work before the injury or illness occurred

**Medical treatment case (MTC):**

Medical treatment includes managing and caring for a patient for the purpose of combating disease or disorder. The following are not considered medical treatments and are NOT recordable:

- Visits to a doctor or health care professional
- Solely for observation or counselling;
- diagnostic procedures, including administering prescription medications that are used solely for diagnostic purposes; and
- any procedure that can be labelled first aid

**Occupational Illness:**

A physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a period of time. For practical purposes, an occupational illness/disease is any reported condition which does not meet the definition of injury (traumatic).

Some conditions may be classified as either an injury or an illness (but not both), depending upon the nature of the event that produced condition. Eg.

- a. Loss of hearing resulting from an explosion (an instantaneous event) is classified as an injury; the same condition arising from exposure to industrial noise over a period of time would be classified as an illness.
- b. Similarly, irritation of throat from exposure of chlorine gas fumes could be classified as either an injury or an illness. If the exposure was instantaneous and occurred when a cylinder of gas ruptured, the case would be considered an injury. The case would be an illness if the employee was exposed to the agent over a period of time, such as working in an area where chlorine fumes from a bleaching process were present.



**Frequency Rate:** Number of Reportable lost time injuries per million man hours worked.

$$\text{Frequency Rate} = \frac{\text{Number of Reportable Lost Time Injuries} \times 10^6}{\text{Man-hours worked}}$$

**Severity Rate:** Number of man days lost due to reportable lost time injuries per million man-hours worked.

$$\text{Severity Rate} = \frac{\text{Mondays Lost due to Reportable LTI} \times 10^6}{\text{Man-hours worked}}$$

**Frequency rate of First aid cases:** Number of First Aid Cases per million man hours worked.

$$\text{Frequency Rate of First Aid Cases} = \frac{\text{Number of first aid cases} \times 10^6}{\text{Man-hours worked}}$$

**Total Recordable Incidence Rate (TRIR):** is a measure of the rate of recordable workplace injuries, The factor is derived by multiplying the number of recordable injuries in a calendar year by 106 and dividing this value by the total man-hours worked.

$$\text{TRIR} = \frac{(\text{No. of Restricted Work Case} + \text{No. of Medical Treatment Case} + \text{No. of Loss time injury case} + \text{No of Occupational Illness}) \times 10^6}{\text{Man - hours Worked}}$$

**Incident Potential Rate:**

Number of Unsafe Act / Unsafe Condition per million man hours worked.

$$\text{Incident Potential Rate} = \frac{\text{Number of Unsafe Act / Unsafe Condition} \times 10^6}{\text{Man-hours worked}}$$



**Injury (Traumatic):**

A wound or other condition of the body caused by external force including stress or strain. The injury is identifiable as to time and place of occurrence and member or function of the body affected, and is caused by a specific event/ incident or series of events/ incidents within a single day or work shift.

**Vehicle Incident Frequency Rate:**

$$\text{Vehicle Incident Rate} = \frac{\text{Total Number of Motor Vehicle Incidents} \times 10^6}{T}$$

**Environmental management system:**

Part of the management system used to manage environmental aspects, fulfil compliance obligations and address risks and opportunities.

**Environmental aspect:** Element of an organization's activities or products or services that interacts or can interact with the environment

*Note to entry:* An environmental aspect can cause (an) environmental impact(s)

A significant environmental aspect is one that has or can have one or more significant environmental impact (s)

*Note to entry:* Significant environmental aspects are determined by the organization applying one or more criteria.

**Environmental impact:** Change to the environment, whether adverse or beneficial wholly or partially resulting from an organization's environmental aspects.

**Life cycle:**

Consecutive and interlinked stages of a product or service system from raw material acquisition or generation from natural resources to final disposal

*Note to entry:* the life cycle stages include acquisition of raw materials design production transportation delivery use end of life treatment and final disposal

**Continual improvement:** Recurring activity to enhance performance

*Note to entry:* Enhancing performance relates to the use of the environmental management system to enhance environmental performance consistent with the organization's environmental policy.

*Note to entry:* The activity need not take place in all areas simultaneously or without interruption



**Interested party:** Person or organization that can affect or be affected by or perceive itself to be affected by a decision or activity.

**Fire:**

Fire is an event or occurrence with a rapid, persistent chemical change that releases heat, light and various reaction products which is accompanied by smoldering or a flame, especially the exothermic oxidation of a combustible substance. The flame is the visible portion of the fire and consists of glowing hot gases.

**Property Damage:**

Property damage is an event or occurrence which has damaged property or equipment.

**tk Employee (directly employed):**

tk Employee - includes all ThyssenKrupp employees including full-time, part-time and temporary employees.

**Contractor / Subcontractor:**

Contractor / Subcontractor include all contractor employees including their subcontractors.

**Third Party:**

Third Party is any person who is not categorized as directly employed or contractor / subcontractor.

**Witness:**

“Witness” is a person who has observed (actual eyewitness) or person having knowledge (circumstantial witness) of the circumstances of a specific event or occurrence

**Line Manager:**

Line Manager is the nominated person responsible for ensuring the health, safety of employee, the environment, contractors or subcontractor’s employees working under their authority.

**5.1.2 Incident Reporting:**

tkIS India has established, documented and implemented an Instruction (Refer HSE Procedure No. PIN LP-HS-011 to record, report, investigates and analyze the incidents in order to:

- a. determine underlying HSE deficiencies and other factors that might be causing or contributing to occurrence of incidents.
- b. identify need for corrective actions.
- c. identify opportunity for preventive actions.



- d. identify opportunity for continual improvement.
- e. communicate the results of such investigations (management review).

## **5.2 HSE Personnel**

### **5.2.1 Safety Committee**

1. Every Site wherein 500 or more construction workers are ordinarily employed, a safety committee shall be constituted represented by equal number of representatives of staff and the construction workers. In no case, the number of representatives of the staff shall exceed the representatives of the construction workers.

However, a safety committee shall be formed if advised by tkIS India Site HSE Representative or tkIS India Site Manager (SM) even though the numbers of construction workers are less than 500 for effective implementation of safety at site.

2. The main functions of the safety committee, shall be -
  - (a) to identify probable cases of accident and safe practice in building or other construction work and to suggest remedial measures;
  - (b) to stimulate interest of employees and construction workers in safety by organizing safety weeks, safety competitions, talks and film shows on safety, preparing posters or taking similar other measures as and when required or as necessary;
  - (c) to go round the construction site with a view to check unsafe practices and detect unsafe conditions and to recommend remedial measures for their rectification including first aid, medical and welfare facilities;
  - (d) to look into the health hazards associated with handling different types of explosives, chemicals and other construction materials and to suggest remedial measures including use of proper personal protective equipment;
  - (e) to suggest measures for improving welfare amenities in the construction site and other miscellaneous aspects of safety, health and welfare in building or other construction work; and.
  - (f) to bring to the notice of the employer, the hazards associated with the use, handling and maintenance of the equipment used during the course of the building and other construction work.
3. The safety committee shall meet at regular intervals at least once in a month and it shall be chaired by tkIS India Site Manager.
4. The agenda and minutes of the meeting shall be circulated to all concerned.
5. The decisions and recommendations of the safety committee shall be complied with by the concerned (tkIS India & Contractor) within reasonable time limits.

### **5.2.2 Site HSE Manager**

In every Site wherein 100 or more construction workers are ordinarily employed, the concerned contractor shall appoint Site HSE Manager, such site HSE Manager shall be assisted by suitable and adequate staff as referred in Procedure no. PIN LP-CHM-022

### **5.3 HSE Induction/ Training**

- a) All employees of tkIS India, Contractors & Vendors shall be provided with HSE Induction / training before assigning any job to them.
- b) Site Visitors shall also be provided with Visitors HSE Induction.  
Training shall include, as minimum but not limited to - familiarisation about site, site facilities & First-aid points, Emergency Response Plan, PPE requirement, Site Rules and regulations.
- c) Further personnel requiring special training based on specific trade shall be identified and necessary training shall be provided. Such special training includes - Working at Height, Lifting & Rigging, Work Permit system, Welding & Cutting, Electrical Safety, First-Aid, etc. These trainings can be conducted in-house or through external trainers.

Records of all trainings shall be maintained.

### **5.4 HSE Meetings**

#### **5.4.1 Kick off Meetings**

- On mobilisation of Contractor, prior to start of work, tkIS India Site HSE Manager, shall organise a meeting with Contractor's HSE team & Construction Engineers. Owner's representative shall attend the Kick-off meeting as applicable.
- During this meeting, safety, medical, fire protection, and other HSE related aspects of the work under consideration shall be reviewed, so as to ensure that Contractor is fully aware of HSE requirements.

#### **5.4.2 Toolbox Meetings**

- Contractor supervisors shall conduct periodic toolbox meeting. All workers shall attend the toolbox meetings.
- Contractors HSE Officer/s shall also participate & assist.
- Records of attendance shall be maintained.
- Weekly reports on toolbox meetings shall be submitted to tkIS India Site HSE Manager

#### **5.4.3 Contractors Weekly Progress Review meetings**

- HSE performance and current areas of concern shall be reviewed as a default agenda point during weekly progress review meeting with the contractor. The corrective actions needed as well as status and effectiveness of earlier corrective actions shall be reviewed.
- Minutes of such meetings shall be maintained.

#### **5.4.4 Monthly HSE Meeting**

tkIS India Site Manager shall conduct a monthly HSE meeting involving all the contractor's working at site. The meeting shall cover minimum but not limited to: -

- HSE issues, including HSE co-ordination between contractors.
- HSE violations, if any and necessary disciplinary actions.
- HSE performance
- Observations during monthly general area inspection
- Follow-up of actions decided in the previous meetings.
- Owners HSE representative may also be invited for the meetings.
- Records of meetings shall be maintained by tkIS India site HSE Manager.

#### **5.5 HSE Motivation**

- Contractors shall establish a motivation system for their employees through appropriate publicity, encouraging a proper attitude, in addition to personal contact, recognition and HSE Programs.
- Contractors shall allocate a general purpose bulletin board, which can be used for posting general information, job bulletins and safety signs.
- Contractors shall post in prominent locations and make use of safety posters, signs, booklets and reminders on its job site.

#### **5.6 HSE Violation – Disciplinary Action**

- HSE violation is a case of disregard for a HSE procedure, which caused or could have caused an incident.

HSE officers shall immediately correct and report any such violations seen in the course of his duties in writing to tkIS India Site HSE Manager.

- These reports shall be maintained giving details of the violation, work area, date and time, perpetrator, etc.
- Disciplinary action shall be considered for repeated offenders.



- In case of HSE violations, upon detecting the situation or upon verbal request from tkIS India. Contractors shall immediately take necessary corrective action and provide a written report within 24 hours including root cause analysis and corrective actions taken to avoid reoccurrences.

## **5.7 HSE Inspections**

Following types of Inspections / audits, but not limited to, shall be conducted at site.

### **5.7.1 Daily Inspections**

- Contractors HSE Officer/s shall conduct daily site inspections.
- tkIS India Site HSE Manager shall participate in the inspections or conduct independent inspections as required.
- Records of these inspections shall be maintained.
- Any minor problems / deviations observed shall be corrected by the Contractor's HSE Officer/s immediately.
- Where the situation exposes any individual, to injury or ill health, work shall be immediately suspended until the situation is rectified.

### **5.7.2 Weekly Walk Around**

- tkIS India and Contractor's Resident Construction Managers, along with their site HSE managers shall conduct an inspection, on at least one area of the project site on weekly basis. However, it shall be ensured that the entire project site is covered during a calendar month.
- Deficiencies noted shall be registered, reviewed and appropriate corrective action shall be implemented.
- Follow up inspection, as required shall be conducted to ensure effectiveness of implementation of the corrective actions.
- Records of this Weekly Walk around shall be maintained.

### **5.7.3 General Area Inspection**

- tkIS India and Contractor's Resident Construction Managers along with their HSE team shall conduct a general area inspection of complete site monthly.
- These inspections shall be conducted prior to the monthly HSE meeting.
- Records of such inspections shall be maintained.
- Owner may be invited to participate in above mentioned inspections.



## **5.8 HSE Audits**

- HSE audits are carried out in order to evaluate the effectiveness of implementation of the Project HSE Plan and requirements of this Construction HSE Manual. Schedule of these audits shall be included in project HSE Plan.
- Audits shall be conducted by competent person independent of the area or activities being audited. Audit findings along with necessary actions shall be recorded.
- Owner/client may participate on request.

## **5.9 HSE Records**

Various HSE records, statistics required to be maintained during the project execution at site shall consist of, but not limited to, the following:

Minutes of various meetings

- Accident/Incident Report
- HSE inspections/audit reports
- Training Records
- Work permits
- Equipment Inspection reports / certificates

Medical examination records

- Any other record required as per requirements of this manual
- Any records as required by local regulations / project HSE Plan
- Any records as required as per Owner/Client requirement
- Monthly reports to tkIS India Construction HO and HSE HO consisting of: -
  - HSE activity during the month (meetings, inspections, training etc.)
  - Incident data
  - Statistical data
  - Any other HSE related matter required to be brought to the notice of tkIS India Construction HO and HSE HO.

These records shall be maintained for the complete duration of site activities.

Site HSE manager on completion of the site work shall submit summary of relevant statistic and records to tkIS India Construction HO and HSE HO.

*For details refer Procedure No. PIN LP-CHM-022*

## 6. List of Reference Documents

### 6.1 List of Applicable HSE instructions

Sr.No	HSE Instruction No.	Description
1	PIN LP-CHM-001	Compressed Gas Cylinders
2	PIN LP-CHM-002	Electrical Equipment
3	PIN LP-CHM-003	Emergency procedure
4	PIN LP-CHM-004	Fire Safety
5	PIN LP-CHM-005	Hazardous substances Procedure
6	PIN LP-CHM-006	Housekeeping
7	PIN LP-CHM-007	Pressure Testing
8	PIN LP-CHM-008	Hand and Portable Power Tools
9	PIN LP-CHM-010	Lifting Operations
10	PIN LP-CHM-011	Lockout Tag out Procedure
11	PIN LP-CHM-012	Personal Protective Equipment
12	PIN LP-CHM-013	Radiography
13	PIN LP-CHM-014	Scaffolds and Ladders
14	PIN LP-CHM-015	Site Security and Access Control
15	PIN LP-CHM-016	Spray Painting and Abrasive Cleaning
16	PIN LP-CHM-017	Vehicles and mobile equipment procedure
17	PIN LP-CHM-018	Work permit procedure
18	PIN LP-CHM-019	Working Safely at height
19	PIN LP-CHM-020	Welding and cutting safety procedure
20	PIN LP-CHM-021	Trenching and Excavation procedure
21	PIN LP-CHM-022	Site HSE Management
22	PIN LP-CHM-023	Confined Space Entry
23	PIN LP-HS-011	Incident Reporting and Investigation
24	PIN LP-HS-002	Risk Assessment
25	PIN LP-HS-002-A01	Annex: Master HIRA – Construction
26	PIN LP-HS-002-A03	Annex: Likelihood-Consequence table
27	PIN LP-HS-002-A04	Annex: Risk matrix

28	PIN LP-HS-002-A05	Annex: Principles of prevention
29	PIN LP-HS-002-F01	Form: HIRA Template
30	PIN LP-HS-003	Impacts Evaluation
31	PIN LP-HS-003-A02	Annex -Environmental Impacts Evaluation Register - Construction
32	PIN LP-HS-003-A03	Annex -Criteria for Significance Evaluation of Environmental Aspects
33	PIN LP-HS-003-F01	Form -Environmental Impacts Evaluation Register
34	PIN LP-HS-003-F02	Form - Master Life cycle Perspective register
35	PIN LP-HS-004	Regulatory & Other Requirements and Evaluation of Compliance
36	PIN LP-HS-004-A01	Annex: Master List of applicable Regulatory and Other Requirements Register:-Construction
37	PIN LP-HS-004-F01	Form: Regulatory and Other Requirements Template:-Construction
38	PIN LP-HS-004-F03	Form: Regulatory and Other Requirements Compliance Checklist:- Construction
39	PIN LP-HS-005	HSE Objectives, Targets and Programs
40	PIN LP-HS-005-A01	Annex: Guidelines for fixing HSE objectives & Targets - Sites
41	PIN LP-HS-005-F01	Form: Management Program
42	PIN LP-HS-005-F02	Form: HSE Objective & Targets
43	PIN LP-HS-005-F03	Form: Achievement against HSE Objectives
44	PIN LP-HS-005-F05	Form: Guidelines for Objectives and targets-Sites
45	PIN LP-HS-005-F06	Form: Natural Resource saving potential for Project - template
46	PIN LP-HS-006	Monitoring and Measurement Plan

**6.2 List of Relevant Major Acts & Rules of India** (Sites out of India shall follow Law of the land)

- The Factories Act, 1948 & the Concerned State Factories Rules.
- The Explosives Act, 1884 & Explosives Rules, 2008.
- The Gas Cylinders Rules, 2004.
- The Static & Mobile Pressure Vessel (Unfired) Rules, 1981.
- Indian Boiler Act, 1923 and State Boiler Regulation.
- The Petroleum Act, 1934 and the Petroleum Rules, 2002.
- The Manufacture, Storage, Import of Hazardous Chemicals Rules, 1989.
- The Indian Electricity Act, 1910 and the Indian Electricity Rules, 1956 (amended)
- The Public Liability Insurance Act, 1991(amended 1992) and the Public Liability Insurance Rules, 1991(amended 1992).
- Environmental Impact Assessment Notification, 1994 as amended 2004.
- The Central Motor Vehicles Rules, 1989.
- The Biomedical Waste Management & Handling Rules, 1998.
- The Employee's Compensation Act, 1923 & Rules, 1924.
- The Employees' State Insurance Act & Rules.
- BOCW Act, 1996 & Central Rules, 1998.
- The Motor (Prevention and Control of Pollution) cess Act, 1977 amended 1992.
- The Air (Prevention and control of Pollution) Act 1981 amended 1987.
- The Environment (Protection) Act, 1986, amended 1991.
- The Inflammable Substances Act, 1952.
- The Water (Prevention and Control) Act, 1974.
- The Hazardous waste (Mgmt. Hdlg. & Trans boundary movement) Rules, 2008.
- The Batteries (management and handling) Rules, 2001.
- Noise Pollution (Regulation and Control) Rules, 2000.
- The Ozone depleting substances (Regulation and Control) Rules, 2000.
- Environment (Protection) Amendment Rules, 2008 (D.G. sets).
- Central Pollution Control Board Standards.





- IS 7293 – 1974: Working with Construction Machinery.
- Construction Safety Manual by the Building Advisory Service for The Building Employers Confederation, London.
- IS: 7969 –1975 - Safety code for handling and storage of building materials.
- Accident Prevention Manual for business & Industry – Engineering & Technology 10th Edition by NSC – USA.
- Indian Standard Selection, Installation and Maintenance of First – aid Fire Extinguishers - Code of Practice (Third Revision) IS 2190: 1992.
- ILO Construction Safety Manual.
- IS 8235 -1976 Guide for procedures in Hand operated Hand tools.
- OSHA Construction Safety Regulations 29 CFR 1926.
- eLCOSH (Electronic Library of Safety & Health)
- Code of Practice for Safety Colours and Safety Signs IS: 9457-1980.
- OSHA – 1926.56 – Illumination.
- IS 2925: 1984 - Specification for Industrial Safety Helmets.
- IS 8520: 1977 Guide for selection of industrial safety equipment for eye, face and ear protection.
- IS 9167: 1979 Specification for ear protectors.
- IS 4770: 1991 Rubber Gloves - Electrical Purposes – Specification.
- IS 8807: 1978 Guide for selection of industrial safety equipment for protection of arms and hands.
- IS 6994: Part 1 : 1973 Specification for safety gloves Part 1 Leather and cotton gloves.
- IS 6519: 1971 Code of practice for selection, care and repair of safety footwear.
- IS 10667: 1983 Guide for selection for industrial safety equipment for protection of foot and leg.
- IS 1989: Part 1: 1986 Specification for Leather Safety Boots and Shoes - Part 1 : For Miners.
- IS 1989: Part 2: 1986 Specification for Leather Safety Boots and Shoes - Part 2 : For Heavy Metal Industries.
- IS 4501: 1981 Specification for Aprons, Rubberized, Acid and Alkali Resistant.
- IS 8519: 1977 Guide for selection of industrial safety equipment for body protection.
- IS 12254: 1993 Polyvinyl Chloride (PVC) Industrial Boots – Specification.



- IS 9623: 1980 Recommendations for the selection, use and maintenance of respiratory protective devices.
- IS 11226: 1993 Leather safety footwear having direct moulded rubber sole – Specification.
- IS 3521: 1999 Industrial safety belts and harnesses – Specification.
- Personal Protective Equipment Guide - Canadian Centre for Occupational Health and Safety.
- Personal Protection at Workplace – Publication of Loss Prevention Association of India Ltd.
- Solutions for your workplace – Publication of Occupational Health and environmental Safety division of 3M limited.
- IS: 3696 (Part 1 & 2) Ladders and Scaffolds.
- IS: 818 – 1968 Code of practice for Safety and Health requirements in Electric and Gas Welding and Cutting Operations.
- IS: 3016 – 1965 Code of practice for fire precautions in welding and cutting operations.
- Health and Safety in Welding and Allied Processes – N.C.Balchin.
- Rigging Manual by D.E.Dickie.
- IS 7293 – 1974: Working with Construction Machinery.
- IS: 5245 (Part I) – 1969 Methods for Splicing of wire Ropes.
- IS 5175 – 1974: Polypropylene rope Specification.
- IS 3764: 1992 Excavation Works – Code of Safety.
- Excavation Safety Manual (Based on OSHA) by Environmental Health and Safety Services, Occupational Safety Division, Virginia.
- IS 4081 – 1986 Safety Code for blasting & Related drilling operations.
- Metalliferous Mines Regulation, 1961
- OSHA Checklist for the construction industry, Occupational Health Bureau
- Elements of Mining Technology – Volume: 1 by D.J. Deshmukh (7th Edition 1995)
- IS 5121 – 1969 Safety Code for Piling and other deep foundation.
- Code of Practice – Pumping Concrete, Work Cover NSW (New South Wales Publications), Australia.
- Co-worker Training Package, American Concrete Pumping Association.
- IS: 7969 –1975 - Safety code for handling and storage of building materials.
- Health and Safety Executive, Cement Construction Information Sheet No. 26 (revised).



- Code of Practice – Safe work on roofs, WorkCover NSW (New South Wales Publications), Australia.
- HSE Information Sheet – Working on roofs, Health & Safety Executive, UK.
- The Electricity Act 2003
- IS 4130: 1991 Demolition of Buildings – Code of Safety
- IS 8964: 1999 Safety Conditions for woodworking Machines – Recommendations.
- Factories Act, 1948 and Tamilnadu Factories Rules, 1950.
- HSE Information Sheets of Health & Safety Executive, UK.
- IRC: SP: 55 – 2001 - Guidelines on Safety in Road Construction Zones.
- IRC: 67 – 1977 – Code of Practice for Road Signs.
- IRC: 79 – 1981 - Recommended Practice for Road Delineators.
- IRC MOST SPEC – 100 – 3100 2001 – MOST Specifications for Road and Bridge Works.
- IRC: SP: 44 – 1996 – Highway Safety Code.
- Publication on Structural Steel Erection by (OSHA)
- IS: 7205-1974 - Safety Code for erection of structural steel work.
- OSHA Publication No. 2209 – Based on 29 CFR 1910.215.
- Radiographer's Handbook of Industrial Radiographic inspection & Co. based BARC (Bhabha Atomic Research Centre) Regulations.
- Encyclopaedia of Environment and Pollution Control (4 Vol.Set).
- Industrial Safety & Pollution Control Handbook (NSC associate Publishers Pvt.Ltd.
- Introduction to Environmental Science (BS Publication) Y. Anjaneyulu.
- OSHA Standards (29 CFR 1926 /1910).
- ILO Code of Practice: Safety & Health in Construction Works.
- Construction Health and Safety Manual by Construction Industry Publications Limited, UK.
- Accident Prevention manual, NSC, Chicago, USA

### 6.3 List of Relevant IS Codes:

Sl. No.	IS CODE	Details
1	11057 - 1984	Specification for Industrial Safety Nets
2	2309 - 1969	Code of practice for the protection of Buildings and Allied Structures against lightning.
3	12640 - 1988	Residual Current-Operated Circuit Breakers - Specification
4	4850 - 1968	Application guide for Expulsion-type Fall Arresters
5	4004 - 1985	Application Guide for Surge Arresters with Series Gap and Non-linear Resistors for AC Systems
6	11226 - 1993	Leather Safety Footwear having direct moulded Rubber Sole Specification
7	3043 - 1987	Code of Practice for Gas cutting
8	3521 - 1989	Industrial Safety Belt and Harness - Specification
10	2266 - 1989	Steel Wire Ropes for general engineering purposes - Specification
11	3764 - 1992	Excavation Work - Code of Safety
12	2190 - 1992	Selection, Installation and Maintenance of First Aid Fire Extinguishers - Code of Practice
13	1856 - 1977	Specification for Steel Wire Ropes for haulage purposes
14	2363 - 1981	Glossary of Terms related to Wire Ropes
15	3459 - 1977	Specification for Small Wore Ropes
16	4573 - 1968	Code of Practice for design of Mobile Cranes (All Types)
17	1991 - 1962	Safety Codes for Grinding Wheels
18	3938 - 1967	Specification for Electric Wire Rope Hoists
19	5121 - 1969	Safety Code for Piling and other Deep Foundation
20	4014 - 1967	Code of Practice for Steel Tubular Scaffolding
21	2551 - 1963	Danger Notice Plates
22	1336 - 1959	Recommendations for the Colour of Push Buttons



23	807 - 1963	Code of Practice for Design, Manufacture, Erection and testing (Structural portion) of cranes and hoists
24	1991 - 1962	Safety Code for grinding Wheels
25	3814 - 1967	Specification for metal arc welded short link, uncalibrated steel chain, Grade 30 for lifting purposes.
26	4167 - 1966	Glossary of Terms related to Air Pollution
27	13849 - 1993	Portable Fire Extinguishers, Dry powder type (Stored Pressure) - Specification
28	8964 - 1978	Recommendations for Safety Conditions for Woodworking Machines
29	7205 - 1974	Safety code for Erection of Structural Steelwork
30	5916 - 1970	Safety code for constructions involving hot Bituminous Material.

## 6.4

### APPENDIX-1

#### Contents of a First-Aid Box

- A sufficient number of eye wash bottles filled with distilled water or suitable liquid clearly indicated by a distinctive sign which shall be visible at all times.
- 4% xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops.
- Twenty-four small sterilised dressings.
- Twelve medium size sterilised dressings.
- Twelve large size sterilised dressings.
- Twelve large size sterilised burn dressings.
- Twelve (fifteen cm.) packets of sterilised cotton wool.
- (Two hundred ml.) bottle of certimide solution (1%) or suitable antiseptic solution.
- One (two hundred ml.) bottle of mercurochrome (2%) solution in water.
- One (one hundred twenty ml.) bottle of Sal volatile having the doses and mode of administration indicated on the label.
- One pair of scissors.
- One roll of adhesive plaster (six cm. x one metre)
- Two rolls of adhesive plaster (two cms. x one metre)
- Twelve pieces of sterilised eye pads in separate sealed packets.
- A bottle containing hundred tablets (each of three hundred twenty five mg) of aspirin or any other analgesic.
- Twelve roller bandages ten cms. wide.
- Twelve roller bandages five cms. wide.
- One tourniquet.
- A supply of suitable splints.
- Three packets of safety pins.
- Kidney tray.
- A snake bite lancet.
- One (thirty ml.) bottle containing potassium permanganate crystals.
- One copy of first-aid leaflet issued by the Directorate General.
- Six triangular bandages.
- Two pairs of suitable, sterilised, latex hand gloves.

6.5

APPENDIX – 2

Dangerous Occurrences

- Collapse or failure of lifting appliances or hoist or conveyors or other similar equipment for handling building or construction material or breakage or failure of rope, chain or loose gears; overturning of cranes used in building or other construction work; falling of objects from height;
- Collapse or subsidence of soil, any wall, floor, gallery, roof or any other part of any structure, platform, staging, scaffolding or any means of access including formwork;
- Contact work, excavation, collapse of transmission;
- Explosion of receiver or vessel used for storage, at a pressure greater than atmospheric pressure, of any gas or gases or any liquid or solid used as building material;
- Fire and explosion causing damage to any place on construction site where building workers are employed;
- Spillage or leakage of hazardous substances and damage to their container;
- Collapse, capsizing, toppling or collision of transport equipment.
- Leakage or release of harmful toxic gases at the construction site.
- Bursting of a vessel used for containing steam under pressure greater than atmospheric pressure, other than plant which comes within the scope of the Indian Boilers Act.
- Collapse or failure of a crane, derrick, winch, lift, hoist or other appliances used in raising or lowering persons or goods or any part thereof, or the overturning of a crane.
- Explosion, fire, bursting out, leakage or escape of any molten metal, hot liquor or gas causing bodily injury to any person or damage to any part of portion of the factory in which persons are employed or damage to any plant, machinery or material. Explosion of a receiver or container used in any process, or used for storage at a pressure greater than atmospheric pressure of any gas or any gases (including air) or any liquid or any solid.
- Collapse or subsidence of any floor, gallery, roof, bridge, tunnel, chimney, wall or building forming part of a factory or within the compound or curtilage of factory.

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### 1. Scope

This HSE procedure is applicable for storage, handling and use of compressed gas cylinders during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, contractor, sub-contractor or vendor personnel.

### 2. Aim

This HSE procedure is aimed at providing guidelines and defining requirements for safe system of work for storage, handling and use of compressed gas cylinders during the execution stage of project at construction sites.

The procedure sets the basic minimum standard, in addition to compliance with current industry practices and applicable regulatory standards/requirements for storage, handling and use of compressed gas cylinders. In addition to this procedure, client /owner applicable requirements are to be followed. As a rule, the most stringent requirement shall be implemented.

### 3. Definition / Abbreviation

**Contractor** means the agency appointed by owner or tkIS India for carrying out specific work.

**Owner / Client** means the organisation which retains tkIS India for the purpose of the project.

**Subcontractor** means the agency which takes part of a contract from the contractor.

**Vendor** means a supplier who provides goods or services to the company

**COM** Commissioning Manager

**CO<sub>2</sub>** Carbon di oxide

**DCP** Dry Chemical Powder

**HSE** Health Safety Environment

**LPG** Liquefied Petroleum Gas

**SSI** Site Superintendent

**SSV** Site Supervisor

**SM** Site Manager

**tkIS India** thyssenkrupp Industrial Solutions (India) Private Limited

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#### 4. Responsibilities

The key responsibilities of site personnel related to HSE function are given below:

SM (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI / SSV	Responsible to implement this procedure and ensure that:  (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements.  (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods(recovery stage).  (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable (ALARP) and enable the process of continual improvement.
tkIS - India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site.  (ii) To assist construction engineer in identification, assessment, evaluation and control methods of likely hazards associated with the activity.  (iii) To ensure necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ HSE Personnel	(i) Carry out hazard identification & risk assessment for activity, as applicable and submit to tkIS India for comments / approval prior to commencement of the respective activities.  (ii) Ensure that personnel under their supervision understand and adhere to this procedure.  (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

#### 5. Procedure

The following general procedure pertains to the use, handling and storage of compressed gas cylinders of all sizes.

##### 5.1 Storage, handling and use

- Any damaged cylinder shall not be used. Any cylinder whose contents are not satisfactorily identified shall not be used. Such cylinder shall be red tagged with deficiency clearly stated, and reported to HSE personnel.
- Defective valves or safety relief devices on cylinders shall not be tampered with. No repair shall be attempted on such cylinders. They shall be identified and arrangements made for returning them to the supplier immediately. These cylinders shall be clearly tagged with "Danger – Do Not Use" tags.

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- Cylinders in the upright position must be properly secured by means of a chain or equivalent method.
- Oxygen cylinders shall not be stored within 6.1 meters of combustible gas cylinders or near any other substance where an accelerated fire could result.
- Cylinders shall be adequately supported during handling.
- Conveyors, trolleys and cradles of adequate strength shall, as far as possible, be used when moving cylinders.
- Gas cylinders shall be protected against shock, especially falling and temperature extremes.
- Gas cylinders handled by cranes or a hoist must be in suitable cages and must never be lifted by rope, chain slings or magnets.
- The cylinders shall be appropriately secured in upright position during transportation by hand truck, forklift or similar devices.
- Cylinders shall not be dragged or slid.
- Cylinders shall not be dropped when being unloaded or loaded off or onto a truck or dock.
- Gas cylinders shall never be used as rollers, supports, or for any purpose other than storage of gas as received.
- When using individual oxygen cylinders, the pressure regulator should be located directly on the cylinder.
- No oil or similar lubricant shall be used on any valves or other fittings of any cylinder.
- Cylinders are uniquely threaded (by cylinder type) to minimize contamination. The use of adapters or systems that can compromise this safeguard is strictly prohibited.
- Cylinder-to-cylinder connections are prohibited for the purpose of gas transfer.
- Wherever there is danger of material flowing back into the cylinder, a check valve shall be installed on the downstream side of the regulator valve.
- Cylinders shall not be placed where they might form part of an electrical circuit or a grounding path.
- Cracking (quickly opening and closing the cylinder valve) is required prior to connecting components to clear debris, dust, and water and to prevent plugging of the hoses, torches, regulator, or other systems.
- Cylinders shall be stored in a cool, dry, well ventilated place under cover, away from boilers, open flames, steam pipes or any potential sources of heat and such place of storage shall be easily accessible. The storage room or shed shall be of fire resistant construction.
- A cap shall be kept on the cylinder at all times, except when a cylinder is in service to the extent of being connected to a line or hose.
- The cap shall be hand tight.
- The protective cap/guard shall never be used for lifting or handling the cylinder.
- Any cylinder movement shall be with cap on.
- No child under the age of 18 years and no person who is in a state of intoxication shall be employed in-charge of loading or unloading or transport of any compressed gas cylinder or in any premises licensed under Gas Cylinder Rules, 2004.
- No person shall smoke and no fires, other than blow pipe flames for repairs, or no articles or such other substances of flammable nature or liable to spontaneous ignition or to cause or communicate fire or explosion shall be allowed at any time in proximity to a place where any cylinder for flammable gases is being filled, stored or handled.
- No person in or near any place where cylinders containing flammable gases are filled, stored or handled shall have in his possession any matches, fuses, mobile phones or any other appliances for producing ignition or explosion.
- Cylinders together with their valves and other fittings and the identification colours marked by supplier under Gas Cylinder Rules, 2004 shall always be maintained in good condition.
- No cylinder shall be subjected to any heat treatment or exposed to high temperatures or to the sun or stored with any other flammable or explosive material.
- Leakage of gas shall be detected / checked daily by soap solution only.

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- If a leak in the valve cannot be rectified by tightening the gland nut or the spindle, the cylinder shall be removed to an open space where it is least dangerous to life and property and the gas cylinder supplier shall be informed.
- Open flames, lights, mobile phones if applicable, lighting of fires, welding and smoking shall be prohibited in close proximity to any cylinder containing flammable gases except those while in use for welding, cutting and heating.
- Working places shall not be considered as storage places.
- Cylinders shall not be stored under conditions, which shall cause them to corrode.
- Empty cylinders shall be segregated from the filled one and care shall be taken that all the valves are tightly shut.
- In premises for storing of flammable gases in cylinders all electric meters, distribution boards, switches, fuses, plugs, sockets, all electric fittings, fixed lamps, portable hand lamps and motors shall be of flame proof construction conforming to IS: 2148 and shall be effectively earthed. Additional legal requirement if any is to be followed.
- A cylinder exposed to fire shall not be used unless it has undergone proper examination and hydrostatic test or hydrostatic stretch test.
- Dissolved Acetylene cylinders, which have been damaged by fire shall be condemned and destroyed by an experienced and competent person.

### Colour Coding of Cylinders

- Color-coding of compressed gas cylinders shall not be relied upon. Colours vary with manufacturers and from country to country.
- Stores Personnel shall ensure that correct color coded cylinders are supplied as per applicable standards/codes/local law.

**Following check list shall be used before its usage and periodically safety of gas cylinders at site.**

### Compressed gas cylinder inspection checklist

- Inspection of cylinders - are cylinders suitable for use?  
- Remove defective/damaged cylinders.
- Is the cylinder color-coded or does it have a suitable label identifying correct content? (e.g., Oxygen, Acetylene, Nitrogen, etc.)
- Are correct valves and safety relief devices fixed to the cylinder?
- Are correct hoses utilized and free of damage?
- Are cylinders stored upright in rack, cart or trolley?
- Are cylinders chained securing them to the rack, cart or trolley?
- Are suitable cages or proper handling devices available where cylinders need to be lifted into position?
- Are cylinders stored appropriately away from sources of ignition and hot work operations?
- Are protective caps available and positioned after work has been performed minimizing potential damage to cylinder threads and connection points?
- Is the work surface such that movement of the cylinder by trolley/cart is suitable, preventing excessive physical exertion?
- Are signs posted identifying location, types of cylinders, and smoking restrictions?

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- Is suitable personal protective equipment available for those working with highly flammable liquids and gases?
- Whether any fire prevention arrangements available – fire extinguishers, fire blanket, etc.?
- Are emergency procedures fully understood by all users of gas cylinders –highly flammable gases?

### 3. Records

Following records are to be maintained at site:

- Periodic Inspection record (check list contents provided in this procedure)

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## Attachments and forms:

**Form: PIN LP CHM-002 F01 – Safety Inspection Checklist - Electrical Equipment**

Validity

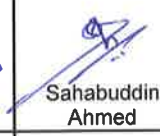
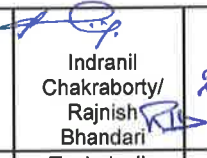

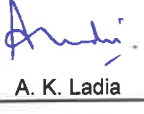
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### 1. Scope

This HSE instruction is applicable to Electrical installations and Electrical equipment during the execution of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, Vendor personnel.

### 2. Aim

This HSE instruction is aimed at providing guidelines and defining requirements for safe system of work for electrical installations and electrical equipment during the execution stage of project at construction sites.

The instruction sets the basic minimum standard, in addition to compliance with current industry practices and applicable regulatory standards/ requirements for electrical installations and electrical equipment.

However, the most stringent requirements shall be implemented.

### 3. Responsibilities

The key responsibilities of site personnel related to HSE functions are given below: Site Manager (SM)/ Commissioning Manager (CoM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India Construction Engineer	Responsible to implement this procedure and to ensure: (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods. (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM/CoM in effective implementation of this procedure on site. (ii) To assist construction engineer in identification, assessment, evaluation and control methods of likely hazards associated with the activity. (iii) To ensure necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ HSE Personnel	(i) Carry out HIRA for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.



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#### 4. Procedure

This procedure informs the meaning, necessity of insulation & grounding, GFCI, Assured Equipment Grounding Program and defines the safety requirements in connection with activities of electrical installation and use of electrical equipments at construction site.

Working with electricity can be dangerous. Engineers, linemen, electricians and others work with electricity directly, including overhead lines, cable harnesses and circuit assemblies.

##### Definition of Important Terms:

**Earth Leakage Circuit Breaker (ELCB)** – it is a safety device used in electrical installations with high earth impedance to prevent shock. It detects small stray voltages on the metal enclosures of electrical equipment and interrupts the circuit if a dangerous voltage is detected. Once widely used, more recent installations instead use residual current circuit breaker (RCCB) which instead detects leakage current directly. Now a day, ELCBs have been mostly replaced by residual-current devices (RCDs).

**Residual-Current Circuit Breaker (RCCB)** – It is an electrical wiring device that disconnects a circuit whenever it detects that the electric current is not balanced between the energized conductor and the return neutral conductor. Such an imbalance may indicate current leakage through the body of a person who is grounded and accidentally touching the energized part of the circuit. A lethal shock can result from these conditions. RCCBs are designed to disconnect quickly enough to prevent injury caused by such shocks. They are not intended to provide protection against over-current (overload) or short circuit conditions.

**Ground Fault Circuit Interrupter (GFCI)** – In the United State of America (USA) and Canada, a residual current device is most commonly known as ground fault circuit interrupter (GFCI) or ground fault interrupter (GFI) or an appliance leakage current interrupter (ALCI). In Australia / Europe they are sometimes known as “safety switches” or simply “RCD” and in the United Kingdom (UK) along with circuit breakers, they can be referred to as “trips” or “trip switches”.

**Residual Current Circuit Breaker with Overload protection (RCBO)** – it combines the functions of over-current protection and leakage protection. An earth leakage circuit breaker (ELCB) may be a residual-current device, although an older type of voltage-operated earth leakage circuit breaker exists.

**Residual Current Device** – it is a generic term covering both RCCBs and RCBOs.

In this instruction for better understanding GFCI word has been used commonly in all the places.

#### 4.1 Insulation and Grounding

Insulation and grounding are two recognized means of preventing injury during electrical equipment operation.

Consider for example, the metal housing or enclosure around a motor or the metal box in which electrical switches, circuit breakers and controls are placed. Such enclosures protect the equipment from dirt and moisture and prevent accidental contact with exposed wiring. However, there is a hazard associated with housings and enclosures. A malfunction within the equipment – such as deteriorated insulation – may create an electrical shock hazard. Many metal enclosures are connected to a ground to eliminate the hazard. If a “hot” wire contacts a grounded enclosure, grounds fault results which normally will trip a circuit breaker or blow a fuse. Metal enclosures and containers are usually grounded by connecting them with a wire going to ground. This wire is called an equipment grounding conductor. Most portable

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electric tools and appliances are grounded by this means. There is one disadvantage to grounding, a break in the grounding system may occur without the user's knowledge.

Insulation may be damaged by hard usage on the job or simply by aging. If this damage causes the conductors to become exposed, the hazards of shocks burns and fire will exist. Double insulation may be used as additional protection in the live parts of a tool, but double insulation does not provide protection against defective cords and plugs or against heavy moisture conditions.

The use of ground-fault circuit interrupter (GFCI) is one method used to overcome grounding and insulation deficiencies.

#### 4.2 Ground Fault Circuit Interrupter (GFCI)

The ground-fault circuit interrupter (GFCI) is a fast acting breaker which senses small imbalances in the circuit caused by current leakage to ground and, in a fraction of a second, shuts off the electricity. The GFCI continually matches the amount of current going to an electrical device against the amount of current returning from the device along the electrical path. Whenever the amount "going" differs from the amount "returning" by approximately 5 milliamps, the GFCI interrupts the electric power within as little as 1/40 of a second.

However, the GFCI shall not protect employee from line-to-line contact hazards (such as a person holding two "hot" wires or a hot and a neutral wire in each hand). It does provide protection against the most common form of electrical shock hazard - the ground fault. It also provides protection against fires, overheating and destruction of insulation of wiring.

##### GFCI at Site

All electrical outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees shall have approved GFCIs for personnel protection. Receptacles on a two-wire, single-phase portable or vehicle-mounted generator rated not more than 5 kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with GFCIs.

GFCIs shall be designed to interrupt the circuit quickly enough to prevent electric shocks.

The following requirements pertain to the location and recommended use of a ground fault circuit (GFCI).

According to applicable codes/standards, GFCIs shall be provided for all receptacle outlets that are not part of the permanent wiring of a building or structure (e.g. distribution panels, temporary wiring during construction), unless the assured equipment grounding conductor procedure is implemented.

GFCIs shall be provided for lavatory, washroom, and change room outlets.

GFCIs shall be provided for all areas likely to have a moist or wet atmosphere where electrical equipment or portable electric tools may be used.

There are certain limitations associated with the use of both GFCIs. These should be understood, which include:

GFCIs operate only on line to ground fault currents, such as insulation leakage currents or currents likely to occur during accidental contact with an energized wire and ground.

GFCIs do not protect in the event of line to line contact.

It is essential that the polarity of conductors in all cords, plugs and receptacles supplying single pole portable GFCI units be properly maintained or the unit may not protect personnel against shock.

It is generally desirable to locate portable GFCI units near the equipment being used and to use relatively short cords to each tool or lamp. This will also help to minimize nuisance tripping.

These include, as a minimum, the following:

Records shall be maintained.

An Assured Equipment Grounding Conductor Program is a schedule system for testing construction site electrical tools and extension cords to assure their proper grounding, polarity and resistance.

The assured equipment grounding conductor program covers all cord sets, receptacles which are not a part of the permanent wiring of the building or structure and equipment connected by cord and plug which are available for use or used by employees.

The outline of Assured Equipment Grounding Conductor program is given below:

### Outline of Assured Equipment Grounding Conductor Program:

1. Written description
  2. Competent person to implement
  3. Inspection and tests
  4. Record of tests
- \* Visual inspection of – (a) cord sets;  
(b) cap, plug and receptacle of cord sets and  
(c) Equipment connected by cord and plug
- Exceptions – receptacles and cord sets which are fixed and not exposed to damage
- Frequency of Inspections – before each day's use
- \* Conduct tests for – (a) continuity of equipment grounding conductor  
(b) proper terminal connection of equipment grounding conductor
- Frequency of Tests – (a) before first use  
(b) after repair, and before placing back in service  
(c) before use, after suspected damage every 3 months , except  
and receptacles that are fixed and not exposed to damage must be tested at regular  
exceed 6 months.

### Details of Assured Equipment Grounding Conductor Program

The tkIS India/ Contractor shall establish and implement assured equipment grounding conductor program on construction site covering cord sets, receptacles which are not a part of the building structure and equipment connected by cord and plug which are available for use or used by employees. This program shall comply with the following minimum requirements:

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A written description of the program, including the specific procedures adopted by tkIS -India / Contractor shall be available at the job site.

The tkIS India/ Contractor shall designate one or more competent persons to implement the program. Each cord set, attachment cap, plug and receptacle of cord sets and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage, shall be visually inspected before each day's use for external defects, such as deformed or missing pins, insulation damage and for indications of possible internal damage. Equipment found damaged or defective shall not be used until repaired.

The following tests shall be performed on all cord sets, receptacles which are not a part of the permanent wiring of the building or structure, cord and plug connected equipment required to be grounded: All equipment conductors shall be tested for continuity and shall be electrically continuous.

Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.

All required tests shall be performed:

- (a) Before first use;
- (b) Before equipment is returned to service following any repairs;
- (c) Before equipment is used after any incident which can be reasonably suspected  
To have caused damage (for example, when a cord set is run over); and
- (d) At intervals not to exceed 3 months, except that cord sets and receptacles which  
are fixed and not exposed to damage shall be tested at intervals not exceeding  
3 months.

The tkIS India/Contractor shall not make available or permit the use by employees of any equipment which has not met the requirements of this program.

Tests performed as required in this program shall be recorded. This test record shall identify each receptacle, cord set, cord and plug connected equipment that passed the test and shall indicate the last date it was tested or the interval for which it was tested. This record shall be kept by means of logs, colour coding or other effective means and shall be maintained until replaced by a more current record.

The record shall be made available on the jobsite for inspection.

#### 4.4 Hazards

With the wide use of portable tools on construction sites, the use of flexible cords often becomes necessary. Hazards are created when cords, cord connectors, receptacles, cord and plug connected equipment are improperly used and maintained.

Generally, flexible cords are more vulnerable to damage than is fixed wiring. Flexible cords shall be connected to devices and to fittings so as to prevent tension at joints and terminal screws. Because a cord is exposed, flexible and unsecured, joints and terminals become more vulnerable. Flexible cord conductors are finely stranded for flexibility, but the strands of one conductor may loosen from under terminal screws and touch another conductor, especially if the cord is subjected to stress or strain.

A flexible cord may be damaged by activities on the job, by door or window edges, by staples or fastenings, by abrasion from adjacent materials or simply by aging. If the electrical conductors become

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exposed, there is a danger of shocks, burns or fire. Frequent hazard on a construction site is a cord assembly with improperly connected terminals.

When a cord connector is wet, hazardous leakage can occur to the equipment conductor and to humans who pick up that connector if they also provide a path to ground. Such leakage is not limited to the face of the connector but also develops at any wetted portion of it.

When the leakage current of tools is below 1 ampere and the grounding conductor has a low resistance, no shock shall be perceived. However, should the resistance of the equipment grounding conductor increase, the current through the body also will increase. Thus, if the resistance of the equipment grounding conductor is significantly greater than 1 ohm, tools with even small leakage become hazardous.

#### 4.5 Preventing and eliminating hazards

GFCIs can be used successfully to reduce electrical hazards on construction sites.

Tripping of GFCIs interruption of current flow – is sometimes caused by wet connectors and tools. It is good practice to limit exposure of connectors and tools to excessive moisture by using watertight or sealable connectors.

Providing more GFCIs or shorter circuits can prevent tripping caused by the cumulative leakage from several tools or by leakages from extremely long circuits.

#### 4.6 Electrical Safety Responsibility

It is the tkIS India RCM / Contractor responsibility to provide or use either: (a) GFCIs on construction site for receptacle outlets in use and not part of the permanent wiring of the building or structure; or (b) a scheduled and recorded assured equipment grounding conductor program on construction site, covering all cord sets, receptacles which are not part of the permanent wiring of the building or structure and equipment connected by cord and plug which are available for use by employees. These requirements are in addition to any other requirements for equipment grounding conductors.

#### 4.7 Additional specific electrical safety requirements

##### **Electrical hand tools and equipment shall be of the following standards:**

230 volts tools used shall be double insulated or protected with approved ELCB/RCCB.

Equipment casing shall be intact with no loose fittings or exposed cables.

Plug fittings shall be of an approved industrial type.

Condition shall be good and the tool shall be subject to preventive maintenance as scheduled.

##### **Power Generators / Transformers**

Generators and welding transformers shall be maintained in good condition.

Fuel / storage tanks shall be located in areas with containment provisions rated to 110% of the total tank contents.

The area around generators shall be maintained free of oil and diesel spills.

Rotating components shall be guarded.

Grounding/Earthing shall be provided on all mobile electrical generators.

Outlets shall be in good condition with no exposed conductors.

DO NOT bring a generator indoors. Be sure it is located outdoors in a location where the exhaust gases cannot enter a building. Good ventilation is the key.

Process <b>CHM</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure</b> <b>Electrical Installation and Equipment</b>	QM code <b>PIN LP-CHM-002</b>
		Page <b>8</b> of <b>12</b>

Be sure that the main circuit breaker is OFF and locked out prior to starting any generator. This shall prevent inadvertent energization of power lines from back feed electrical energy from generators and help protect utility line workers from possible electrocution.

Turn off generators and leave them cool prior to refueling.

### **Welding Transformers**

The welding transformers shall be connected to the supply by heavy duty cables, and an efficient isolating switch, together with protective fuses or circuit-breakers, shall be located in an accessible position – usually on the transformer tank. Fixed transformers shall have permanently wired in conduit or armored cable but moveable or transportable items required heavy duty flexible cables, preferably armoured.

Insulated flexible cables shall be provided for the welding cable to the electrode holder and care shall be taken to provide an effective return lead from the work piece to the transformer. The welding transformer shall be efficiently earthed; this will automatically provide an earth connection for the welding return lead.

A properly constructed and insulated electrode holder shall be used. It shall have the insulated handle so arranged that construction that accidental contact with live parts cannot be made.

The holder shall be well balanced and easy to handle. Although the welder shall be equipped with suitable clothing and gloves the latter cannot, and shall not, be relied upon as insulation.

Provision shall be made for accommodating the holder from the supply. Although electric arcs for welding do not normally exceed 100 volts AC or DC, all electrical equipment, auxiliary cables and connections shall be checked frequently. Special low voltage devices are available and shall be used in hazardous conditions.

### **Power Distribution**

Distribution boards shall be GFCI fitted, as per following guidelines:

All Sockets shall be protected by GFCIs / RCCB's with a nominal residual current of 30 mA. Protection of feeding sockets by protective low voltage or via isolation transformers shall be encouraged.

Terminal points shall be in an enclosure with feed and outlet cables channeled through the enclosure via rubber/ plastic grommets.

Distribution panels shall be kept locked and the keys held by authorized personnel only. Cables shall be of a size and rating suitable for purpose.

Grounding/Earthing shall be fitted to all distribution boards and metal support frames.

Splicing of cables shall not be allowed; cables shall be extended or repaired using the correct fittings.

Domestic cables and fittings shall not be allowed on site. Cables shall be to a construction standard and resistant to damage/wear and tear.

Particular attention shall be given to cable management to ensure that cables are routed in a manner that does not create an obstruction or trip hazard. The method of such routing shall be in a manner that does not damage or affect the integrity of the cable. Main isolation points shall be provided in conspicuous and accessible places in workshop/fabrication areas.

Process <b>CHM</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure</b> <b>Electrical Installation and Equipment</b>	QM code <b>PIN LP-CHM-002</b>
		Page <b>9</b> of <b>12</b>

Machinery shall also have isolation points provided adjacent to the equipment.

Cable connections shall be made with industrial fittings according to applicable codes and standards.

Distribution panels shall carry an electrical Hazard warning sign.

Distribution boards shall be accommodated in weatherproof positions or cabinets. They shall be proofed against interference or unauthorized operation and they shall be large enough to accommodate all the necessary apparatus required. Each circuit shall be clearly labeled and circuit diagram shall be located at each board. Boards shall be positioned such that extension leads to power tools are not more than 30m in length.

All temporary distribution boards shall be externally grounded regardless of their status as being 'internally grounded'

### **Overhead Transmission Power Lines**

Overhead and buried power lines are especially hazardous because they carry extremely high voltage.

Fatal electrocution is the main risk, burns and falls are also hazards:

Where overhead power transmission lines exist on or adjacent to construction sites or site roads, the contractor's supervisor shall provide information describing the methods to be used to prevent contact with the overhead lines.

Look for overhead power lines and buried power line indicators.

Stay at least 10 feet away from overhead power lines and assume they are energized.

De-energize and ground lines when working near them.

Use non-conductive wood or fiberglass ladders when working near power lines.

As a general rule, the following controls shall be implemented:

A risk assessment must be conducted (e.g. HIRA or similar method)

Work must be planned, as far as is practical, to avoid close proximity to the overhead lines and any accidental contact.

The following activities shall be controlled when working around overhead power lines:

The erection of scaffold and handling scaffold tubes.

Handling long ladders

Operating mobile elevated work platforms.

Operating tipper trucks or dump trucks.

Operating backhoes

Operating cranes

However, required clearance for given voltages shall be observed.

Maintain minimum distances as follows while working:

Process <b>CHM</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure</b> <b>Electrical Installation and Equipment</b>	QM code <b>PIN LP-CHM-002</b>
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<b>Voltage</b>	<b>Minimum Distances</b>
LT	0.9 m (3 feet)
11 kV	2.5 m (8 feet 6 inches)
33 kV	2.7 m (9 feet)
66 kV	3.0 m (10 feet)
132 kV	3.5 m (11 feet)
220 kV	4 m (14 feet)
While earthing	3.5 to 4.5 m (12 to 15 feet)

Any work to be carried out within the above limits must be controlled by a Work Permit.

### **Extension cords**

Normal wear on cords can loosen or expose wires. Cords that are not 3 –wire type, not designed for Hard-usage or those have been modified; increase your risk of contacting electrical current.

Use only equipment that are approved to meet Indian standard

Do not modify cords or use them incorrectly.

Use factory-assembled cord sets and only extension cords that are 3-wire type.

Use only cords, connection devices and fittings that are equipped with strain relief.

Remove cords from receptacles by pulling on the plugs not the cords.

All extension cables / cords shall have a current inspection tag affixed and shall be checked for damage prior to use.

Extension cables / cords in one office shall not used to supply power to another office, building or adjacent offices. Cables / cords may not run through doors, windows or ceilings for the purposes of temporary construction which required the cable to be physically protected from damage.

Extension cables / cords that are frayed or have insulation tears, cracks or abrasions or with bent, broken or “spread” prongs shall not be used.

### **Equipment**

Due to dynamic, rugged nature of construction work, normal use of electrical equipment causes wear and tear that results in insulation breaks, short-circuits and exposed wires. If there is no ground-fault protection, it can cause a ground-fault that sends current through worker's body.



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Use GFCIs on receptacles or have an assured equipment grounding conductor program (AEGCP).

Use double-insulated tools and equipment, distinctively marked.

Visually inspect all electrical equipment before use. Remove from service any equipment with frayed cords, missing ground prongs, cracked tool casings, etc.,

### **Temporary Electrical Supply**

#### **Overhead Cables**

Overhead cables from the supply point or metering point to the distribution boards on the site shall be of a robust pattern and preferably pliable and wire armoured with a further outer sheath of insulating material. Braided screened cable may be used but the more usual types shall be PVC insulated, wire armoured and PVC sheathed cable.

All the cables shall be properly terminated and have suitable and efficient protective devices such as H.R.C. fuses or moulded circuit breakers.

The cables shall be so sited as to present the minimum of obstruction on the site.

#### **Underground Cables**

The cables shall be suitable for the duty and loading expected, e.g. armoured PVC Cables.

The cables shall be buried at a safe depth and their routes clearly marked both on the site and on the site plans.

The cables shall be properly terminated and be provided with efficient circuit protection.

Cable routes shall be so arranged that the minimum of obstruction be caused.

#### **Distribution Cabling**

These cables shall normally be multi-strand multi-core armoured PVC cables, in certain cases may be of mineral insulated copper clad cables. The later type shall be sheathed with PVC.

The installation shall be so arranged as to prevent the need for long trailing cables. Socket outlets shall be located as near the working point as possible.

Power and lighting circuits shall be kept separate.

Adequate records shall be made of all parts of the installation and shall be kept up to date when alteration or extensions are made.

The entire distribution system, and all connected apparatus, shall be efficiently earthed. The earth lead and the earth continuity conductors shall be connected to an efficient 'earth'.

The electrical conductivity or impedance of the earth continuity conductor, including metal conduits, metal cable sheaths or armouring must be sufficiently low to provide adequate and efficient protection when earth faults occur. This impedance shall be related to the fuse or overload ratings of the protective devices but shall never exceed 1 ohm.

Each installation shall be provided with an efficient earth electrode, together with adequate earth leads and earth leads and earth continuity conductors.

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Earth continuity of all circuits and of all apparatus shall be tested by means of a 'loop tester' with an appreciable current of the order of 20 amperes.

### **Inspection and Testing**

The temporary power supply shall be tested once in every 3 months by competent personnel  
Portable electrical tools and extension cables / cords shall be inspected and tagged once in 3 months by competent personnel.

Tools and equipment shall be inspected frequently using safety inspection check-list no. HSE-CON-IN-002-M01 by tkIS India/Contractor HSE Rep. and tkIS India/ Contractor Electrician.

## **5. Records**

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN LP-CHM-099.

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>SAFETY INSPECTION CHECKLIST ELECTRICAL EQUIPMENT</b>	QM code PIN LP-CHM-002-F01
		Page <b>1</b> of <b>2</b>

Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location / Area: \_\_\_\_\_

Date & Time: \_\_\_\_\_

Sr. No.	ITEM	S / Y	NS / N	NA	Remarks
<b>GENERAL</b>					
1	Whether electricians are certified, trained and authorized?				
2	Whether Electricians are available during the entire working hours?				
3	Whether appropriate and approved types of PPEs are being used by electricians?				
4	Whether work on equipment is conducted after proper isolation?				
<b>CABLES</b>					
1	Whether the condition of cables is checked regularly?				
2	New cables and cables received from other sites checked for Insulation Resistance before putting them into use?				
3	Are all main cables, taken either underground / overhead above 7'?				
4	Are welding cables routed properly above the ground without causing stumbling hazard?				
5	Are welding & electrical cables overlapping?				
6	Are there any improper joints of cables and wires prevail at Site?				
7	Are there any insulation damages prevail around cable joints?				
8	Whether the cables are protected from sharp edges, nails, bolts, overrunning of vehicles etc.?				
9	Whether extension boards (if used) are of non-combustible material?				
10	Whether the safe distance from overhead transmission lines (>6 mtrs) are maintained?				
11	Whether the overhead cables contact preventive barricading and warning signs provided?				

Sr. No.	ITEM	S	NS	NA	Remarks
<b>DISTRIBUTION BOARDS</b>					
1	Whether metallic boxes with covers/doors are in use?				

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>SAFETY INSPECTION CHECKLIST ELECTRICAL EQUIPMENT</b>	QM code PIN LP-CHM-002-F01
		Page <b>2</b> of <b>2</b>

2	If not, whether Distribution Boards (DBs) & extension boards are protected from rain/water?				
3	Is energised wiring in junction boxes, Circuit Board panels & similar places covered all times?				
4	Is earth conductor continued up to DB?				
5	Whether correct/properly rated fuses & circuit breakers provided at main boards & sub- boards?				
6	Is there any overloading of DB?				
7	Whether a clear approach is provided to DB?				
8	DBs and free of obstructions is maintained at all times?				
<b>ELCB – Earth Leakage Circuit Breaker / RCCB</b>					
1	Whether all the cable connections are routed through ELCB?				
2	Whether all ELCBs are numbered & tested periodically?				
3	Whether ELCB test records countersigned by competent person are maintained at site?				
4	Whether ELCBs sensitivity maintained at 30 mA?				
<b>EARTHING</b>					
1	Is neutral and double earthing ensured at the source of power (Main DB at Generator or Transformer)?				
2	Whether the continuity & tightness of earth conductor are checked? (Check for broken earthing strips, detached earthing wires, loose connections, missing screws etc.)				
3	Whether two separate body earthing at two distinctive earth pits provided separately for all DBs/ FDs / equipment / metallic installations				
4	Whether specified gauge of earth conductor is used at all places of earthing?				
5	What is the value of Earth Resistance?				
6	Whether the Insulated rubber mats are provided wherever required?				
<b>* S – Satisfactory                      NS – Not Satisfactory                      NA – Not Applicable</b>					

tkIS India / Contractor Site HSE Representative

tkIS India SSI or SSV / Contractor Site Engineer

\_\_\_\_\_

(Name &amp; Signature)

\_\_\_\_\_

(Name &amp; Signature)

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure Emergency Preparedness and Response</b>	QM code <b>PIN LP-CHM-003</b>
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**Attachments and forms: Nil**

### Validity

Valid from: 12. 2018



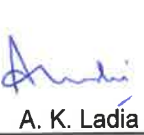
Valid until: 12. 2021

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**This procedure replaces HSE-CON-IN-003**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet..

tkIS-India Local IMS Standard	10/12/18		20/12/18	Indranil Chakraborty/ Rajnish Bhandari	20/12/18		31/12/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
No project-specific adaptation								

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Emergency Preparedness and Response	QM code PIN LP-CHM-003
		Page 2 of 4

### 1. Scope

This HSE Procedure is applicable for emergency preparedness and response during the execution stage of project at construction sites. These requirements shall be applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

This HSE Procedure is aimed at providing guidelines and defining requirements for safe system of work for emergency preparedness and response.

The Procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements for managing emergency situations at construction sites. In addition to this procedure, client /owner applicable requirements are to be followed, however the most stringent requirement shall be implemented.

### 3. Responsibilities

The key responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM)/Commissioning Manager (CoM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India Construction Engineer/ Commissioning Engineer (CoE)	Responsible to implement this procedure and to ensure: (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (ii) that there is active involvement in effective implementation of this procedure.
tkIS India Site HSE Personnel	(i) Responsible to assist SM/CoM in effective implementation of this procedure on site. (ii) To ensure identification of potential emergency situations for the site in Construction HSE Plan. (iii) To prepare Site emergency preparedness and response plan for the identified emergency situations. (iv) To ensure availability of necessary safety appliances and first aid kits at the construction situations. (V) To ensure that periodic mock drills are conducted to test the effectiveness of Site emergency preparedness and response plan.
Contractor Engineers/ Supervisors/ HSE Personnel	To ensure that all personnel working on their behalf are adequately trained on their role during emergency.  To support tkIS India in effective handling of emergency situations.
All personnel working at the construction site	All personnel working at the site must be aware of the potential emergency situations at the construction site and their role during emergency.

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Emergency Preparedness and Response	QM code PIN LP-CHM-003
		Page 3 of 4

#### 4. Requirements

Potential emergency situations for sites shall be identified in Site Emergency Response Plan (Site ERP).

Emergency preparedness plan shall be developed for these situations.

Any change (addition/ detection) in the potential emergency situation shall be reviewed periodically.

##### 4.1 Site Emergency preparedness and response

Site emergency preparedness and response plans shall cover but not be limited to the following:

- Potential emergency situation
- Discovery/Detection
- Emergency Response
- Clean up
- Notification of the end of the emergency situation
- Debriefing and counselling
- Investigation
- Follow up
- Rehabilitation Activities

In case of site being in customer's existing location, due consideration shall be given to any already available emergency preparedness and response plans.

Site Emergency Preparedness and response plans shall clearly identify:

- Roles and responsibilities during emergencies
- Emergency contact numbers
- Local Medical Facilities /Hospital numbers
- Emergency services numbers (Ambulance, Fire Brigade etc.)
- Site Evacuation routes/plans
- Muster points /Assembly points

The efficacy of emergency preparedness and response plans shall be tested at regular intervals. The frequency of mock drills shall be decided, jointly by Site HSE Personnel and SM, and recorded in Construction HSE Plan.

Record of mock drill shall be maintained, along with actions taken on the observation for improvement identified during mock drill.

These plans shall be reviewed for continual suitability after such testing, or following any emergency situation. Necessary amendments to emergency preparedness and response plans shall be made to ensure that they remain relevant and appropriate.

##### 4.2 Communication & Training

All site personnel shall be trained and communicated on their role in emergency preparedness plans through following means

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Emergency Preparedness and Response	QM code PIN LP-CHM-003
		Page 4 of 4

- Induction programs
- Mock drills
- Training of individuals/teams
- Toolbox Meeting
- Daily Pre-start meetings
- Hazard Identification and Risk Assessment (HIRA)
- Table Top discussions

#### 4.3 Emergency Response Team

- Names and contact details of emergency response team members shall be displayed  
Clearly at strategic locations
- First Aid Treatment and Facilities
  - Availability of sufficient number of first aid kits and sufficient number of trained first aiders shall be ensured at construction sites, as long as the work continues.
  - In case of any incident, first aid shall only be administered by competent trained personnel.
  - Records of first aid treatment shall be maintained.
  - Names and contact details of first aiders shall be clearly displayed.

#### 5. Records

Necessary records as required by this Procedure shall be maintained.

For further details, please refer Procedure PIN LP-CHM-099.



Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure Fire Safety at Sites</b>	QM code <b>PIN LP-CHM-004</b>
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**Attachments and forms: NIL**

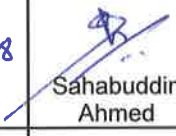
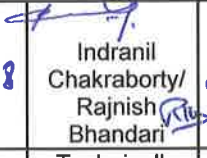

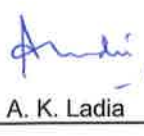
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Validity  
Valid from: 12. 2018  
Valid until: 12. 2021

**This procedure replaces HSE-CON-IN-004**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS-India Local IMS Standard	10/12/18		20/12/18		20/12/18		31/12/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				No project-specific adaptation				
				Page 245 of 673				

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Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Fire Safety at Sites	QM code PIN LP-CHM-004
		Page 2 of 5

### 1. Scope

This HSE procedure is applicable for fire safety at sites during the execution stage of project at active construction sites. These requirements shall be applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, contractor, sub-contractor and vendor personnel.

### 2. Aim

This HSE procedure is aimed to define requirements for safe system of work for fire safety at sites. This instruction is also aimed to safeguard all personnel at tkIS India construction site from the direct and indirect effects of fire. With personnel protection as a priority, this procedure also addresses the protection of the environment, buildings, plant and equipment through the selection and standardization of appropriate fire-fighting measures.

The procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements for fire safety at sites. In addition to this procedure, client /owner applicable requirements are also to be followed. As a rule, the most stringent requirement shall be implemented.

### 3. Definition / Abbreviation

Contractor means the agency appointed by owner or tkIS India for carrying out specific work.

Owner / Client means the organisation which retains tkIS India for the purpose of the project.

Subcontractor means the agency which takes part of a contract from the contractor.

Vendor means a supplier who provides goods or services to the company

COM Commissioning Manager

CO<sub>2</sub> Carbon di oxide

DCP Dry Chemical Powder

HSE Health Safety Environment

SSI Site Superintendent

SSV Site Supervisor

SM Site Manager

tkIS India thyssenkrupp Industrial Solutions (India) Private Limited

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Fire Safety at Sites	QM code PIN LP-CHM-004
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#### 4. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

SM / COM (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI / SSV	Responsible to implement this procedure and to ensure: (a) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (b) that there is active involvement in effective implementation of this procedure.
tkIS India Site HSE Personnel	(i) Responsible to assist SM /COM in effective implementation of this procedure on site. (ii) Ensure that suitable fire safety equipments are available at the site. (iii) Ensure that fire safety equipments are being maintained. (iv) Ensure availability of trained fire fighters at the site during working hours
Contractor Engineers/ Supervisors/HSE Personnel	(i) Provide suitable fire safety equipment at the site. (ii) Maintain fire safety equipment properly. (iii) Ensure availability of trained fire fighters at the site during working hours. (iv) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the requirements of this procedure and adhere to the requirements of this procedure.

#### 5. Procedure

##### 5.1 Assessment of potential fire risks

An assessment of potential fire risks shall be carried out for the construction sites. The same shall be included suitably in the site hazard identification and risk assessment register.

In case site being at customer's existing facility, due consideration shall be given to fire risks arising due to interface of construction activities with the customer's existing facility.

However, a further assessment must be carried out for any additional risks due to construction activities.

##### 5.2 Fire safety arrangements

Site shall be provided with basic fire safety equipment.

The fire safety equipment shall include:

- portable fire extinguishers (DCP, foam and CO<sub>2</sub>) of suitable type and capacity

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Fire Safety at Sites	QM code PIN LP-CHM-004
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And as applicable:

- fire blankets
- fire hydrants
- hose packs
- hose reels
- foam generators
- fire tenders (if applicable)
- fire suppression systems (gas or water) where applicable by legislation

All firefighting equipment must be readily accessible and clearly identified.

Sufficient number of personnel trained in use of fire safety equipment shall be available during working hours.

These personnel shall undergo refresher training at periodic intervals.

List of firefighting equipment with details like type and capacity and shall be maintained.

List of personnel trained in use of firefighting equipment along with their contact details shall be maintained. In case site being at customer's existing facility, contact details of customer's emergency team leader shall also be maintained.

### 5.3 Maintenance of firefighting equipment

All firefighting equipment shall be inspected and maintained on a regular basis in accordance with manufacturer's guidelines.

Records of inspection and maintenance shall be maintained.

### 5.4 Fighting the fire

Best way to fight the fire is to prevent it.

All personnel are responsible for working in a safe manner so that the risk of fire is kept to a minimum.

It should be remembered that fire requires three elements – fuel, heat, and oxygen.

Work shall be planned in such a manner to avoid these three elements from combining which can result in a fire.

In case of any eventuality of fire, person noticing a fire must immediately warn people in the vicinity of the fire and report to HSE personnel in the area.

Personnel should attempt to extinguish the fire only if they are trained and comfortable in using the fire fighting equipment.

It must be remembered that firefighting equipment shall be used only by trained personnel. Own safety must be ensured while fighting the fire.

### 5.5 Emergency response

Necessary emergency preparedness and response plans shall be developed in accordance with requirements of HSE procedure PIN LP-CHM-003.

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Fire Safety at Sites	QM code PIN LP-CHM-004
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## 5.6 Bush fires

Where a project site is surrounded by bushes, no naked flames are to be used outside the operational areas. Sufficient distance shall be maintained between the operation area and bush area.

In the case of a bush fire, the employee shall immediately notify their supervisor who shall initiate the emergency procedure.

## 6. Records

Following records are to be maintained at site

- potential fire risk assessment (part of site hazard identification and risk assessment register)
- firefighting training attendance
- list of personnel trained in use of firefighting equipment, their contact details
- contact details of client's emergency team leader
- inspection, maintenance and tagging of firefighting equipment

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure Hazardous Substance Procedure</b>	QM code <b>PIN LP-CHM-005</b>
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**Attachments and forms: Nil**

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#### Validity

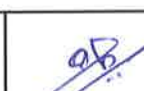

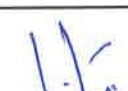

Valid from: 12. 2018

Valid until: 12. 2021

**This procedure replaces HSE-CON-IN-005**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS-India Local IMS Standard	10/12/18		2/12/18		2/12/18		3/1/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				No project-specific adaptation				
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Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Hazardous Substance Procedure	QM code PIN LP-CHM-005
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### 1. Scope

This HSE Procedure is applicable for storage, handling and disposal of Hazardous substance during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

This HSE Procedure is aimed at providing guidelines and defining requirements for safe system of work with hazardous substances. This instruction is also aimed to provide guidelines and information for all concerned personnel on Safe Systems of Work for the handling, storage and use of hazardous substances.

The Procedure sets the basic minimum standard in addition to compliance with current industry practices applicable regulatory standards/requirements for Hazardous substance procedure. In addition to this procedure, client /owner applicable requirements are to be followed, however the most stringent requirement shall be implemented.

### 3. Responsibilities

The key responsibilities of site personnel related to HSE functions are given below:

Site Manager(SM) /Commissioning Manager, CoM (tkIS India) & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India Construction Engineer/ Commissioning Engineer(CoE)	Responsible to implement this procedure and to ensure:  (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements.  (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods.  (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site.  (ii) To assist construction engineer in identification, assessment, evaluation, control methods for likely hazards associated with the activity.  (iii) To ensure necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ HSE Personnel	(i) Carry out Hazard Identification & risk assessment for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Hazardous Substance Procedure	QM code PIN LP-CHM-005
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#### 4. Procedure

##### 4.1 Introduction

Hazardous substances used at construction sites take many forms from common cleaning agents to lubricants, solvents; two pack epoxy paints, asbestos and fibrous materials Etc.

The risk of any hazardous substance is greatest to the person exposed to it and for the protection of environment when:

- it has not been correctly identified
- safe systems of use have not been properly established

The most common injuries associated with hazardous substances and/or materials are eye damage, destruction of the skin and mucous membranes through direct contact with the chemical.

The most common impacts on the environment are contamination of the soil, degradation of groundwater, surface and marine waters and harm to flora and fauna.

##### 4.2 General Safety Precautions

Hazardous substances are used at site for a variety of purposes, and new substances are being introduced each year.

Solids, dusts, liquids, gases, vapours, mists and fumes can all be dangerous.

To minimise the risks, these general precautions shall be considered:

- Where possible, eliminate the need to use hazardous substances completely. If this is not possible, substitute known hazardous substances for one's less hazardous to reduce risks.
- Working constraints shall be considered. Handling with chemicals at height or within confined spaces poses additional risks.
- Solvents shall not to be used with atomising spray equipment.
- Always ensure good ventilation when working with hazardous substances.
- Do not smoke, eat or drink in the area where hazardous substances are stored or in use.

Placing of any food containers shall be prohibited from hazardous substances storage and use areas.

- Before eating, drinking, smoking or going to the toilet, exposed skin areas shall be washed. Gloves and other exposed articles of clothing shall be discarded.
- Read and understand requirements of Material Safety Data Sheet (MSDS) before use of hazardous substance.

Never use a hazardous substance without wearing appropriate personal protective equipment.

- Use the correct type of protective clothing and equipment.



Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Hazardous Substance Procedure	QM code PIN LP-CHM-005
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- Use barrier cream to protect hands and exposed skin.
- Use correctly fitted well maintained respirator approved for use with the type of exposure, when working in dusty and vapoury environment.
- Ensure work areas are contained to prevent the escape of spilt hazardous substances into the environment.
- Use catch or drip trays under work areas to prevent spillage.
- Seek professional advice and/or the MSDS prior to mixing any chemicals or products.
- Never place a chemical into an unlabelled container.
- If unsure of a product, DON'T use it.

All chemicals should be treated as hazardous.

#### 4.3 Statutory and Regulatory Requirements

Applicable local and national statutory and regulatory requirements shall be complied with.

#### 4.4 Managing Hazardous Substances

The following strategy shall be pursued to manage risks associated with hazardous substances:

- Hazardous substances/materials shall not be brought to site, without the approval of authorised personnel of tkIS India/Client.
- Hazardous substances/materials shall not be accepted or offloaded at site, without relevant MSDS and other emergency information.

MSDS/ other emergency information shall be obtained from the manufacturer.

- Hazardous substances/materials shall be used only after taking into account the degree of HSE risk involved and the operational and economic effects of elimination or substitution with less hazardous substances/materials.
- Unnecessary and unauthorised procurement, storage and handling of hazardous substances/materials shall be avoided.
- Where the use of hazardous substances/materials is essential, exposure of employees and the environment to those substances/materials shall be kept as low as reasonably practicable by exercising engineering controls.

Relevant statutory exposure limits shall be regarded as the minimum standard of achievement in this respect.

Material Safety Data Sheets, HSE Legislation, Standards and Codes of Practice shall be used to determine limits of exposure and protective requirements.

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thyssenkrupp Industrial Solutions (India)	Local Procedure Hazardous Substance Procedure	QM code PIN LP-CHM-005
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- As a last resort, when substitution or engineering controls are not practicable, access to hazardous substances/materials shall be restricted to essential personnel. Such personnel shall be competent in working with hazardous substance/materials.

Necessary approved PPE in accordance with the MSDS shall be used.

- Where PPE is used, all concerned personnel shall be trained in its selection, use and where appropriate, maintenance.

The minimum eye protection for use with flammable liquids, solvents, oxidising agents and corrosive chemicals shall be chemical safety goggles and/or face shield.

A risk assessment shall be carried out in order to establish the requirement for an eye-wash and /or safety shower facility.

- Safe handling procedures, consistent with the best available knowledge, shall be developed and implemented in transportation, storage, handling, use and disposal of hazardous substances/materials.

These procedures shall be based on manufacturer's recommendation, technical/research literature information, user experience and local conditions.

- Information on hazardous substances/materials and safe handling procedures shall be disseminated regularly via group and individual training, data sheets, manuals and other aids to all concerned personnel.

The aim shall be to ensure that safe handling procedures are both known and understood by all concerned personnel.

#### 4.5 MSDS (Materials Safety Data sheets)

Material Safety Data Sheets, as provided by the manufacturer (not the distributor), shall be maintained by the HSE personnel & stores. It shall be accessible to all concerned as and when required.

Copies of MSDS shall be readily accessible to all concerned personnel including the First Aid team.

Users and other concerned personnel shall read and comply with the instructions given in the MSDS. The MSDS shall be discussed in the Meeting prior to start the job.

#### 4.6 Risk Assessment

Detailed risk assessment for transportation, storage, handling, use and disposal of hazardous substances/ materials shall be carried out prior to receipt and use of material at site.

Necessary control measures shall be identified and implemented.

Due consideration shall be given to Master Hazard Identification and Risk Assessment (HIRA) Register – Construction.

The following aspects shall be considered:

- Identification of Hazardous substance(s)
- Nature of HSE hazards

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- Degree of exposure to personnel and the environment
- Control measures
- Necessity for HSE monitoring/surveillance
- Induction or training requirements
- Training

Necessary training on use and control of hazardous substances/materials must be provided to all personnel who may come in direct contact with or may get affected by those materials.

Safe handling, transport, storage, disposal, environmental protection and recommended first aid for hazardous substances/materials shall be covered in the site induction.

## 5. Records

Necessary records as required by this Procedure shall be maintained.

For further details, please refer Procedure PIN LP-CHM-099.

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	HOUSEKEEPING CHECKLIST (Housekeeping Inspection shall be carried out once in 15 days)	QM code PIN LP-CHM-06 F01
		Page 1 of 3

Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location / Area: \_\_\_\_\_

Date & Time: \_\_\_\_\_

Sr. No.	Description	Observation Yes/No/NA	Remarks
01	Whether the site debris is collected and removed regularly, to keep the work site in order?		
02	Is there any facility for the adequate disposal of scrap, waste and surplus materials?		
03	Whether the work area and equipment are kept tidy?		
04	Are there any designated areas for waste materials?		
05	Whether sufficient numbers of containers are placed at appropriate places to collect waste materials?		
06	Whether stairways, passage ways, ladders, scaffold and gangways are kept free of material and obstructions?		
07	Whether the loose or light weight materials which are placed/stored on roofs or on open floors are secured appropriately?		
08	Whether loose materials are kept at a minimum distance of 2 m from openings, roof edges, excavations or trenches?		
09	Whether the protruding nails from lumber are removed or bent over?		
10	Whether hoses, power cords, welding leads, etc. are kept away from heavily travelled walkways or areas?		
11	Whether the structural openings are covered / protected adequately?		
12	Whether the rubbish is falling freely from higher level?		

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	HOUSEKEEPING CHECKLIST (Housekeeping Inspection shall be carried out once in 15 days)	QM code PIN LP-CHM-06 F01
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Sr. No.	Description	Observation Yes/No/NA	Remarks & Recommendations
13	Whether the flammable or explosive materials such as gasoline, oil and cleaning agents are stored apart from other materials?		
14	Whether the flammable and explosive materials are kept in proper containers with contents clearly marked, as per MSDS (Material Safety Data Sheet)?		
15	Are greasy, oily rags and other flammable materials are disposed in approved containers?		
16	Whether the full barrels are stored in upright position?		
17	Whether the empty barrels are stored separately?		
18	Whether signs of prohibiting smoking, open flames and other ignition sources are posted at the areas where flammable and explosive materials are stored or used?		
19	Whether the compressed gas cylinders are stored in upright position and chained?		
20	Whether the empty compressed gas cylinders are marked with letters "mt/MT" and stored separately from full or partially full cylinders?		
21	Whether all electric fixtures and switches are of explosion-proof type, where flammable materials are stored?		
22	Are materials piled around fire extinguishers or emergency exits?		
23	Whether the compressed air is used to blow off dust?		
24	Are broken glass and metal straps are collected in suitable containers?		
25	Whether materials are kept on stairs?		

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	HOUSEKEEPING CHECKLIST (Housekeeping Inspection shall be carried out once in 15 days)	QM code PIN LP-CHM-06 F01
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Sr. No.	Description	Observation Yes/No/NA	Remarks & Recommendations
26	Whether the reinforcing steel is stored directly on ground?		
27	Whether wooden spacers are used to separate piles of reinforcing steel?		
28	Whether the scaffold working platforms are stacked by materials beyond its safe loading capacity?		
29	Whether the excavated spoil is kept at a safe minimum distance of 2 ft. from the edge of the excavation?		
30	Whether all the excavations are provided with appropriate barricading?		
31	Whether different containers are provided for different types of wastes (e.g. Food waste, other construction waste etc.,)		

tkIS India / Contractor Site HSE Representative

tkIS India SSI or SSV / Contractor Site Engineer

\_\_\_\_\_

(Name &amp; Signature)

\_\_\_\_\_

(Name &amp; Signature)

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure Housekeeping at Sites</b>	QM code <b>PIN LP-CHM-006</b>
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## Attachments and forms:

Form: PIN LP-CHM-06 F01-Housekeeping Checklist

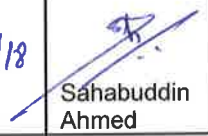

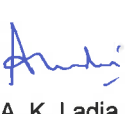
Validity  
Valid from: 12. 2018  
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**This procedure replaces HSE-CON-IN-006**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

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tkIS-India Local IMS Standard	10/12/18		24/12/18	Indranil Chakraborty/ Rajnish Bhandari	24/12/18		30/12/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				No project-specific adaptation				
				Page 259 of 673				

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure Housekeeping at Sites	QM code PIN LP-CHM-006
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### 1. Scope

This HSE procedure is applicable for housekeeping at sites during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, contractor, sub-contractor or vendor personnel.

### 2. Aim

This HSE procedure is aimed at describing the methodology for housekeeping at sites. This procedure is also aimed at ensuring that all personnel are aware of the necessary standards of work place cleanliness and tidiness to minimise risks, environmental damage and to maintain the project site in a safe and hygienic condition.

The procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements for housekeeping at sites. In addition to this procedure, client /owner applicable requirements are to be followed. As a rule, the most stringent requirement shall be implemented.

### 3. Definitions / Abbreviations

**Contractor** means the agency appointed by owner or tkIS India for carrying out specific work.

**Owner / Client** means the organisation which retains tkIS India for the purpose of the project.

**Subcontractor** means the agency which takes part of a contract from the contractor.

**Vendor** means a supplier who provides goods or services to the company

**COM** Commissioning Manager

**HSE** Health Safety Environment

**SM** Site Manager

**SSI** Site Superintendent

**SSV** Site Supervisor

**tkIS India** thyssenkrupp Industrial Solutions (India) Private Limited



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#### 4. Responsibilities

The key responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM)/Commissioning Manager (CoM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI & SSV	Responsible to implement this procedure. (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods. (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site. (ii) To assist construction engineer in identification, assessment, evaluation and control methods for likely hazards associated with the activity. (iii) To ensure necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ Personnel HSE	(i) Carry out hazard identification & risk assessment for activity, as applicable and submit to tkIS India for comments / approval prior to commencement of the respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

#### 5. Procedure

Good housekeeping is the first step towards having safe work place. Maintaining the necessary cleanliness and tidiness to keep the workplace and the site free of unnecessary congestion and equipment is very essential.

Good housekeeping can be summarised by the phrase:

*'A place for everything and everything in its place'*

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## 5.1 Communication and awareness

Information regarding housekeeping issues and requirements at site shall be covered as a part of HSE induction.

Additionally, "housekeeping" topics shall be included in pre-start meetings or toolbox meetings.

## 5.2 General housekeeping requirements

### 5.2.1 Stairways

- Stairways shall be kept clear of electrical leads, air hoses, water hoses and all construction materials and waste materials.
- Stairways shall be properly illuminated and have appropriate handrails fitted.
- Circular stairways shall be avoided, but if required, shall be designed with a minimum variation in tread width. Treads shall be covered with a durable anti-slip material.

### 5.2.2 Access ways and passageways

- Access ways and passageways shall be kept clear at all times.
- Stacked materials shall not protrude into access ways or passageways.
- Access ways shall be arranged so that they are the easiest means of moving through site. This shall reduce the temptation for personnel to take short routes and walk through operational areas.

### 5.2.3 Overhead walkways and Ramps

- Nothing shall be thrown down or dropped from one level to another.
- Tools and construction materials shall not be placed on overhead locations, such as scaffolding, window ledges or shelves where they could fall and strike people working below. In such locations, suitable protection is to be installed to prevent tools materials from falling.
- Regular inspections of overhead walkways shall be conducted to ensure that no loose materials and debris accumulate.

### 5.2.4 Floors

- Floors, passageways and walkways are to be kept clear of articles, tools, scrap metal or any other working material when they are no longer in use. Oils, grease, chips or other material which could cause slippery conditions shall be cleaned up or removed as soon as possible.
- Floors shall be cleaned frequently and kept in good condition.
- Floors shall be firm and levelled. Worn-out spots/openings or any other defects shall be reported and repaired immediately.
- Floor edges shall be barricaded with hard barricades and floor openings shall be adequately barricaded with hard barricading or completely covered with material of adequate strength.

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Suitable signage indicating 'Do not remove, opening below' shall be displayed near covered openings (In local language understood by majority of workers) as well as Tool Box Talk to be conducted to disseminate the information.

### 5.3 Material Storage

- Stacking shall be done only in designated places and properly secured to minimise the stack from falling. The stacked materials shall not present a tripping hazard.
- Sufficient clearance shall be provided between the ceilings and the tops of stacks/racks to allow space for fire safety systems.
- In stacking of unstable objects, specially designed guards or chocks shall be provided to prevent rolling or unexpected slippage of stacked materials.
- Stacked materials on working platforms shall be secured and protected against falling by wire mesh guards or other suitable means.
- Storage facilities shall be designed to minimise unnecessary manual handling.
- Heavy objects shall be stacked close to the ground with lighter objects above.
- Temporary storage areas on site (e.g. containers) shall have shelving lashed back.
- The roof of a sea container (shipping container) shall not be used for storage.
- Articles stored on shelves shall not protrude creating a "struck against" hazard.
- Items shall be stored in such a way that they do not cause any tripping hazards.
- Flammables shall be stored in secure well ventilated areas, including flammables for portable equipment tanks such as generator sets and compactors.
- Any hydrocarbon and hazardous chemicals/materials shall be stored in compliance with local regulatory requirements.

### 5.4 Lighting

- All workplaces, passageways and stairways shall be adequately lit.
- All light fittings, windows and roof lights shall be regularly cleaned and defective fittings replaced.
- Adequate lighting shall be provided at site boundaries and approaches. They shall be located in such a way so as to avoid dazzling drivers.
- Adequate lighting shall be provided for night work activities.

### 5.5 Tools

- Small tools and implements shall not be left lying around where they may present a slip or tripping hazard.

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- Workshop and maintenance facilities shall be well organised with racks, shadow boards and storage areas for tools.
- Tool bins shall be provided for picks, shovels and similar tools.
- Storage places shall be located in a convenient position thus facilitating full utilisation.
- Toolbox and site box lids shall be easily propped open to prevent finger and hand injuries.
- Welders shall use tins to collect welding stubs.

## 5.6 Site Offices

Good housekeeping practices are a must in the site offices as well.

- Proper planning and consideration shall be given while making office layout, so as to minimise the hazards and make it a safe work place.
- All passageways shall be kept open and free from obstruction.
- Books, files, papers shall be kept in their proper place and not stored on the floor or scattered about on tables, desks or makeshift stacks.
- Drawers on filing cabinets shall be shut when not in use with only one drawer at a time opened to access files in order to maintain the cabinet in a stable condition.
- Drawers of filing cabinets shall never be used as steps.
- Computer and power cords shall be neatly run and a cable-over shall be used so as not to cause trip or fire hazards.
- Access to emergency exits and firefighting equipment shall be kept clear at all times.
- Proper signage shall be provided for emergency exits

## 5.7 Rest rooms and site wash rooms

- Rest rooms and site wash rooms shall be maintained in a clean, tidy and hygienic condition at all times.
- Regular cleaning and restocking of consumables shall be organised.
- Separate receptacles shall be provided for left-over food items.
- All personnel shall be encouraged to dispose off leftover food items only in the receptacles provided.

Personnel should remember that basic personal hygiene practices will help to reduce the risk of common infections.

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## 5.8 Waste management

- Waste management facilities shall be clearly identified and inspected on a regular basis.
- Items that contain hydrocarbon waste such as fuel or oil filters should be properly drained, crushed and stored in 200 litre containers and when full, be sealed for transport.

Storage area shall be protected to prevent ground contamination by using (membrane or concrete).

- If a land fill facility is approved for use on a project, the facility shall be inspected and backfilled on a regular basis. Only approved waste shall be disposed off in landfills.
- Hydrocarbon and chemical waste shall be handled and disposed off in an environmentally acceptable manner and in accordance with project and regulatory requirements.
- Different containers shall be provided for different types of wastes (e.g. Food waste, other construction waste etc.)

## 5.9 Work areas

Fieldwork areas, welding stations, material docking stations and formwork fabrication areas shall be kept free of pieces and cut off material.

## 5.10 Loose timber

All loose timber shall be carefully stacked. Loose timber with protruding nails present an unacceptable hazard, therefore all nails shall be bent over or removed immediately after use.

## 6. Records

(1) Periodic housekeeping Inspection record.

Additional applicable records if any shall be maintained.

## 7. References

For further details, please refer Procedure PIN-LP-CHM-099.

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure Pressure Testing</b>	QM code <b>PIN LP-CHM-007</b>
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## Attachments and forms:

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### Validity

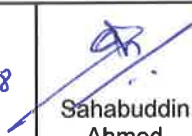
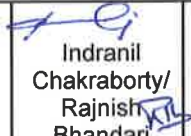

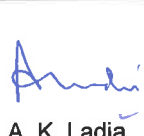
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No project-specific adaptation								

Process CHM		
thyssenkrupp Industrial Solutions (India)	Local Procedure <b>Pressure Testing</b>	QM code PIN LP-CHM-007
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### 1. Scope

This HSE Procedure is applicable for pressure testing activities during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, contractor, subcontractor, vendor personnel.

### 2. Aim

This HSE Procedure is aimed at providing guidelines and defining requirements for safe system of work for pressure testing activities.

The Procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements for pressure testing. This is Procedure and Client / Owner requirements are to be followed, however the most stringent requirements shall be implemented.

### 3. Responsibilities

The key responsibilities of site personnel related to HSE function are given below:

Site Manager (SM)/Commissioning Manager (CoM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI & SSV	Responsible to implement this procedure and to ensure:  (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements.  (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods.  (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site.  (ii) To assist construction engineer in identification, assessment, evaluation and control methods of likely hazards associated with the activity.  (iii) To ensure necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ HSE Personnel	(i) Preparation of Pressure Testing Procedure & carry out Hazard Identification & risk assessment for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities.  (ii) Ensure that personnel under their supervision understand and adhere to this procedure.  (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

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#### 4. Procedure

##### 4.1 Introduction

Pressure testing is carried out to demonstrate the integrity of the system being tested. There is always the possibility that the test may demonstrate a lack of integrity in the system. This may show up as a repairable leak or in extreme cases, as a catastrophic failure of some part of the system.

Pressure testing procedures and programs that meet the following requirements shall be developed.

tkIS India SM / Engineer in charge shall be consulted for any clarification for these requirements.

##### 4.2 General

Pressure testing shall be carried out:

- Hydraulically, using liquid (usually water) as the test medium, or
- Pneumatically, using gas (usually air or nitrogen) as the test medium.
- Vacuum Testing.

Normally, following testing agents are used in pneumatic testing.

- Air                      Air which is compressed by means of a mobile compressor and the dew point of which is not defined.
- Dry Air                Dry Air ( Instrument Air)
- High Pressure        Nitrogen (NH)    Nitrogen at high-pressure N2 with purity of > 99.5% NL
- Low Pressure        Nitrogen at low pressure (from utility station).
- AI+N<sub>2</sub>                Air and Nitrogen for high pressure testing

Air shall be used only for system where the moisture of the testing agent can be neglected. However, the air shall be oil free.

For the systems, which must remain dry, dry air, N<sub>2</sub> high or low pressure shall be used. In case of testing high pressure lines, high pressure N<sub>2</sub> shall be used. However, in this case, the system shall be first filled with Air/Dry Air/Low pressure nitrogen upto the pressure that can be reached and then high pressure nitrogen shall be used.

Note: The stored energy at test conditions for a pneumatic test is many times greater than for a hydrostatic test on the same system. The amount of energy contained in air is more than 200 times the energy contained in water at the same pressure and volume. Hence, Pneumatic testing shall only be carried out in circumstances where use of this method is unavoidable.

Hydraulic pressure testing shall always be the preferred method wherever practicable.

Possibility of a major failure during a pressure test poses potential hazards to personnel and property that must be carefully considered in planning and executing the test. These hazards vary in degree depending on the stored energy of the system at the test conditions and on the extent of the failure.

Potential hazards during a pneumatic test are much more significant from the following four principal effects of a major failure.



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- The blast effect of the high-intensity pressure wave created by a sudden rupture in the system. The destructive effect of parts such as valves, nozzles, sections of pipe is very high as they become high velocity missiles.
- The destructive effect due to high reaction forces at the point of rupture causing structural support failure and pipe whip.
- The destructive effect of the emergent jet from the point of rupture causing structural support failure and pipe whip.
- The destructive effect due to high reaction forces at the point of rupture

The first three effects, above, are primarily dependent on the intensity of the failure, the fourth on its duration, which, in turn, is influenced by the volume of the system under test. The first three effects are the most devastating.

#### 4.3 Test Methods

Pressure tests can basically be divided into two classes:

- Over Pressure Testing: These are tests carried out at pressures exceeding the designed safe working pressure with the object of proving the mechanical strength and integrity of the vessel / system.
- Leak Tests: These tests are normally carried out at or below normal working pressures and are intended to detect leaks at such places as riveted or bolted joints, welded or at defects in the material itself.

#### 4.4 Requirements for Hydraulic Pressure Testing

- Test procedure shall be prepared and approval from tkIS India shall be obtained.
- Only experienced and competent supervisors shall be engaged in testing activities.
- Separate gauge shall be provided for pressurizing pump and piping / equipment. All pressure gauges, temperature recorders shall have valid calibration. The same shall be confirmed before use. Pressure gauges shall be provided preferably at lower and higher elevations.
- It shall be ensured that the pipes/vessels and its supports are capable of withstanding the weight of liquid required for hydraulic tests.
- All joints, including welds shall be left uninsulated/uncoated and exposed for examination during the test.
- Major equipments, such as compressors, pumps, vessels and exchangers shall be isolated from pipeline during hydro-testing. When necessary, for practicability, exchangers and vessels may be included with the connected piping, provided the piping test pressure is within the available cold pressure limits of the equipment.
- Instruments, expansion joints, filter etc., whose maximum permissible cold test pressures are lower than the specified hydrostatic test pressure, shall be isolated and excluded from the test.
- Lines containing valves shall have source of test pressure on the upstream side.
- Required quality of test medium shall be ensured, so as not to contaminate the interior of the vessel.

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The water used for hydrotesting shall be free of dirt, iron oxides and organic substances. Water containing chloride ions may cause pitting and stress corrosion on austenitic Cr-Ni steel, nickel and nickel alloys, if the chloride ions reach a critical concentration. An increase in temperature will accelerate the corrosion rate.

- Piping designed for vapour or gas shall be provided with additional supports, if tested hydraulically.
- It shall be ensured that Blanking off equipment i.e. (plugs and blinds) are of the same specification as the equipment/system, which is to be tested. Plugs and Blinds must be correctly marked (provide tags) prior to installing to prevent any mishaps.
- Relief valves shall be excluded from the test and shall be suitably blanked off.
- It shall be ensured that blanking-off devices and such items as screwed plugs or connections are not liable to be ejected during testing e.g. as the result of thread failure.
- Proper venting shall be provided to the vessel/system being tested to exclude any possibility of air pockets.
- Expansion bellows and expansion bends shall be secured in such a manner that they do not alter their position during test. Line must be supported properly to avoid any displacement due to test pressure.
- Pipe/vessel shall not be subjected to any form of shock loading such as hammer testing while undergoing a full over-pressure test.
- All vent valves must be fully open during filling up as well as during draining.
- Pipe/vessel subjected to a maximum test pressure normally shall not be approached for close examination until after a reasonable period of time has elapsed.
- If the pipelines are to be tested along with the equipment, the test pressure shall not exceed the equipment test pressure.
- Pressure gauge readings shall be taken at suitable intervals. Gauges shall be selected in such a way that most of the readings fall between 40 – 60% of the gauge scale range.
- Special consideration shall be given to safety of personnel in the case of vessels subject to high pressures where the contained energy is high.
- All hydraulic testing must be treated with caution and all test areas can be cordoned off. Notice boards showing the Test Pressure shall be displayed throughout the whole of the Test Area.
- Necessary precautions like stepwise increase in pressure, tightening of bolts/ nuts, grouting etc. before and during the testing shall be ensured.
- During High Pressure testing only personnel involved with the test and Safety Personnel are allowed to be in the test areas.
- If leaks occur during the test, the pressure must be released prior to any personnel working on the system.
- Care shall be taken not to over-stress the pipe/vessel during test.

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- In the absence of any appropriate standard or code, the test pressure shall be limited to the pressure equivalent to 90% of the yield strength, (proof strength) of the material of construction at test temperature for the weakest part of the vessel/system.
- Where a pressurizing medium other than water is used, care shall be taken to recognize any additional hazard associated with the liquid concerned.
- When tested with process fluid, the risk of fire/explosion shall be prevented by properly purging by inert gas prior to repair.
- A leak of a highly flammable liquid e.g. Hydrocarbons could lead to a serious fire. It is also necessary to consider the purity of the testing medium; particularly where complete drainage of the vessel after test may not be possible.

#### 4.5 Proof Hydraulic Testing Requirements

Where the design pressure for which the strength cannot be satisfactorily calculated (e.g. after fabrication work has been carried out on pipe work), a proof hydraulic test will be necessary.

The following precautions in addition to those recommended for hydraulic pressure testing shall be taken.

- Proof hydraulic testing shall be carried out under the direct supervision of a person competent to carry out such a test.
- The pressure shall be applied gradually and increased by steps until the required test pressure is reached, or until significant yielding occurs. At this stage, the pressure shall not be further increased.

Note: The onset of yielding shall be determined by the use of strain gauges or strain indicating coating or by other suitable approved means.

#### 4.6 Hydrostatic Pressure Test Safety requirements:

Hydrostatic test is used for confirming mechanical integrity of installed pressure vessels and pipe lines. It has to be completed before putting the pressure vessels and pipe lines in use.

According to ASME Section VIII Division I, hydrostatic pressure test shall be conducted at the pressure of 1.5 times design pressure. If a vessel is designed for holding 1.0 kg/cm<sup>2</sup> pressure, the hydrostatic pressure test has to be done at 1.5 kg/cm<sup>2</sup>.

The use of high pressure is the main source of hazards associated with hydrostatic pressure test. Hydrostatic test stores high pressure energy that could damage the facilities and endanger worker's safety.

In order to prevent incident from hydrostatic test operation, a good test preparation is required prior to test, during the pressurization process and depressurizing operation. These jobs shall be made in the form of HIRA /Method Statement etc. Safety requirements for each stage of the test are given below:

##### 4.6.1 Hydrostatic Pressure test preparation – safety requirements:

- Specification sheet of the equipment and or pipe line, which mentions pressure and temperature designs are available and complete.
- Hydrostatic test pressure and temperature standard are already clearly defined in the related document.

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- Supported documents such as P & ID and isometric drawing are available and conform to as built facilities at the field.
- Pressure test plan has to be informed to all relevant personnel at the site, well in advance and before the test.
- A good coordination among related departments or contractors in the site well in advance and before the execution of pressure test.
- All test equipment and tools shall be inspected for wear and damage.
- Pressure measurement tools are calibrated and their statuses of calibration are still valid.
- Pressure gauges used in the test have enough capacity. The gauges are recommended to have 150% of the maximum allowable working pressure.
- Pressure gauges shall be installed at a proper location so that it can be easily read and do not create additional hazards to the hydrostatic test or expose personnel to the vessel being tested.
- All the temporary tools (such as valve, fittings, hoses, flanges, blind plate etc..) shall be rated more than the maximum hydrostatic pressure.
- Isolate other equipment and pipe lines that do not include in the hydrostatic test.
- Vents shall be available and installed at the high points to vent air. Check the vent line before testing and make sure it is not blocked.
- Choose drain valve at the lowest point in order to completely empty the vessel and pipe.
- Isolate the test area and surround it with safety line/barricade. Put appropriate safety sign at that area.
- Do not allow person who does not have any relation with the hydrostatic test, to enter the test area.
- If possible perform the test from a remote area.
- Make sure that all pipe and vessel supports are in good condition and have been inspected.
- All hoses must be tied down.
- Water temperature shall be more than 16 degrees.
- The hydrostatic-pressurizing pump is completed with safety relief valve.
- Wear proper personal protective equipment
- Do not start the test if a problem is identified.
- Appropriate Work Permit is to be taken before the start of test.

#### 4.6.2 Pressurization Process – Safety Requirements

- Remove all air from the vessel and pipe line by water through vent line.
- Pressurization is conducted gradually and slowly.
- Mark all leak points and repair them before preceding the test.
- Do not monitor directly in front of sight glass or level glass during pressurization process.

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#### 4.6.3 De-pressurization Process – Safety requirements

- Start de-pressurization by opening gradually the vent valve. Do it slowly.
- Do not open the drain valve if the vent valve is still closed. This is to avoid vacuum condition inside the vessel.
- Open the lowest drain point to completely remove water from the vessel and pipeline.
- Ensure that no remaining pressure trapped inside the pipe line or vessel.

#### 4.7 Pneumatic Pressure Testing Requirements

- Only personnel directly involved in testing shall be allowed in the test area.
- Gas used as the test fluid, if not air, shall be non-flammable and non-toxic.
- Pneumatic testing of vessels constructed of materials liable to brittle fracture under the test conditions should be avoided.
- The air that is used for testing shall be free of dirt, oil. Only non-inflammable (inert) gases can be used along with air.
- Precautions shall be taken to prevent local chilling during filling and emptying of the vessel. Attention is drawn to the fact that if the gas pressure from high-pressure storage is let down to that of the vessel under test its temperature will fall.
- The test arrangement shall be such that the temperature of the gas entering the vessel is not lower than the agreed test temperature.  
Attention is also drawn to the possibility of condensation occurring within the vessel.
- Before testing, careful inspection of the vessel shall be carried out. In the case of pressure vessels, the inspection shall include radiographic or other non-destructive testing of welds.
- Where practicable, steps shall be taken to reduce to a minimum the internal volume of the vessel to be tested. This will help in reducing the energy stored in the vessel while it is under pressure, thus reducing the consequences in the event of vessel failure.  
This can often be achieved by placing metal or hardwood cores inside the vessel.
- Care shall be taken to ensure that the methods used for sealing openings in the vessels under test are adequate.
- Where the source of pressure is higher than the test pressure, precaution against over-pressurization of the vessel should be taken by the use of reducing valves, pressure gauges and safety valves of adequate size.
- To avoid any injury in case of failure/explosion, area of testing shall be evacuated. Personnel required to remain in the test area shall have adequately protected enclosures/shelters. Any enclosure/shelter shall be capable of containing flying materials in the event of vessel failure, and of withstanding the rise in pressure caused by release of the air, steam or gas.
- The vessel under test shall not be subjected to any form of shock loading such as hammer testing.
- The vessel shall not be approached for close inspection until after the test pressure has been reduced.

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- Efforts should be made to complete testing before sunset. As during sunset, the pressure may get affected due to drop in atmospheric temperature.

#### 4.8 Leak Testing Requirements

- Leakage test will be distinguished by testing under pressure or under vacuum.
- Leak testing using air, steam or gas as the test medium may be safely carried out on a vessel which has been subjected to a recent over-pressure hydraulic test at a higher pressure. It may sometimes be desirable to carry out a gas leak test before the hydraulic or pneumatic test.
- Attempt should be made to maintain the test pressure not to exceed 10% of design pressure. The joints shall be checked with foaming agent.
- A leakage test under vacuum shall be performed if there are high demands on the tightness of pipelines. The piping section to be tested shall be completely assembled including control valves, safety valves etc. Vessels, exchangers, pumps instrument, process lines etc., shall also be tested.
- Leak testing is sometimes applied to vessels not designed or intended to be used as pressure vessels for example fuel tanks, radiators, storage tanks and oil drums.  
Danger may arise because the strength of the vessel has not been proved and may not be known.
- In case of testing of vessels and large diameter pipes, danger of Oxygen deficiency due to confined space must be fully understood by personnel involved in testing. Necessary arrangements shall be made to measure and monitor oxygen levels and necessary PPES shall be provided.

#### 4.9 Precautions in leak testing of vessels or articles not designed or constructed to contain pressure.

- There shall be no danger where a vessel has previously been subjected to a hydraulic test at pressure in excess of the leak test pressure. This shall be done wherever possible.
- Leak test pressure shall always be kept as low as possible. In the case of tanks or radiators intended to contain liquids, there is nothing to be gained by testing them at a little high pressures unless they are likely to be subjected to a greater pressure in service than this.
- Means shall be provided to ensure that the intended test pressure is not exceeded. If the pressure of source medium is higher than the test pressure, suitable reducing valve shall be fitted together with a safety valve and a pressure gauge on the low-pressure side.
- All articles or vessels shall be carefully inspected before being subjected to pneumatic test pressure. In the case of low-pressure leak testing, this inspection shall be visual and if necessary shall include radiographic or other non-destructive tests.
- Steps shall be taken to ensure that any openings in the component under test are adequately sealed and that closures are not liable to be blown off under pressure. Bolted flanges or screwed caps shall be used wherever possible.
- The interior volume of the component under test shall be reduced wherever practicable as described above in 'Pneumatic Pressure Testing'.

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#### 4.10 Flexible Tube Connections Requirements

- During low pressure testing, rubber pre-tubing may sometimes be used for connecting the air supply to the article under test. Pushing of the tube onto a pipe or spigot on the test component without positive clamping is strictly not acceptable as an arrangement of preventing over-pressure.
- Where flexible tubes are used, they shall be securely fastened at both ends. Tubes whipping can be a very serious hazard and precautions need to be taken to prevent this by properly securing flexible tubes.

#### 5. Records

Necessary records as required by this Procedure shall be maintained.

For further details, please refer Procedure PIN LP-CHM-099.

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	SAFETY INSPECTION CHECKLIST POWER TOOLS & EQUIPMENTS (To be conducted once in a month by Site tkIS/Contractor HSE Officer and Site tkIS/Contractor Electrician)	QM code PIN LP-CHM-008 F01 Page 1 of 3

Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location / Area: \_\_\_\_\_

Date & Time: \_\_\_\_\_

No.	Item	S	NS	NA	Remarks
	GENERAL				
1	Whether electricians are certified, trained and authorized?				
2	Whether Electricians are available during the entire working hours?				
3	Whether appropriate and approved types of PPEs are being used by electricians?				
4	Whether work on equipment is conducted after proper isolation?				
	CABLES				
1	Whether the condition of cables is checked regularly?				
2	New cables and cables received from other sites checked for Insulation Resistance before putting them into use?				
3	Are all main cables, taken either underground / overhead above 7'?				
4	Are welding cables routed properly above the ground without causing stumbling hazard?				
5	Are welding & electrical cables overlapping?				
6	Are there any improper joints of cables and wires prevail at Site?				
7	Are there any insulation damages prevail around cable joints?				
8	Whether the cables are protected from sharp edges, nails, bolts, overrunning of vehicles etc.?				
9	Whether extension boards (if used) are of non-combustible material?				
10	Whether the safe distance from overhead transmission lines (>6 mtrs) are maintained?				
11	Whether the overhead cables contact preventive barricading and warning signs provided?				



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	DISTRIBUTION BOARDS				
1	Whether metallic boxes with covers/doors are in use?				
2	If not, whether Distribution Boards (DBs) & extension boards are protected from rain/water?				
3	Is energised wiring in junction boxes, Circuit Board panels & similar places covered all times?				
4	Is earth conductor continued upto DB?				
5	Whether correct/properly rated fuses & circuit breakers provided at main boards & sub- boards?				
6	Is there any overloading of DB?				
7	Whether a clear approach is provided to DB?				
8	DBs and free of obstructions is maintained at all times?				
	ELCB – Earth Leakage Circuit Breaker / RCCB				
1	Whether all the cable connections are routed through ELCB?				
2	Whether all ELCBs are numbered & tested periodically?				
3	Whether ELCB test records countersigned by competent person are maintained at site?				
4	Whether ELCBs sensitivity maintained at 30 mA?				
	EARTHING				
1	Is neutral and double earthing ensured at the source of power (Main DB at Generator or Transformer)?				
2	Whether the continuity & tightness of earth conductor are checked? (Check for broken earthing strips, detached earthing wires, loose connections, missing screws etc.)				
3	Whether specified gauge of earth conductor is used at all places of earthing?				
4	What is the value of Earth Resistance?				
5	Whether the Insulated rubber mats are provided wherever required?				

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ELECTRICALLY OPERATED MACHINES / HAND TOOLS				
1	Whether all the equipment / tools used at site is of approved type?			
2	If connection is given to driving equipment i.e., welding machine, grinding machine etc., - whether machine is inspected and status displayed on it?			
3	Whether guards are provided on all rotating/moving parts of the equipment?			
4	Whether cable is exposed at the point of entry into the equipment?			
5	Whether industrial sockets and plug tops are provided everywhere?			
6	Are all metal parts of electrical equipment's light fittings/accessories grounded?			
7	Are there any shed / cover for welding machines?			
8	Whether on/off switches to the equipment and portable tools in working condition?			
9	Are Portable power tools maintained as per norms?			
10	Whether hand lamps are provided with guards to prevent accidental damage?			
ILLUMINATION				
1	Whether the Halogen lamps are fixed at proper places?			
2	Whether specified illumination levels are maintained at all work places?			
EMERGENCY EQUIPMENT/PREPAREDNESS				
1	Whether suitable fire extinguishers and sand buckets are provided at critical areas?			
2	Whether records of emergency equipment are maintained?			
3	Whether first-aid instructions to be followed in case of electric shock are displayed at appropriate location?			
* S – Satisfactory                      NS – Not Satisfactory                      NA – Not Applicable				

Please follow the same trend Y / N / NA

tkIS India / Contractor Site HSE Representative

tkIS India SSI or SSV / Contractor Site Electrician

\_\_\_\_\_  
(Name & Signature)

\_\_\_\_\_  
(Name & Signature)

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure</b> <b>Hand and Portable Power Tools</b>	QM code <b>PIN LP-CHM-008</b>
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### Attachments and forms:

Form: PIN LP-CHM-008-F01

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#### Validity

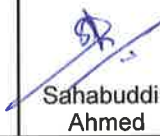
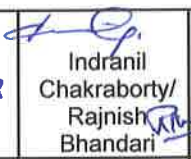

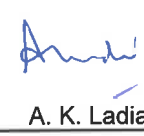
Valid from: 12. 2018  
Valid until: 12. 2021

**This procedure replaces HSE-CON-IN-008**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

PIN-LP-QMC-03 F01 E 2018-03

tkIS-India Local IMS Standard	10/12/18	 Sahabuddin Ahmed	2/1/18	 Indranil Chakraborty/ Rajnish Bhandari	2/1/18	 Nitin Pandit	31/12/18	 A. K. Ladia
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				No project-specific adaptation				
				Page 279 of 673				

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### 1. Scope

This HSE Procedure is applicable for use of Hand and portable power tools during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-contractor, vendor personnel.

### 2. Aim

The HSE Procedure is aimed at providing guidelines and defining requirements for safe system of work in use of Hand and Portable Power Tools.

The Procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements for Hand and Portable power tools.

However, the most stringent requirement shall be implemented.

### 3. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI & SSV	Responsible to implement this procedure and to ensure: (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods. (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site. (ii) To assist construction engineer identification, assessment, evaluation, control methods for likely hazards associated with the activity. (iii) To ensure necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ HSE Personnel	(i) Carry out HIRA for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

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#### 4. Procedure

##### General

Following minimum requirements shall be ensured for the use of hand and portable power tools at site.

- Correct tool shall be selected for the job intended. Faulty tools shall not be used.
- Tools shall be used only for the purpose for which they are designed.

They shall be used in the correct manner and shall not be adapted or modified in any way.

Appropriate and approved tools necessary to perform the job activities shall be provided to the concerned personnel.

- Tools shall be stored in designated storage areas. Store controller shall inspect all returned tools and shall not issue defective or with suspected tools.
- If tools are permanently/or for longer durations held by a personnel/user, he shall ensure that the tools in his care are safe for use.
- When not in use, tools shall be correctly stored. Tools lying on the floor, on scaffolds, in walkways or cluttering work benches represent an unsafe condition, such situations shall be avoided.
- Tools, if small and light in weight, may be carried on a tool belt provided they do not hamper easy movement. Heavier or more cumbersome tools shall be placed in a bag or toolbox and hauled up by hand line.
- Appropriate steps (i.e., barricading of hazardous area, posting danger signs) shall be arranged while working at high elevation to prevent tools from falling onto personnel below.
- Cutting tools shall be sharp.
- Chisels, screwdrivers and pointed tools shall not be carried pointed up in a pocket. They shall be carried in a toolbox. When carried in hands, it shall be ensured that hand points and cutting edges are away from the body.
- Tools shall be handled properly and not thrown by one worker to another worker and from one building/structure to another.
- Appropriate eye and hand protection shall be worn while using tools.
- Appropriate hearing protection shall be worn for work around tools that produce noise levels at or above 85 dB A (or further stringent value if required by project/regulatory requirements).
- Hammers, axes, shovels, or similar tools with loose, split, or splintered handles shall not be used.
- The wooden handles of tools such as hammers, pickaxes, files, etc., shall be of the correct size, correctly and securely fitted, undamaged and free from oil or grease.
- Pipes shall not be used to increase torque.
- Tools shall be inspected for defects periodically, prior to issue, and upon return of the tool. Damaged or worn tools shall be repaired before issue or use, and if repair is not possible, the tool must be taken out of service. The following are guidelines for defect inspection checklist :
  - Mushroomed or burred heads on impact tools such as chisels, hammers, driving bars, etc.
  - Loose, over or under sized handles.
  - Open ended wrenches with jaws spread or distorted.
  - Cracked box end or socket wrenches.
  - Splintered or cracked handles.
  - Improper handles or handles and control bars missing or bent.
  - Defective extension or power cords such as chafed, kinked, weather cracked, male or female plugs broken or not installed properly, no ground wire, etc.
  - Defective or inoperable guarding mechanisms.
  - Evidence of abuse, which negates safe operation.

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- Tools found to be defective/declared unsafe shall be tagged appropriately. Use of such tagged tools shall not be permitted.
- Tools shall be repaired in accordance with the manufacturer's specifications/guidelines, by competent personnel.

## 5. Requirements/Guidelines for using Hand tools.

### Hammers:

- Hammers shall have a securely wedged handle to the type of head used.
- The wooden handle shall not be loose, splintered or cracked.
- Hammers shall have a smooth oil free handle, shaped to fit the hand and of the specified size and length.

### Screw Drivers:

- Screw drivers shall be so chosen that the blade thickness fits the slot.
- Screw drivers shall not be used as a punch, wedge, or chisel.
- Screw drivers shall not be exposed to excessive heat.
- Screw drivers shall not be used around electrical conductors. Screw drivers used for electrical work shall be insulated.

### Pliers and Cutters:

- Pliers and Cutters shall not be used as substitutes for wrenches.
- Pliers shall have insulated handles when used around electrical conductors.
- Cutters shall not be used near live energized circuits and should only be used for the rated capacity specified by the manufacturer.
- Cutters shall not be used as nail pullers or pry bars.

### Wrenches:

- For safety and efficiency, the use of socket spanners, ring spanners, tubular spanners and open-end spanners shall be preferred to the use of wrenches.
- Pipe extension shall not be used to increase the load capacity.
- The socket shall be clean so as to seat fully on the nut or bolt.
- Adjustable wrenches shall generally be used for light jobs only.
- Wrenches shall be pulled with the jaws facing the user, and not pushed.
- Pipe wrenches, both straight and chain tong, shall have sharp jaws, and be kept clean.
- The adjusting nut of pipe wrenches shall be inspected frequently for signs of cracks. If cracked, the wrench shall be taken out of service.
- Pipe wrenches shall not be used on nuts, bolts, or valves which may be crushed or bent out of shape.
- A wrench shall not be used as a hammer.

### Knives:

- Knives shall be used by cutting away from the body.
- Knives shall be carried in a sheath or holder to the side or back of the body.
- Knives shall not be stored on benches or floors haphazardly.
- Knives shall not be used where excessive pressure needs to be applied to the cutting surface.
- Knives shall not be thrown from one worker to another.

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Files:

- Files without a handle shall not be used.
- Files shall not be cleaned by striking against a vice or other metal object.
- Files shall not be used as a hammer or as a pry.

Chisels:

- Material to be cut, the size and shape of the material and the depth of the cut shall be considered in the selection of Chisels.
- Chisels shall be made heavy enough not to buckle when struck.
- Chisels shall be large enough for the job so that the blade is used rather than the point or corner.
- For regular use, a sponge rubber pad, forced down over the chisel shall be used to provide a protective cushion for the hand.
- Goggles shall be worn when chipping. Chipping must be in a direction away from the personnel undertaking the chipping.
- Bulk chisels held by one man and struck by another shall require the use of tongs or a chisel holder to guide the chisel so that the workman is not injured.
- Chisels with burred heads shall not be used.
- Chisels shall be sharp enough for the job. Chiseling in easy stages with no attempt to take off much metal at one time. While cutting, keep the tool as cool as possible with water or other cooling medium.
- The work to be chiseled shall always be secured properly.
- Both the person working and co-workers shall be protected with adequate screening.

Hack Saws:

- Hack Saws shall be properly adjusted in the frame to prevent buckling and breaking, but shall not be so tight that it break off the pins that support the blade.
- Hack Saw blades shall be installed with the teeth pointing forward. The blade chosen shall be dependent on the type of material being cut. (See Table below):

## BLADE SELECTION GUIDELINES:

TEETH PER INCH	USED FOR CUTTING
14	Soft solid metal
18	Tool steel, iron pipe, hard metal and general shop use
24	Drill rods, sheet metal and tubing
32	Thin sheet metal (less than 18 gage) and tubing

- Pressure shall be applied on the forward stroke only. The saw shall be lifted slightly and pulled back in the cut lightly to protect the teeth. If the blade is twisted or too much pressure is applied, the blade may break and cause injury to the user.

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## 6. Requirements/Guidelines for Usage of Power Tools

### General:

- The hazards associated with the use of hand held power tools are greater than those for other electrical apparatus in similar conditions, because the hand is usually tightly gripping the apparatus when in use, making it difficult or impossible for the victim to let go if any fault develops. If the earth continuity conductor is broken, the operator provides the only path to earth in the event of an electrical fault.
- A Work Permit must be obtained before any work is performed in a hazardous area using electrical equipment.
- Portable power tools shall be inspected by the user for any damage prior to use.
- Electrically operated tools shall be grounded with a grounding conductor or shall be double insulated.
- When flameproof transformers are required, they shall conform to local regulations. Associated plugs and sockets to local regulations.
- The transformers shall be connected to the main supply by heavy-duty cables. An efficient isolating switch & circuit breakers shall be located in an accessible position.
- The supply cables to flameproof transformers for low voltage portable appliances shall always be supported above ground level. The transformers shall never be taken inside tanks, vessels or other confined spaces.
- No electrical hand held appliances shall be used in wet areas.
- Portable appliances shall be connected to an electrical supply only through correct connectors
- Temporary or locally made connectors shall not be used.
- Tools shall be disconnected from electrical power when not in use.
- Tools shall be disconnected from electrical power before servicing and while changing its accessories such as bits, blades, cutters etc.
- All portable electrical appliances shall be issued against a signature. Returned appliances shall be checked for damage. The stores representative shall ensure that any tool or accessory that appear damaged are not issued. Such tools and accessories shall be tagged defective and sent for repair.
- Power tools shall be fitted with a fail-safe device which renders the tool inoperative when the operator releases his hold.
- No person shall use any appliance unless he has been trained and is authorized to do so.
- Where guards are required, they shall be securely fitted and correctly adjusted.
- The operator shall ensure that all moving parts are motionless before setting the hand tool down.
- When working in an elevated or restricted area, (e.g. on scaffolds), the operator shall ensure a good safe footing and wear safety harness and shall use both hands to operate the tool.

### Electric drills:

- Electric Drill bits shall be carefully chosen for the work to be done. Electric drills shall be firmly gripped prior to activation.
- When large, powerful drills are used, small pieces of work shall be clamped or anchored to prevent whipping.
- Where the operator is required to guide the drill with his hand, the drill shall be equipped with a sleeve that fits over the drill bit. The sleeve shall protect the operator's hands and also serve as a limit stop if the drill should plunge through the material.
- Oversized bits shall not be grind down to fit small electric drills, instead an adaptor shall be used that will fit the large bit and provide extra power through a speed reduction gear.



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- Electric drills shall not be left unattended with the power on.
- Power source shall be disconnected prior to any authorized repairs.
- Appropriate eye protection shall be worn during use of Electric drills.
- The drill shall not be used with damaged cords.
- Proper type of electrical plug shall be installed for the drill's voltage requirements.
- The key shall be removed prior to operating the drill.
- The drill shall be unplugged before changing the bit.
- All adjustments shall be made prior to operating the drill.
- The object shall be cooled properly during drilling operation.

#### Grinding Wheels:

- Every abrasive wheel, in excess of 55 mm must be marked with the maximum permissible speed. Maximum speeds of small wheels must be stated on a notice attached to the machine.
- The maximum permissible peripheral speed of an abrasive wheel must never be exceeded.
- Grinding Wheels shall never be used at greater than their rated speed.
- The maximum working speed of spindles on grinding machines must be marked on the spindle/machine.
- Grinding wheels must always be handled with care. Often wheel breakage can be attributed to careless handling and storage.
- Grinding Wheels shall be examined before each use for gouges, cracks, and general condition.
- For portable grinding the maximum angular exposure of the periphery and sides shall not exceed 180 degrees and the top half of the wheel (the portion facing the operator) shall always be enclosed.
- Guards shall be adjustable so that operators shall inclined to make the correct adjustment rather than remove the guard.
- The wheel shall be kept away from water and oil which might affect its balance.
- Care shall be taken not to strike the sides of a wheel against objects, or to drop the wheel.
- The speed and weight, particularly with a larger one, make it more difficult to handle than some other power tools. Since part of the wheel is exposed, it is important that personnel take much more care to hold and use the tool, so that the wheel does not touch the clothes or the body.
- A running wheel shall not be kept on the floor unattended.
- Appropriate eye protection shall be worn during use of Grinding Wheels.
- The tongue guard shall be maintained within ¼ inch of the grinding wheel.
- Hand held grinder shall not be clamped in a vise.
- Maximum care shall be taken while using grinder at higher elevation.

#### Soldering Iron:

- Insulated and non-combustible holders shall be used for Soldering Iron.
- Soldering Iron shall not be left unattended, particularly when hot.
- Soldering Iron shall not be placed when hot on wooden tables or on combustible materials.
- Harmful quantities of fumes from lead soldering shall not be allowed to accumulate. Even if lead fumes are not present in harmful quantities, it is desirable to exhaust the nuisance fumes and smoke.
- Lead solder particles shall not be allowed to accumulate on the floor and on work tables.
- The Soldering iron shall not be used as a screw driver or pry.

#### 7. Requirements & Guidelines for Pneumatic/ Pneumatic Impact Tools:

- High-pressure air jets can be extremely dangerous. Exposure of fingers, etc. to orifices, exhaust or line leaks may cause injury.

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- Prior to any pneumatic tools being prepared for use, the manufacturer's instructions shall be read and fully understood.
- Pneumatic tools shall not be used for any purpose other than that for which they are designed.
- Non-standard attachments and accessories shall not be used.
- The compressed air supply shall be regulated to the correct pressure, adequately filtered, dried, and where necessary, lubricated.
- The means of disconnection from the air supply must be easily accessible. Prior to performing any repair, adjustments or cleaning of pneumatic tools the air supply shall be isolated, lines and tools depressurized and tools disconnected.
- Safety goggles and breathing masks shall be worn where grit or dust may be produced or disturbed. Ear protectors shall be worn where the work generates high noise levels in excess of 85 dB A (Any further stringent value as required by project/regulatory requirement).
- Under no circumstances, compressed air shall be directed at any part of a person's body.
- Precautions must be taken to prevent clothing, hair, rags, etc. from becoming entangled with any moving parts of pneumatic tools.
- Maintenance of pneumatically operated tools shall be carried out at regular intervals by competent persons.
- Tools shall not be modified or the labels and descriptions defaced or removed.
- Safety mechanisms shall not be interfered with or immobilized.
- Hoses and couplings of the recommended size and rating shall be used.
- They shall also be in proper condition.
- Hoses/couplings secured by jubilee clips, tying wire or other unauthorized means shall be rejected and removed from site.
- Compressed air shall not be used to clean working areas. When working with tools driven by compressed air, an acoustic jacket shall be fitted on the tool to reduce high noise levels.
- Compressed air driven tools shall be fitted with governors to ensure correct speed control.
- Prior to connecting any pneumatic tool, the airline shall be blown through momentarily to ensure that any debris in the line is cleared out. During this act, the line shall be securely held and shall be directed away from the operator or any other persons in the vicinity.
- The airline to the tool shall not be charged without enough men to handle the tool.
- Water/moisture shall be removed from the air before connecting the air hose to the pneumatic tool.
- Pneumatic Impact Tools shall be provided with an automatic closing valve actuated by a trigger located inside the handle where it is reasonably safe from accidental operation. The machine shall operate only when the trigger is depressed.
- Pneumatic Impact Tools shall have a retaining device that holds the tool in place so that it cannot fly off accidentally from the barrel.
- Pneumatic Impact Tools shall be provided with heavy rubber grips to reduce vibration and fatigue to the workmen.
- Training shall be conducted on the safe use of tools for the concerned personnel.
- Personnel assigned to inspect, test, repair hand or power tools shall receive specialized training, authorization and/or certification as being qualified to complete the work safely.
- Personnel using explosive actuated tools shall be trained and certified for the brand or type of device they shall using.
- Personnel using and handling abrasive wheels and discs shall be trained in identifying the types, handling, testing and mounting of these items. Training shall cover :
  - Receipt, identification, storage, and issuing of abrasive wheels and discs.
  - Types of abrasive wheels and discs which will be available for field use.
  - Wheel or disc characteristics, such as standard markings, speed and revolutions per minute (RPM) ratings, special handling, etc.
  - Wheel or disc types to be used on particular materials or jobs.
  - Storage, handling, use, and precautions for field or shop applications.
  - Wheel or disc mounting, this includes testing, balancing, RPM matching, etc., for any equipment location.

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- Guards utilized for physical hazard protection must be properly adjusted, utilized and maintained on any equipment of this type.
- Shelf life of the grinding disc. (shelf life)

#### Safety Rules:

- Inspect the wheel and bush for any defects.
- Check for correct position and security of safety guards.
- Check that whether wheel has the correct speed rating.
- On starting the machine, hold the machine safely until the wheel reaches its normal running speed. Thereafter, check for wobbling and vibration.
- Apply the work-piece to the wheel slowly and do not use excessive pressure.
- Keep the work-piece properly secured and use a holder for small pieces.
- Keep the work-piece rest adjusted as close as practicable to the wheel.
- Do not strike the wheel or use the side of the wheel for grinding, unless it is so designed.
- Switch off and wait until the wheel has stopped before making adjustments.

#### 8. Powder-Actuated Tools

Powder-actuated tools operate like a loaded gun and shall be treated with the same respect and precautions. In fact, they are so dangerous that they shall be operated only by specially trained employees.

Safety precautions to remember include the following:

- These tools shall not be used in an explosive or flammable atmosphere.
- Before using the tool, the worker shall inspect it to determine that it is clean, all moving parts operate freely and that the barrel is free from obstructions.
- The tool shall never be pointed at anybody.
- The tool shall not be loaded unless it is to be used immediately. A loaded tool shall not be left unattended, especially where it would be available to unauthorized persons.
- Hands shall be kept clear of the barrel end. To prevent the tool from firing accidentally, two separate motions are required for firing: one to bring the tool into position and another to pull the trigger.
- The tools shall not be able to operate until they are pressed against the work surface with a force of at least 5 pounds greater than the total weight of the tool.
- If a powder-actuated tool misfires, the employee shall wait at least 30 seconds, they try firing it again. If it still does not fire, the user shall wait another 30 seconds so that the faulty cartridge is less likely to explode, than carefully remove the load. The bad cartridge shall be put in water.
- Suitable eye and face protection are essential when using a powder-actuated tool.
- If the tool develops a defect during use it shall be tagged and taken out of service immediately until it is properly repaired.
- When using powder-actuated tools to apply fasteners, there are some precautions to consider. Fasteners must be fired into material that shall let them pass through to the other side. The fastener shall not be driven into materials like brick or concrete any closer than 3 inches to an edge or corner. In steel, the fastener shall not come any closer than one-half inch from corner or edge. Fasteners shall not be driven into very hard or brittle materials which might chip or splatter, or make the fastener ricochet. An alignment guide shall be used when shooting a fastener into an existing hole. A fastener shall not be driven into a spalled area caused by an unsatisfactory fastening.

#### 9. Hydraulic Power Tools

- The fluid used in hydraulic power tools shall be an approved fire-resistant fluid and shall retain its operating characteristics at the most extreme temperatures to which it shall be exposed

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- The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters and other fittings shall not be exceeded.
- All jacks – lever and ratchet jacks, screw jacks and hydraulic jacks – shall have a device that stops them from jacking up too high. Also, the manufacturer's load limit shall be permanently marked in a prominent place on the jack and shall not be exceeded.
- A jack shall never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. Use wooden blocking under the base if necessary to make the jack level and secure. If the lift surface is metal, place a 1 inch thick hardwood block or equivalent between it and the metal jack head to reduce the danger of slippage.
- To set up a jack, make certain of the following:
  - a. the base rests on a firm level surface,
  - b. the jack is correctly centered,
  - c. the jack head bears against a level surface, and
  - d. the lift force is applied evenly.
- Proper maintenance of jacks is essential for safety. All jacks shall be inspected before each use and lubricated regularly. If a jack is subjected to an abnormal load or shock, it shall be thoroughly examined to make sure it has not been damaged.
- Hydraulic jacks exposed to freezing temperatures shall be filled with adequate antifreeze liquid.

#### 10. Records

Necessary records as required by this Procedure shall be maintained.

For further details, please refer Procedure PIN LP-CHM-099.

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A. Project: \_\_\_\_\_ Project number: \_\_\_\_\_

B. Name of Contractor: \_\_\_\_\_ Location / Area: \_\_\_\_\_

C. Date & Time: \_\_\_\_\_

1. Crane Third Party Inspection Certificate Valid: Yes: ☐ No: ☐ Date of expiry: \_\_\_\_\_.

2. Operator HVM Certified: : Yes : ☐ No : ☐ License Number: \_\_\_\_\_

3. Description of load: \_\_\_\_\_.

Stowed	Stowed	Erected	N/A	(kgs)
Jib				
Extension				
Hookblock(Main):				
Aux. Boom Head:				
Headache Ball:				
Slings, Shackles, etc.:				
Others:				
Total (Gross Load Weight):				

4. Type of crane to be used: \_\_\_\_\_

Boom length (total): \_\_\_\_\_m

Jib length: \_\_\_\_\_m

5. Weight of load \_\_\_\_\_ kgs

Effective weight of jib \_\_\_\_\_ kgs (see jib chart)

Effective weight of jib **headache ball** \_\_\_\_\_ kgs

Weight of load block \_\_\_\_\_ kgs

Weight of hoist rope below boom tip \_\_\_\_\_ kgs

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Weight of spreader bar \_\_\_\_\_ kgs

Weight of other rigging \_\_\_\_\_ kgs

Total load weight \_\_\_\_\_ kgs

6. Hoisting clearance \_\_\_\_\_ m.

7. Lift quadrant zone \_\_\_\_\_.

8. Operating radius \_\_\_\_\_ m.

9. Crane capacity at operating radius \_\_\_\_\_ (Note: Do not make lift if total load is greater than crane capacity shown in Item 10).

10. Crane Capacity for jib configuration: \_\_\_\_\_.

11. Ground and site conditions: \_\_\_\_\_.

12. Wind speed: \_\_\_\_\_ mph (32 kmph)

13. Work permit required: Yes ☐ No: ☐

14. Load moment indicator: Yes ☐ No: ☐ Type: \_\_\_\_\_.

15. Percentage capacity of the crane at that particular radius (must be restricted to 75%) :

16. Sketch and supplementary information for crane lift is required to be attached to this plan. (Note: The Sketch of the crane should include the following rigging information: size of each component; safe working load (SWL) capacity; length of slings; type of component; component diameter; weight of component and sling angles).

\_\_\_\_\_  
Contractor Representative (Name & Sign)

Date:

\_\_\_\_\_  
Crane Operator (Name & Sign)

Date:

\_\_\_\_\_  
Contractor Competent Person (Name & Sign)

Date:

\_\_\_\_\_  
Reviewed by tkIS site HSE Representative (Name & Sign)

Date:

\_\_\_\_\_  
Approved by tkIS SM (Name & Sign)

Date:

Process <b>Construction HSE Management</b>		
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### Attachments and forms:

Annex A01: PIN LP-CHM-010 F01- Lift Plan for Cranes


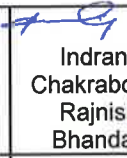

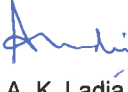
Validity  
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Valid until: 12. 2021

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This procedure replaces HSE-CON-IN-010

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS-India Local IMS Standard	14/12/18		24/14/18		24/12/18		31/14/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
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## 1. Scope

This Procedure shall apply to all thyssenkrupp Industrial Solutions (India) projects. This document remains unchanged in all projects.

It contains the minimum requirements which are formulated in order to guarantee an appropriate Health, Safety and Environment level at thyssenkrupp Industrial Solutions (India).

It specifies the requirements defined in the thyssenkrupp Occupational Health & Safety Management Manual and Implementation Guides.

These minimum requirements do not invalidate the applicable national rules and regulations. Therefore, if in some cases stricter statutory rules and regulations exist, they must be given priority.

## 2. Aim / purpose

The aim of this procedure is to establish basic requirements for the Lifting operations, including planning, execution, supervision and records.

The Lifting operations procedure is aimed at providing guidelines and defining requirements for safe system of work for lifting operations.

This procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements for lifting operations. The use of this procedure is intended to protect personnel and to prevent damage to equipment, materials and the environment.

## 3. Definitions

HIRA – Hazard Identification and Risk Assessment

## 4. Responsibilities

The responsibilities of site personnel related to HSE function are given below:

Site Manager (SM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI & SSV	Responsible to implement this procedure and to ensure: (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods. (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.



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tkIS India Site HSE Personnel	(i) Responsible to assist Site manager in effective implementation of this procedure on site. (ii) To assist construction engineer/Supervisor identification, assessment, evaluation, control methods for likely hazards associated with the activity. (iii) To ensure necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ HSE Personnel	(i) Carry out HIRA for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the same.

## 5. Procedure

The following requirements are minimum standards and are not to be seen as replacing any legal requirements or any locally or internationally recognized codes of practice.

Clearly designated restricted entry zones shall be established for all lifting operations. Personnel movement/work in these zones shall be controlled when lifting operations are on. Only the personnel performing the lifting operation shall be allowed inside the zone. A designated banks man who shall wear a high visibility jacket and be in constant communication with the crane operator.

No lifting operations shall be permitted over areas where personnel are working.

### 5.1 Critical Lift or Heavy Lift

Although all crane lifts require pre-lift planning to determine factors such as load weight, crane configuration, rated capacity and site conditions, some lifts require more extensive planning by qualified / experienced persons and are often referred as "critical lifts". Critical lifts require a more comprehensive lift plan to minimize the potential of crane failure and / or catastrophic loss.

There are many definitions of critical lift used in construction industry, based on National Standards; International Standards like NIOSH, OSHA etc. and other good practices; tkIS India considers any of the following condition as critical lift:

1. Lifting greater than 75% of the rated capacity of lifting crane
2. Lift involving more than one crane
3. Lift over occupied structures
4. Blind lift (out of the view of the operator)
5. Lift near power lines
6. Hoisting personnel (Personnel being hoisted)
7. Lift involving non-routine or technically difficult rigging arrangements
8. Lift where the center of gravity may change
9. Lifting high value, unique, irreplaceable, hazardous, explosive or radioactive loads
10. Lifting submerged loads
11. Lifts involving special hazards such as within an industrial plant, cranes on floating barges, loads lifted close to power lines and lifts in high winds or with other adverse environmental conditions present.
12. Lifting in congested areas
13. Lifting above traffic or people or live pipe lines / equipment.

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14. Lifts involving turning or flipping the load where "shock loading" and / or "side loading" may occur.
15. Lifts where the load weight is not known
16. Lifts in poor soil or unknown ground condition
17. Lifts involving unstable pieces
18. Lift load more than 50 T
19. Any lift - which the crane operator believes is critical
20. Any lift - advised by tkIS India Site Manager / tkIS India HSE Manager as critical

## 5.2 Critical Lift Plan

Before making a critical lift, a critical lift plan is to be prepared by a qualified / experienced person such as crane operator, Rigger or Supervisor /Engineer and is to be approved by the concerned tkIS India Engineer and tkIS India Site HSE Manager.

The lift plan shall be documented in writing and made available to all personnel involved in the lift.

The critical lift plan includes the following information:

- Description of the lift
- Crane position and configuration
- Lift height
- Load radius
- Boom length and angle
- Size and weight of the load
- Percent of crane's rated capacity (safe working limits of the crane – load chart)
- Personnel involved
- Rigging Plan (Rigging hardware, Rigging sketch, rated capacity of rigging components etc.)
- Sling angles
- Communication method
- Ground conditions
- Environmental conditions (wind velocity etc.)
- Inspection Procedures
- Procedures for hoisting personnel
- Swing and tail clearance
- Explanation of hand signals
- Load Moment Indicator (LMI)

The critical lift plan should be based on the operational limitations specified by the crane manufacturer's load chart. Measured load weights, as opposed to calculated load weights, should be used when available. Critical Lift Form is provided as HSE-CON-IN-010-M01.

During lifting, the crane should be restricted to 75% of its maximum at that particular radius of the crane

### Pre-Lift Review

A pre-lift meeting involving the participating personnel (i.e. crane operator, lift supervisor/engineer, rigger, Contractor & tkIS India HSE Manager and RCM), should be conducted prior to making a critical lift and meeting minutes need to be documented. The critical lift plan shall be reviewed and ensure that the Project Team is prepared to safely conduct the lift. Wherever feasible, a practice lift with similar crane configurations and load conditions shall be conducted. Practice lifts shall always be performed by the same crew, using the same lifting equipment, as those for the critical lift.

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### Hoisting Personnel

The use of a crane suspended personnel platform (basket) is prohibited by OSHA unless there is no safer, practical, conventional means of access to an elevated work area.

Ladders, scaffolds, stairways, aerial lifts and personnel hoists (elevators) shall be considered before using a personnel basket. If these options are more hazardous or not possible because of structural design or worksite conditions the hoisting of personnel from a crane is permitted. The reason for using personnel platform (basket) shall be documented in the critical lift plan.

The Design of the Personnel Platform (Man basket) is to be approved by tkIS India site HSE Manager and RCM.

The following requirements apply to hoisting personnel in a crane suspended platform (basket):

- The total weight of the load must not exceed 50% of the crane's load chart capacity.
- A positive locking safety latch must be on the crane hook.
- Load lines must have a safety factor of at least 7 times the maximum intended load.
- Guard rails provided with a locking gate that does not swing outward.
- Weight of the platform and rated safe working load weights conspicuously and permanently marked on the platform.
- Proof testing at 125% of the platform' rating capacity is required prior to hoisting employees and after any repair or modification. Whenever the crane is moved to a new location, new proof test is required.

A pre-lift meeting with the crane operator and other personnel involved in the lift should be performed and documented prior to the trial lift. A proper tie-off to structural member inside the basket or the lower load block / overhaul ball should be reviewed during the pre-lift meeting. The trial lift with the unoccupied platform loaded at least to the anticipated lift weight should be made from ground level to each location at which personnel will be hoisted.

All operations will be required to have a valid permit detailing the requirements and limitations of the lift.

A copy of the permit must be in the crane operator's possession at all times. The timing of the lifts shall be coordinated with the various construction disciplines in order to minimize disruption to normal construction activities.

For all other lifts, contractor shall submit rigging plan to tkIS India.

### 3. Conditions and Requirements

Equipment involved in lifting operations shall, as a minimum, comply with the following conditions prior to use:

- All lifting equipment shall have valid test certificate from competent person approved by statutory agency as per BOCW Act & Rules, Factories Act/local regulations.
- A copy of the original certificate must be carried in the cab of the vehicle at all times.
- All such documentation must be clearly traceable to the machine/equipment in question. (e.g. a coding number in a register maintained by the contractor).
- Manufacturers operating manual and load charts to be carried in the cab.
- All safety and override devices shall be operational.
- Competence of Operator shall be certified (declaration by the owner) for the particular type of machine.
- Equipment shall be inspected by a competent person prior to use.

Note: No crane shall be allowed at site without a valid Third Party (Competent Person) certificate.

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#### 4. Crane and Rigging Safety

##### a. Crane setup/Ground stability

One of the critical factors of proper crane set-up is stability of supporting ground. Ground surface shall be adequate to support the static and dynamic loads of a "working crane".

Three basic elements shall be considered and checked prior to lifting:

- Total imposed load (Static and dynamic)
- Supporting surface area
- Ground stability

##### b. Operator Qualifications

The following personnel shall only operate Cranes:

- Designated operators who have a valid license(HGV or as per applicable local statutory requirement) for that type of equipment.
- Crane Inspectors are authorized for crane inspection

##### c. Operating procedures

The operator shall:

- Not engage in any practice that may divert his attention while engaged in crane operations.
- Not operate his crane if physically or mentally unfit, or be taking prescription drugs that may impair judgments.
- Not respond to any signal that is unclear or is given by anyone other than an appointed signal man.

Exception: The operator shall respond to an emergency stop signal given by anyone.

- Perform the first lift to determine lift stability, crane function, and safety in general
- Have final responsibility and control over the crane operations. Whenever there is any doubt as to safety, the operator shall have the authority to stop and refuse to handle loads until safety has been assured.
- Be familiar with the crane and its care, the operators' manual, and load charts.
- The operator shall be responsible for notifying his supervisor of any needed adjustments or repairs and for logging his findings in the crane log.
- Upon request, demonstrate his ability to determine total load weight and its relationship to the crane load charts.
- Conduct and document pre-work daily equipment checks, as required.
  - i. Load Weight
    - No crane shall be loaded beyond its Safe Working Load except during load test.
  - ii. Attaching the Load
    - The load shall be attached to the hook by means of slings or other approved devices.
    - No open hooks shall be used. All hooks shall have hook safety latches or be safety wired.
  - iii. Moving the Load
- The operator shall determine that the crane is level to within one (1) degree and, where necessary, is properly cribbed and blocked.
- The operator is responsible for determining that the load is properly secured and balanced before making the hoist.
- The operator shall position the hook over the load in such a manner as to prevent load swing.

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- The operator shall determine that the rope is properly seated on the drum and in the sheaves; the load line is not kinked and multiple part lines are not twisted around each other.

#### d. Mobile Cranes

##### Crane Set-up

The operator shall be responsible for:

- Proper placement of the crane in relationship to the load to be handled and the landing area, so as to obtain the best rated lift capacity
- Leveling the crane to within 1 degree of level and rechecking the level a minimum of three times during the 8-hour work shift
- Proper placement and use of outriggers.
- The determination of stable or unstable ground or footing. Should additional floats, be needed, they shall be of proper design and sufficient to uniformly distribute the load.
- The installation and maintenance of crane swing radius protection.

##### Load Ratings

- The weight of all auxiliary handling devices such as hoist blocks, headache balls, hoods and rigging shall be considered as part of the total load.
- Additionally, the weight of all items added to the load at the site shall be determined and added to the total load weight.
- Some manufacturers require that the load cable also be considered as part of the total load weight.
- Whenever possible, the operator shall be provided with a copy of the Bill of Load/item with the item weight clearly legible. This shall be used to determine total load weight.

##### Crane Inspection

Cranes shall be inspected:

- After set-up and prior to initial lift
- Before each shift
- After any malfunction
- During and after extreme weather conditions

Daily inspection items to check:

- All control mechanisms
- Fluid levels
- All safety devices for any malfunction
- Deterioration or leakage in air or hydraulic systems
- Crane hooks with deformation or cracks; slings and chokers for broken strands, fraying or linking.
- Electrical apparatus for malfunctioning, signs of excessive wear, dirt and moisture accumulation.
- Other items as required under manufacturer guidance/instructions
- Periodic inspections shall be performed in accordance with the manufacturer's recommendations.

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e. Tower Cranes

- A tower crane shall only be erected or dismantled and tested by competent persons, i.e. an Engineer and erection crew trained in the erection and dismantling of that type of tower crane.
- A tower crane shall only be operated by trained and competent operator who is physically fit, including eyesight and hearing, conversant with the type of crane and able to cope with the conditions existing on site.
- Where the tower crane operator is required to move loads under the control of another person,  
A suitable slinger/signaler/rigger shall be provided who is conversant with the lifting Capabilities of the tower crane and able to communicate clearly with the tower crane operator via hand or radio signals.
- Any method of lifting other than the recommended vertical lifting of loads shall be actively discouraged, as damage may be caused to the crane.
- The tower crane operator shall be capable of carrying out daily/weekly inspection of his crane and shall be given sufficient time in which to do this. A report of such an inspection shall be made in an appropriate document.
- The tower crane will have a maximum service wind speed , usually about 72 kph (45 mph), wind speed shall be substantially reduced according to the area and weight of the load being handled by the crane. The crane operator shall be given sufficient authority to decide when the crane shall be put out of service, because of high winds and his inability to control the load.
- The tower crane shall always be in a position to rotate (slew freely) when it is placed into the out of service condition. The slew brake shall not be left on under normal conditions.
- When the selection of a tower crane is being made against particular environmental considerations, the following are an example of what might have to be taken into account:
  1. Overall area to be covered
  2. The height of the building /structure
  3. The required speed of the lift
  4. Weight of critical loads
  5. The type of base or mounting
  6. Existing ground conditions
  7. All proximity hazards
  - 8 Types of jib
  9. Erection
  10. Dismantling

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- When two or more tower cranes are employed on a site, each should be erected to a different working height to prevent the possibility of collision between the jobs.
- Smaller tower cranes with lighter lifting capacity are usually more suitable on projects where traditional methods of building in brick, concrete etc. employed. In these situations the lorry or crawler mounted tower crane may be the right one for the job.
- The bigger tower cranes, with their greater lifting capacities, are more suitable for projects where constant off-loading and placing of heavy prefabricated units occur. Here, speed may have to be sacrificed in the interest of precision lowering, placing and safety.

#### f. Record Keeping

- All records pertaining to the crane inspections shall be kept on-site at all times whilst the crane is present.  
In addition, each contractor shall keep copies of all such records in his site office.
- If during any safety inspection or at any other reasonable time, the operator or supervisor cannot produce the required crane inspection sheets, the crane should, as soon as possible be shut down and inspected.
- All crane operators shall at all times carry documentary evidence that they are competent to operate the crane that they are using.

### 5. Rigging Requirements

#### a. General

- All rigging equipment shall be inspected prior to each shift and as necessary during the shift to ensure safety.
- All rigging devices including slings shall have permanently marked identification stating size, grade, rated capacity, and manufacturer.
- Rigging equipment not in use shall be removed from the immediate work area and correctly stored.
- Wire rope slings shall be lubricated as necessary during use. Slings shall be lubricated no less than every four (4) months when in storage.
- "Shop-made" grabs hooks, clamps, or other lifting devices shall not be used unless tested and approved by competent person as per Factories Act/local regulations.  
Approved devices shall have the capacity permanently affixed;
- Slings shall not be left lying on the ground or otherwise exposed to dirt;
- Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.
- Protruding ends of strands in splices on slings or bridles shall be covered or blunted.
- Damaged or defective slings should be immediately removed from service.
- Personnel must not pass under suspended loads.
- Always know how to properly use the equipment, slinging procedures before attempting the lift operation using chain slings.
- Inspect the chain slings and accessories before use for any defects.
- Check whether chain slings fit freely. Do not force, hammer or wedge chain slings or fittings into position.
- Keep off hands and fingers from between load and chain when tensioning chain slings and When landing loads.
- Ensure the load is free to be lifted.
- Make a trial lift and trial lower to ensure that the load is balanced, stable and secure.

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- Balance the load to avoid overstress on one sling arm or the load slipping free.
- Pad sharp corners to prevent bending links and to protect the load.
- Position hooks of multi-leg chain slings facing outward from the load.
- Do not leave suspended loads unattended.
- Reduce the load limit when using chain slings in temperatures above 425 degree celcius
- Store chain slings arms on racks in assigned areas and not lying on the ground. The storage area shall be dry, clean and free of any contaminates which may harm the chain sling.
- When using chain slings, avoid impact loading. Do not jerk the load when lifting or lowering chain sling. This increases the actual stress on the sling.
- Do not drag chain slings over floors or attempt to drag a trapped chain sling from under a Load. Do not use a chain sling to drag a load.
- \* Do not use worn-out or damaged chain slings
- \* Do not lift on the point of the hook of a chain sling.
- \* Do not overload or shock a chain sling.
- \* Do not splice a chain sling by inserting a bolt between two links.
- \* Do not shorten a chain with knots or by twisting other than by means of an integral Chain clutch.
- \* Do not force or hammer hooks into place.
- \* Do not use homemade connections. Use only attachments designed for the chain sling.
- \* Do not heat treat or weld chain sling links, the lifting capacity of sling shall be reduced Drastically.
- \* Do not expose chain links to chemicals without the manufacturers approval.

tkIS India reserves the right to remove from service and/or disallow any damaged or defective rigging equipment.

#### b. Safe Operating Practice

- Slings in use shall not be shortened by knots, bolts, or other makeshift devices.
- Wire rope slings shall be padded or softeners shall be used to protect from damage due to sharp corners.
- Slings used in a basket hitch shall have the loads balanced to prevent slippage.
- Loads handled by slings shall be landed on cribbing.  
Slings shall not be pulled from under the load
- Slings subjected to shock loading shall be immediately removed from use and destroyed
- When U-bolt wire rope clips are used, manufacturer instructions shall be used to determine number and spacing of clips. Minimum 3 – U bolts @ 6xdia spacing.

#### c. Inspection and Record Keeping

Thorough inspection of slings in use shall be made on regular basis as determined by:

- Severity of service conditions
- Frequency of sling use
- Nature of lifts being made



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- Experience gained on the service life of slings used in similar use
- Inspection periods shall not exceed once in six months
- A record of all inspections shall be kept at contractors site office and be available for inspection at all times.

d. Criteria for rejection of Hook

The hook shall be removed from service for the following reasons:-

- Sling hooks those have opened more than 15% of the normal throat opening or twisted more than 10 degree off centre
- Stretch exceeds 5% of the original reach
- Exposure to temperatures in excess of 315 C°
- If there are visible crack

e. Criteria for rejection of Wire Rope Slings

Wire rope slings shall be removed from service when:

- Wear or scraping on one-third the original diameter of outside individual wires
- Kinked, crushed, bird caged or any other damage causing deterioration
- End attachments are cracked, deformed, or excessively worn.
- Rope or end attachments are significantly corroded
- 10 random broken wires is one lay
- 4 broken wires is one strand of a rope lay
- 1 broken wire at the fitting
- Severe localized abrasion or scraping
- Evidence of heat damage
- Bent or opened hooks

f. Criteria for rejection of Synthetic Web Slings

Synthetic web slings shall be removed from service when:

- Subjected to acid or caustic burns
- Melting or charring of any part of the sling surface occurs
- Snags, punctures, tears, or cuts are observed
- Stitches are worn or broken
- Fittings are distorted
- Exposed to temperatures in excess of 82 C° (for synthetic web) or 93 C° (for polypropylene web).

g. Criteria for rejection of Chain Slings

Chain slings shall be removed from service when:

- \* Wear exceeds 15% of a link diameter.
- \* When cut, cracked, gouged, burned or corrosion pitted.
- \* When the link twisted or bent.
- \* When the link stretched, Links tend to close up and get longer.
- \* Check master link, load pins and hooks for any of the above faults. Hooks shall be removed

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From service if they have been opened more than 15% of the normal throat opening,  
Measured at the narrowest point, or twisted more than 10 degrees from the plane of the  
Unbent hook.

## 6. General Notes

- Chains shall not be used for lifting
- Only the manufacturer or an equivalent entity shall repair or condition slings
- Night lifting shall be prohibited.
- Lifting in bad weather/high wind condition is prohibited (i.e. Wind speed  $\geq 11\text{m/s}$  or  $(40\text{km/hr})$ , fog, sand storms etc.

## 7. Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN-LP-CHM-099

## 8. Notes

Usage of hydra is not permitted for any works. Contractor shall engage pick and carry cranes such as TRX, K-series, FX series etc. or equivalent. Crane in use shall not be older than 15 years.

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Project: \_\_\_\_\_ Project Number: \_\_\_\_\_

Date: \_\_\_\_\_ Name of Contractor: \_\_\_\_\_

Identification of Equipment: \_\_\_\_\_ Location of Equipment: \_\_\_\_\_

Lockout Box Number if applicable: \_\_\_\_\_ Relevant PTW Numbers: \_\_\_\_\_

Physical Hazards to be locked	Types of Hazards (CHECK ONE)				Lock Numbers used.
Identify equipment i.e isolator, valve etc Locked / Tagged out	<b>Mechanical</b>	<b>Electrical</b>	<b>Hydraulic/ Pneumatic</b>	<b>Chemical</b>	
1.					
2.					
3.					
4.					
5.					
6.					
Person completing Form - (Name & Sign)					

Personnel to be notified in Area regarding lockout \_\_\_\_\_

Signatures of persons who will work on the equipment locked out, (Continue on back).

Sign on	Personal Lock No	Sign Off

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## Attachments and forms:

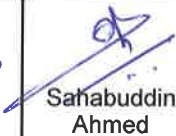



Form: PIN LP-CHM-011 F01- LOCKOUT / TAGOUT FORM

Validity  
Valid from: 12. 2018  
Valid until: 12. 2021

**This procedure replaces HSE-CON-IN-011**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS-India Local IMS Standard	10/12/18	 Sahabuddin Ahmed	21/12/18	 Indranil Chakraborty/ Rajnish Bhandari	24/12/18	 Nitin Pandit	31/12/18	 A. K. Ladia
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
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### 1. Scope

This HSE Procedure is applicable to ensure that adequate control measures and safeguards are identified implemented prior to any construction, commissioning, operational, maintenance or repair work is allowed to begin at site. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

This HSE Procedure is aimed at providing detailed guidelines and defining requirements for safe system of work with regards to Lockout Tag out procedure. This instruction is also aimed at providing detailed information, instruction and guidance on the methods to be used and the standards required for all lockout/Tag out (LOTO) activities on site.

The Procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements.

However, the most stringent requirement shall be implemented.

### 3. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM) (tkIS India & Contractor)	<p>(i). Ensures that all required personnel receive lockout and tagout procedure training.</p> <p>(ii). Determines which unit personnel require the use of lockout and tagout equipment and ensures that these personnel are issued the appropriate lockout and tagout equipment. Ensure that Lockout Boxes are provided in a secure area for isolation of complex plant.</p> <p>(iii). Ensures that all outside contractors performing work at the facility adhere to the lockout and tagout procedure.</p> <p>(iv). Initiates disciplinary action when authorized personnel fail to comply with the lockout and tagout procedure.</p>
tkIS India SSI & SSV	<p>Responsible to implement this procedure and to ensure:</p> <p>(i) Ensures that all authorized personnel adhere to the lockout and tagout procedure.</p> <p>(ii) Makes sure that all outside contractors performing work at the facility adhere to the lockout and tagout procedure.</p> <p>(iii) Assist the Site HSE Department in conducting the lockout and tagout training.</p> <p>(iv) Initiates disciplinary action when authorized personnel fail to comply with the lockout and tagout procedure.</p>

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tkIS India Site HSE Personnel	<p>(i) Conducts lockout and tagout procedure training.</p> <p>(ii) Ensures the lockout and tagout procedure remains current with applicable regulations.</p> <p>(iii) Conducts random inspections to ensure authorized personnel are adhering to the lockout and tagout procedure</p>
Contractor Engineers/ Supervisors/HSE Personnel	<p>(i). Carry out HIRA for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities.</p> <p>(ii). The Site Authorized Person will inform the contract personnel, prior to work startup, of this lockout and tagout procedure.</p> <p>(iii). Whenever contract personnel are engaged in activities covered by the applications of lockout and tagout, the procedure is to be utilized by them.</p>
Personnel (Authorized Personnel)	<p>(i). It is the responsibility of an authorized person to fully adhere to the requirements set forth in the lockout and tagout procedure when installing, servicing, and maintaining machinery and equipment.</p> <p>(ii). Such personnel is also responsible for maintaining the "lockout" equipment issued to them.</p>

#### 4. Definitions

- 4.1 Affected Personnel - Personnel whose job requires that they operate or use a machine or piece of equipment on which servicing or maintenance is being performed under lockout/tagout, or whose job requires them to work in an area in which such servicing or maintenance is being performed.
- 4.2 Authorized Personnel - A qualified person to whom authority and responsibility to perform a specific lockout and/or tagout assignment has been given.
- 4.3 Other - Personnel that need to know a machine/piece of equipment is locked out.
- 4.4 Energised - Connection of an energy source (mechanical, electrical, hydraulic, etc.) which has not been isolated.
- 4.5 Energy Isolating Device - A device that physically prevents the transmission or release of energy. This includes manually operated electrical circuit breakers, a disconnect switch, a manually operated switch, a slide gate, a line valve, and buttons, selector switches and other control circuit-type devices.
- 4.6 Energy Source - Any electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy source that is capable of causing injury to personnel.
- 4.7 Lockout Device - A device that utilizes a lock and key to hold an energy isolating device in a safe position.

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- 4.8 Lockout / Tagout - The placement of a lock and a tag on the energy isolating device in accordance with an established procedure indicating that the energy isolating device or the equipment being controlled shall not be operated until removal of the lock and/or tag.
- 4.9 Double Block & Bleed – This isolation consists of a blocked valve on the energy source side of the piping, a bleed valve opened in between, and another blocked valve on the equipment side of the piping.
- 4.10 Servicing and Maintenance - Functions that include workplace activities such as installing, constructing, adjusting, setting up, inspecting, maintaining, or repairing machines and equipment.
- 4.11 Lockout/Tagout Form: This form or format shall be used to identify, communicate, and verify all energy sources to be locked out for the specific work to be performed including the following: Lockout/Tagout of isolation points, means to release stored energy, and means to verify that Energy Sources have been adequately isolated.
- 4.12 Hasp: A clasp secured with a lock.

## 5. Procedure

### 5.1 Applications Requiring Lockout / Tagout

This procedure applies to any operation in which there may be an unexpected energizing, startup or release of stored energy. For example, applications would include, but not be limited to, the servicing and maintenance of motors; pumps; air compressors; lighting; cranes; elevators; compactors; refrigeration and air conditioning equipment; boilers, piping, and valves; welders; fans; switch gears; transformers; etc.

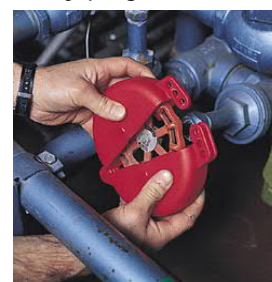
### 5.2 Applications Not Requiring Lockout / Tagout

Lockout / Tagout Procedures do not apply to the following:

Work on electrical equipment for which exposure to the hazards can be controlled by plug removal from the receptacle.

### 5.3 Required Lockout and Tagout Equipment

- Lockout hasp
- Padlock, individually keyed
- Plastic Lockout Tag
- Complex isolations shall utilize a lockout box where lockout keys are held and on which the persons carrying out the work can place their personal locks.



### 5.4 Training

- All new, existing and transferred personnel authorized to utilise the lockout and tagout procedure shall receive training.

The lockout/tag-out training must be given to affected employees as part of orientation.

- Periodic retraining shall be conducted whenever there is a change in procedure, or whenever it is believed deviations from the procedure are occurring.
- Records of all training shall be retained.

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d. The training program includes:

- i. Recognition of applicable hazardous energy sources.
- ii. Recognition of methods to isolate/control these energy sources.
- iii. Instruction in the purpose and use of a lockout and tagout procedure.

#### 5.5 Periodic Inspection

- (a) The site commissioning team with site HSE Rep. shall conduct periodic audit to ensure that lockout and tagout procedures are being followed.
- (b) Any discrepancies noted are to receive prompt corrective action.
- (c) The tkIS India site HSE Department shall maintain a record of this audit.

#### 5.6 Isolation / Energisation

##### 5.6.1 Electrical isolation and Energisation permit:

Before issuing any electricity related work permit, it is essential that the equipment / facility to be worked on is electrically safe and electrical power is isolated to the extent necessary for the safe conduct of the authorized work.

Permit for electrical isolation and energisation shall be in triplicate. (PIN LP-CHM-011 F01)

Section-A shall be used for electrical isolation and Section-B for energisation.

Electrical department / section authorized person, on isolation / energisation of the equipment / circuit shall return the original to the issuer keeping copy for record. Specific format for the Electrical isolation / energisation shall be used.

##### 5.6.2 Equipment electrically isolated and tagged:

Before issuing a permit, it shall be ensured that electrical isolation has been done (by Electrical Isolation / Energization Permit), switches are locked-out and cautionary tags duly signed with date and time are attached (refer 5.7 a for LoTo system details)

#### 5.7 Lockout and Tagout System

The following procedures apply to 600 volt (or lower) nominally rated systems. For systems above 600 volts, the person carrying out the work shall submit full procedures, method statements and risk assessment for working with these systems prior to starting work. The following steps shall be followed when using this procedure:

- (a) Before proceeding with any equipment shutdown, a survey shall be made to locate and identify all energy isolating devices, feeding the equipment (i.e., electrical circuit breakers, shut-off valves, electrical disconnect switches, etc.) marked in Line diagram.
- (b) Once the survey is complete, the authorized personnel shall notify all affected personnel that a shutdown of the equipment or machine shall occur.
- (c) Following notification, the equipment or machine, if operating, shall be shut down by normal stopping procedures.



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- (d) Once turned off, the energy isolating device (i.e., circuit breaker, disconnect switch, valve, etc.) shall be operated in such a manner that the machine or equipment shall be isolated from the energy source (electrical, mechanical, hydraulic, pneumatic, chemical, thermal, etc.).
- (e) The energy-isolating device shall be then "locked out" by applying the lockout, padlock and tag to the device. In some cases, a chain shall be used (in combination with a padlock) to sufficiently "lockout" a device (i.e., steam valve, hydraulic valve, etc.).
- (f) The tag shall be legibly filled out by the authorized personnel indicating his name and the date and time of the lockout.
- (g) Once the energy isolating device has been locked out and tagged, all potentially hazardous sources or residual energy shall be purged or dissipated (i.e., grounding, bleeding, venting, lowering, etc.).
- (h) After ensuring that no personnel are exposed, the authorized personnel shall operate the normal operating controls to make certain the equipment shall not restart. The operating controls MUST be returned to the "off" or "neutral" position after the test (LOTO – tryout)
- (i) Use a volt meter or test device to make sure that work is not energized.
- (j) Attach earthing of sufficient size to handle any possible fault current to all three phases of the source.
- (k) All points of lockout/tagout shall be noted on the lockout/tagout form including drains or vents opened, equipment blocked or other methods of dissipating potential energy and accumulators or receivers drained.
- (l) The lockout/tagout form will be signed on by the person doing the work after having placed his personal lock on the main isolating device or lockout box if used.
- (m) Maintenance or servicing of the machine or equipment can now be performed.
- (n) When the maintenance and/or service is completed, the work area shall be inspected to ensure that all affected personnel are safely positioned and/or removed. In addition, all nonessential items and waste from the equipment. Shall be removed.
- (o) The Lockout/Tagout form can then be signed off and the workers personal lock removed. The lockout, padlocks, and tags shall then be removed from the energy isolating device by the authorized personnel who applied the lockout devices.
- (p) When the authorized personnel who applied the lockout/tagout devices is not available to remove it, that device may be removed provided:
  - (i) Verification by the highest ranking RCM/CoM/Site Dept Head that the authorized personnel who applied the device is not in the facility.
  - (ii) Making all reasonable efforts to contact the authorized personnel to inform them that their lockout device has been removed.
  - (iii) Ensuring that the authorized personnel has this knowledge before he/she resumes work at the facility.
- (q) In the event that the isolation is complex and that there are a number of energy sources, one of the following processes will be used:

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- (i) Each and every person involved with the service or maintenance of the locked out equipment shall place their padlock to each and every lockout device and/or chain in such manner that if every other padlock were removed, the personnel would still have a padlock assuring that each and every source of energy is still "locked out". No personnel may affix the personal lockout/tagout device of another personnel.
- (ii) All isolation lockout keys and fuses are held in a lockout box where the personal lock of each person working on the equipment can be fitted. The identity of the lockout box will be noted on the Lockout/Tagout form.

## 5.8 Special Provisions

### 5.8.1 Shift and/or Personnel Change :-

If work on a piece of equipment or machinery that is locked out carries over to the next shift, the authorized personnel may remove their lockout device, provided that the next authorized personnel applies their lockout device at the same time the previous authorized personnel removes their lock device.

### 5.8.2 Testing of machinery, equipment and/or trouble shooting.

When machinery and/or equipment must be tested before service work is completed (i.e., checking motor rotation, checking belt alignment, electrical calibration) the following procedure shall be followed:

Clear the machine and/or equipment of nonessential items.

Safely clear personnel from the machine area.

Remove lockout devices from energy isolating equipment.

- Ensure appropriate PPE is utilized. (i.e., insulating gloves, mats, sleeves, safety glasses, etc.)
- Energize and proceed with the test.
- De-energize all systems and reapply lockout devices to the energy isolating devices to proceed with maintenance if required. In the event that the test confirms that the equipment is safe to use, then the lockout/tagout form can be cancelled and signed off.

## 5.9 Requirement of Working on Energized Equipment & machines

- No work is to be performed on any equipment or machinery, which is knowingly "hot", "live", "energized", "pressurized", etc. All attempts shall be made to schedule the shutdown of equipment or machinery to safely perform the necessary work.
- If the equipment or machinery cannot be shut down for the required period of time, all work shall be postponed until a proper action plan, method statement and risk assessment is developed and approved. Final approval of this documentation shall be made by a competent Engineer and the Site HSE Rep. This documentation shall be communicated to all individuals who shall be effected by the shutdown including operators of the equipment, maintenance personal, supervisors, and contract employees.

## 6. Records

Necessary records as required by this Instruction shall be maintained.

For further details, please refer Instruction PIN LP-CHM-099.

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## Attachments and forms:

APPENDIX – I: - Personal Protective Equipment (PPE) IS codes -

APPENDIX – II: - PPE – International Standards -

Validity

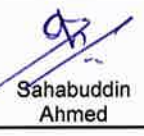
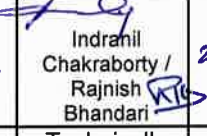
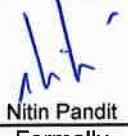
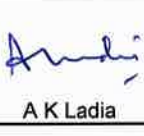
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Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

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tKIS-India Local QM Standard	10/12/18	 Sahabuddin Ahmed	21/12/18	 Indranil Chakraborty / Rajnish Bhandari	21/12/18	 Nitin Pandit	31/12/18	 A K Ladia
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## Attachments and forms:

APPENDIX – I: - Personal Protective Equipment (PPE) IS codes - Page No.11

APPENDIX – II: - PPE – International Standards – Page No. 14

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## 1 Scope

This HSE procedure is applicable for Personal Protective Equipment (PPE) during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

## 2 Aim

This HSE procedure is aimed at providing guidelines and defining requirements for safe system of work with regards to personal protective equipment (PPE). The HSE procedure is also aimed at ensuring that all people on site are provided with Personnel Protective Equipment (PPE) that meets the requirements of the relevant national Standards.

The procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements for Personal Protective Equipment (PPE).

However, the most stringent requirement shall be implemented.

## 3 Terminology, Definitions, Abbreviations

PPE: Personal Protective Equipment

BS: British Standard

BS EN: British and European Standards

ISO: International Standards Organisation

ANSI: American National Standards Institute

NIOSH: The National Institute for Occupational Health & Safety

IS: Indian Standard

BIS: Bureau of Indian Standard

CE – Marking: Mandatory conformity marking for products sold in the European Economic Area (EEA). The CE marking is the manufacturer's declaration that the product meets the (safety) requirements of the applicable regulations and directives of European Union.

dB (A) – A - Weighted decibels.

EN – European Standard

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#### 4 Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM) (tkIS India & Contractor)	<p>(i) Responsible to ensure effective implementation of this procedure on site.</p> <p>(ii) Ensure that the PPE for tkIS India employees and visitors are purchased &amp; available at site.</p> <p>(iii) Agree with the Site HSE Rep and others as necessary disciplinary measures in the events requirements are violated.</p>
tkIS India SSI & SSV	<p>Responsible to implement this procedure and to ensure:</p> <p>that relevant personnel are trained in this procedure, and other relevant statutory training requirements.</p> <p>that basic personal protective equipment are used at the site by all</p> <p>that additional personal protective equipment are used, depending upon the hazard involved with the task.</p>
tkIS India Site HSE Personnel	<p>Responsible to assist RCM in effective implementation of this procedure on site.</p> <p>Co-ordinate implementation of this procedure with Contractors.</p> <p>Ensure that all employees are trained in proper selection and use of PPE.</p> <p>Ensure that additional personal protective equipment are used, depending upon the hazards involved with the task.</p>
Contractor Engineers/ Supervisors/HSE Personnel	<p>Ensure that basic personal protective equipment are provided to and used by all at the site.</p> <p>Ensure that additional personal protective equipment are provided and used, depending upon the hazard involved with the task.</p> <p>Ensure that personal protective equipment conforms to the relevant standards and are properly maintained.</p>
All Employees	<p>Wear the appropriate PPE as assigned to the task and /or the work area</p> <p>Care for and maintain PPE and clothing so that it is in good condition and available for use.</p>

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## 5 Procedure

### 5.1 PPE Policy

**5.1.1** PPE shall be used as a protective measure only as a last resort. Initially all attempts shall be taken to employ more effective collective prevention measures. Where it is not possible to reduce the risk sufficiently using these measures then PPE may be used. Appropriate measures should be implanted as soon as possible, following the hierarchy of controls:

- Elimination – removing the hazard from the workplace, task, process, method or material.
- Substitution – replace the activity, process, material or substance with a less hazardous one.
- Engineering (separation or redesign) – isolate the hazard by using technical measures or
- Other engineering control methods or by using mechanical aids, barriers, machine guarding,
- ventilation, insulation, space or time.
- Administration – establish policies, procedures, work practices and training programs to
- reduce exposure to risk.
- PPE – provide, suitable and properly maintained to protect persons from hazards.

PPE shall be used when identified risks (risks assessment) cannot be avoided or sufficiently through technical measures, methods or procedures of work organization.

**5.1.2** All personal protective equipment (PPE) shall be provided to the employees free of charge.

There must be a system in place to control the (central) storage and issuance of PPE. This system must guarantee that employees always have the correct PPE at their disposal before starting their job. **Therefore, it must be based upon periodical issuing of PPE but rather on the replacement of worn-out PPE.** PPE users shall report regarding expired or defective PPE immediately. If expired or defective, PPE must not be used and immediately replaced. It is only allowed to purchase PPE which are approved and list din the applicable PPE matrix.

**Proper PPE storage facilities must be provided.**

**5.1.3** The minimum requirements for PPE on the site are as follows:

The uses of safety helmets are mandatory at all times except in offices or welfare facilities. Failure to wear a safety helmet shall result in disciplinary action, and may lead to exclusion from the site.

Safety footwear in good condition is worn on Site at all times

The employees have to examine the proper condition of the PPE visually before each use.

The fitness for purpose of PPE must be checked regularly according to the manufacturer's instructions and legal requirements.

PPE shall be protected from oil, grease, varnishes etc.,

**5.1.4** The practice of wearing logos of a company other than the current employer, whether on site dress or helmets, is prohibited as this increases the potential for confusion.

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**5.1.5** General training and information shall be provided to all site employees at the time of initial assignment as part of the site induction training:

- Areas where to use helmets, safety glasses, etc.
- Minimum standards for footwear
- Minimum standards for general clothing
- Conditions requiring further PPE and how to obtain PPE
- When conditions call for PPE beyond the standard site apparel, each affected employee shall be given additional training regarding the specifics of the necessary PPE.
- Whenever notices are displayed stating that such PPE shall be worn, such notices shall be in English and any other languages appropriate to the workforce. Visual signs shall be displayed in accordance with the EHS procedures.
- Working with any machinery or equipment where a significant hazard exists.

**5.1.6** The risks posed in any particular work activity shall be assessed, and adequate PPE shall be selected in accordance with the following considerations:

- It gives protection against risk without itself leading to any increased risk
- Its suitability for the user
- Its compatibility with the work activity
- Compliance with a recognised national or international standard of design or construction (i.e. IS/BS/BS-EN/ANSI/NIOSH/ISO etc.)

**5.1.7** All employees shall be provided with the necessary PPE complying with this procedure for their particular work activity.

**5.1.8** All employees shall be held responsible for the proper care and use of any PPE supplied to them. Site HSE Rep and subcontractors shall replace free of charge to the employee, any PPE which becomes deficient and defective in any way through normal work usage or wear and tear such that at all times the worker has adequate protection. Normal wear and tear shall include the period of effective use specified by the manufacturer and requirements of basic hygiene standards.

**5.1.9** All employees shall wear the appropriate PPE supplied to them at all times while working at their assigned tasks. Supervisors shall apply disciplinary action to any employee who fails to comply.

**5.1.10** Visitor's PPE requirements shall be identified based on a risk assessment. This assessment shall take into consideration the areas of the site that the visitor(s) will be exposed to.

**5.1.11** PPE shall be stored in sufficient quantity and maintained in order to ensure it is in good condition when supplied to the personnel or visitors.

**5.1.12** PPE shall be inspected and changed-out following the supplier's recommendations, or in case of any anomaly or deterioration.

**5.1.13** PPE shall not be older than 3 years from the manufacturing date.



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Welders when actually welding and cutting, where the necessary eye shield or heat protective cap prevents its use, are not required to wear a helmet.

## 5.2 Selection of PPE

PPE shall be selected based on the results of risk assessment and used to provide protection for all personnel on the project against:

- Inhalation and respiratory tract hazards
- Skin contact hazards
- Mechanical injury and hazards
- Construction safety hazards
- Physical agent hazards
- Environmental hazards
- Radiological hazards

### 5.2.1 Head Protection

**5.2.1.1** Safety helmet shall be used which are manufactured in accordance with ISO 3873, BS EN 397 or ANSI Z 89.1 equivalent or IS 2925.

### 5.2.2 Eye and face Protection

**5.2.2.1** Suitable protective goggles, face shields or screens shall be worn by personnel involved in, assisting with or adjacent to any activity where there may be a danger of flying particles, dust, sparks or other particles; corrosive fluids or mists; excessive heat, light or other harmful radiation. Such work conditions include, but are not limited to:

- Working with rotating equipment such as grinders, drills, etc.
- Cutting and welding
- Working with hazardous materials, grit or abrasive blasting operations.
- Working with chemicals (paints, disinfectant or other toxic or hazardous fluids, etc.)
- Working with strong sources of electromagnetic radiation, welding, machines etc.
- Working in the open with winds blowing sand.

**5.2.2.2** Eye and face protection shall be manufactured in accordance with established national or international standards.

**5.2.2.3** The necessity for wearing eye protection for any specific work activity shall be indicated at the work site by prominent signs in English and any other languages appropriate to the workforce. Visual representation of the type of protection needed shall also be displayed (pictorial drawing of goggles or face mask)

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**5.2.2.4** In general, eye and face protection, which are worn frequently, shall be personal and not shared. Exceptions to this would be in case of fixed grinding, drilling or other rotating machines used by multiple users in a workshop. In such cases, it is recommended leaving suitable eye protection adjacent to the machine, in addition to any eye protection issued individually to the workers in the workshop.

### **5.2.3 Respiratory Protection**

**5.2.3.1** Protective equipment shall be available to all persons who are exposed to any situation in which there is a possibility of the atmosphere being or becoming deficient in oxygen or containing any harmful substance, whether particle, dust, mist, vapor or gas, including:

- Work in containers or vessels where a danger of oxygen deficiency or harmful gases may be present
- Grit or abrasive blasting operations
- Work with materials creating dusts and vapours.

**5.2.3.2** Respiratory protection shall be used which are manufactured in accordance with established national or international standards such as:

- BS EN 143, 149 Respiratory protective devices
- NIOSH approved disposable particulate respirators (e.g. N95)

### **5.2.4 Hearing Protection**

**5.2.4.1** Hearing protection shall be made available to all employees exposed to noise levels of 90dB (A) 8 hours or above in India and 85dB (A), 8 hours as per OSHA. The general form of hearing protection shall be earplugs and earmuffs.

**5.2.4.2** Protective devices shall be conformance with its National Standard or International Standard e.g. BS EN 352 industrial Hearing Protectors or equivalent.

**5.2.4.3** In all work environments where the noise level is at or above 85dB (A), prominent signs in English and any other languages appropriate to the workforce shall be displayed indicating the need for ear protection. A visual sign in the form of a pictorial drawing of earplugs shall also be displayed.

### **5.2.5 Hand Protection**

**5.2.5.1** Adequate hand protection shall be available for all manual labour. The type of protection worn shall be selected according to the hazard to be protected against. These hazards include but are not limited to:

- Impacts, cuts, abrasions and infections
- Extreme temperatures
- Chemical, toxic, corrosive and other hazardous substances.
- Works on live equipment's

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**5.2.5.2** Hand protection shall conform, where applicable, to a recognized national or international standard.

**5.2.5.3** Hand protective devices shall be regularly inspected and replaced when physically damaged, or contaminated by substances (such as greases, paints, cooling fluids or chemicals), which might impair their effectiveness or safety.

## **5.2.6 Body Protection**

**5.2.6.1** Specific and adequate body protection shall be supplied for all work activities that present these hazards, including but not limited to:

- Working in extremes of temperature, such as fire fighting, etc.
- Welding, burning, cutting and grinding
- Handling or mixing of acids and other toxic, corrosive or hazardous chemicals.
- Clean-up and disposal of hazardous waste (chemicals, hydrocarbons, etc.)

**5.2.6.2** tkIS India Site HSE Rep and Subcontractor HSE Rep, shall review the various situations where employees are required to work outdoors and take all reasonable practicable measures to reduce exposure to the harmful effects of the sun.

**5.2.6.3** Body protective devices shall be manufactured to recognized national or international standards.

## **5.2.7 Safety Harnesses and Lifelines**

**5.2.7.1** Safety harnesses and lifelines shall be provided, worn and properly secured in all work situations where any risk for falling from height greater than 1.8 meters

**5.2.7.2** Full body harness shall include as a minimum double lanyard with shock absorber. Lanyards shall not be longer than 1.5 meters.

**5.2.7.3** Lifelines shall be made of steel (min 12mm diameter)

**5.2.7.4** Vertical Lifelines and Lanyards which tie-off one employee shall have a minimum strength of 2268kg (equivalent to 5000 pounds and 22.2 kN).

**5.2.7.5** Safety belts shall not be used.

## **5.2.8 Foot Protection**

**5.2.8.1** Hard soled shoes with toe protection shall be worn at all times. General-purpose rubber or plastic footwear is not allowed.

**5.2.8.2** Where personnel are required to work in areas where they may come into contact with acid and alkalis, specific approved footwear shall be worn.

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- Foot protection shall conform, where applicable, to a recognised national and international standard

### 5.2.9 Other Personal Protective Equipment

- High-visibility jacket shall be used by all at site.

### 5.3 Training

All PPE training shall include:

- When and where the PPE is required,
- Proper selection of PPE,
- Proper use of PPE,
- Limitations of the PPE provided,
- Proper care, maintenance, storage and disposal of the PPE

### 5.4 General PPE

As a general requirement, safety helmet and safety shoes shall be worn in all construction and commissioning areas.

It is strictly forbidden to enter the site in short trousers.

The minimum basic PPE Includes:

- Safety helmet
- Safety shoes
- \* Safety Glasses
- \* Reflective jacket

Depending on the kind of site work, the basic equipment may be expanded with special safety devices like full face gas masks, harnesses, hearing protection.

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### Recommended Matrix for PPE Usage

PPE / Category of Personnel	Helmet	Safety Shoe *	Apron	Hand Gloves	Welding Gloves	Welding Screen	Eye Protection Goggles	Reflective jacket	Safety Belt / Full body Harness	Nose Mask	Ear Plug / Ear Muff
Engineer & Above	M	M	R	R	NA	NA	M	M	AA	AA	AA
Supervisors	M	M	R	R	NA	AA	M	M	AA	AA	AA
Surveyor	M	M	R	NA	NA	NA	M	M	NA	AA	AA
Welder	M	M	M	NA	M	M	M	M	AA	AA	AA
Grinder	M	M	M	M	NA	NA	M	M	AA	AA	M
Gas Cutter	M	M	M	M	NA	NA	M	M	AA	AA	AA
Helpers	M	M	R	M	NA	NA	M	M	AA	AA	AA
Masons	M	M	R	AA	NA	NA	M	M	AA	AA	AA
Riggers	M	M	R	M	NA	NA	M	M	AA	AA	AA
Plant Operators	M	M	R	AA	NA	NA	M	M	NA	AA	R
Construction Equipment Driver	M	M	R	NA	NA	NA	M	M	AA	AA	AA
Painter	M	M	R	M	NA	NA	M	M	AA	M	AA
Shot blaster	M	M	R	M	NA	NA	M	M	NA	M	M

#### Legend:

M - Mandatory

R - Recommended

AA - As Applicable

NA - Not Applicable

\* - In case of working in mud/water logged area, Steel toe Gum Boot shall be used.

## 6 Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN LP-CHM-099.

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<b>thyssenkrupp Industrial Solutions (India)</b>	<b>Local Procedure  Personal Protective Equipment</b>	QM code <b>PIN-LP-CHM-012-A01</b>
		<b>Page 1 of 3</b>

**APPENDIX - I****Personal Protective Equipment (PPE) IS codes****Body**

IS 3521 : 1999	Industrial safety belts and harnesses – Specification
IS 4501 : 1981	Specification for aprons, rubberized, acid and alkali resistant
IS 6153 : 1971	Specification for protective leather clothing
IS 7352 : 1974	Specification for X-ray lead rubber protective aprons
IS 8519 : 1977	Guide for selection of industrial safety equipment for body protection
IS 8990 : 1978	Code of practice for maintenance and care of industrial safety clothing

**Ears**

IS 6229 : 1980	Method for measurement of real ear protection of hearing protectors and physical attenuation of ear muffs
IS 8520 : 1977	Guide for selection of industrial safety equipment for eye, face and ear protection
IS 9167 : 1979	Specification for ear protectors

**Eye and Face**

IS 1179 : 1967	Equipment for eye and face protection during welding
IS 5983 : 1980	Eye protectors
IS 7524 : 1980 Part 1	Method of test for eye protectors:- Non - optical tests
IS 8521 : 1977 Part 1	Industrial safety face shields – with plastic visor
IS 8521 : 1994 Part 2	Industrial safety face shields – with wire mesh visor
IS 8940 : 1978	Code of practice for maintenance and care of industrial safety equipment for eyes and face protection
IS 9973 : 1981	Specification for visor for scooter helmets
IS 9995 : 1981	Specification for visor for non-metal police and firemen's helmets
IS 14352 : 1996	Miners safety goggles – Specification

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	<b>Personal Protective Equipment</b>	<b>Page 2 of 3</b>

## Feet and Legs

IS 1989 : 1986 Part 1	Specification for leather safety boots and shoes – for miners
IS 1989 : 1986 Part 2	Specification for leather safety boots and shoes – for heavy metal industries
IS 3737 : 1966	Leather safety boots for workers in heavy metal industries
IS 3738 : 1998	Rubber boots – Specification
IS 3976 : 2003	Protective rubber canvas boots for miners – Specification
IS 4128 : 1980	Specification for fireman's leather boots
IS 5557 : 1999	Safety Rubber boots – Specification
IS 5852 : 1996	Protective steel toe caps for footwear – Specification
IS 6519 : 1971	Code of practice for selection, care and repair of safety foot wear
IS 7329 : 1974	Metal last for safety rubber canvas ankle boots
IS 10348 : 1982	Safety footwear for steel plant
IS 10665 : 1982	Safety rubber ankle boots for miners
IS 10667 : 1983	Guide for selection for industrial safety equipment for protection of foot and leg
IS 11225 1985	Leather safety shoes for women workers in mines and steel plants
IS 11226 : 1993	Leather safety foot wear having direct moulded rubber sole – Specification
IS 11264 1985	Code of practice for manufacture of safety rubber footwear for miners
IS 13295 : 1992	Code of practice for manufacture of leather safety boots and shoes for workers in mines and heavy metal industry
IS 14544 : 1998	Leather safety footwear with direct moulded PVC soles – Specification
IS 15298 : 2002 Part 2	Safety, protective and occupational footwear for professional use – Specification for safety footwear

## Hands

IS 2573 : 1986	Specification for leather gauntlets and mittens
IS 4770 : 1991	Rubber Gloves – electrical purposes – specification
IS 6994 : 1973 Part 1	Specification for safety gloves – leather and cotton gloves
IS 8807 : 1978	Guide for selection of industrial safety equipment for protection of arms and hands

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**Head**

IS 2745 : 1983	Specification for non-metal helmet for firemen and civil defence personnel
IS 2925 : 1984	Specification for industrial safety helmets
IS 4151 : 1993	Specification for protective helmets for scooter and motor cycle riders

**Respiratory**

IS 8318 : 1977	Colour identification markings for air purifying canisters and cartridges
IS 8347 : 1977	Glossary of terms relating to respiratory protective devices
IS 8522 : 1977	Respirators, chemical cartridge
IS 8523 : 1977	Respirators, canister type (gas masks)
IS 9473 : 2002	Respiratory protective devices – Filtering half masks to protect against particles – specification
IS 9563 : 1980	Carbon monoxide filter self rescuers
IS 9623 : 1980	Recommendations for the selection, use and maintenance of respiratory protective devices
IS 10245:Part 1 to 46	Breathing apparatus
IS 15322 : 2003	Particle filters used in respiratory protective equipment – Specification
IS 15323 : 2003	Gas filters and combined filters used in respiratory protective equipment – Specification

**Other**

IS 5424 : 1969	Specification for rubber mats for electrical purpose
IS 6685 : 1972	Specification for life jackets
IS 10592 : 1982	Specification for industrial emergency showers, eye and face fountains and combination units
IS 11057 : 1984	Specification for industrial safety nets
IS 12078 : 1987	Recommendations for personal protection of workers engaged in handling asbestos



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**APPENDIX - II****PPE – International Standards****Ears**

BS EN 352	Industrial hearing protectors or equivalent
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**Eye and Face**

ISO 4849	Personal eye-protectors-Specifications
BS EN 166	Personal eye protection
BS EN 175	Personal protection. Equipment for eye and face protection during welding and allied processes
ISO 4850	Personal eye-protectors for welding and related techniques – filters-utilization and transmittance requirements
ANSI Z87.1	Eye and face protection

**Feet and Legs**

BS EN 346	Specification for Protective footwear for professional use
ANSI Z 41	Personal Protection – Protective Footwear

**Hands**

BS 1651	Specification for Industrial gloves
BS 697	Specification for rubber gloves for electrical work
BS EN 374	Protective gloves against chemicals
BS EN 407	Protective gloves against thermal hazards

**Head**

ISO 3873	Safety Helmet
BS EN 397	Safety Helmet
ANSI Z 89.1	Safety Helmet

**Respiratory**

BS EN 143, 149	Respiratory protective devices
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**Other**

BS EN 471	High visibility warning clothes
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thyssenkrupp Industrial Solutions (India)	<u>RADIOGRAPHY PERMIT/REQUEST</u>	QM code PIN LP-CHM-013 F01
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Project: \_\_\_\_\_ Project number: \_\_\_\_\_ Date & Time: \_\_\_\_\_

Start time: \_\_\_\_\_ Time valid to: \_\_\_\_\_ Serial No. \_\_\_\_\_  
Date: \_\_\_\_\_

#### SECTION 1: To be completed by the contractor requesting the radiography

Contractor requesting permit: \_\_\_\_\_ NDE Contractor: \_\_\_\_\_  
 Date requested: \_\_\_\_\_ Date required: \_\_\_\_\_  
 Proposed start time: \_\_\_\_\_ Proposed finish time: \_\_\_\_\_  
 Location of radiography: \_\_\_\_\_ Equipment/line number: \_\_\_\_\_  
 Print Name: \_\_\_\_\_ Signature: \_\_\_\_\_

A PLOT PLAN IDENTIFYING THE PROPOSED WORK LOCATION MUST BE ATTACHED TO THE PERMIT

#### SECTION 2: To be completed by the NDE contractor's level II radiographer

Names of technician(s)	NDE level	Badge No	Dosimeter (0-200 mr/h) Start
------------------------	-----------	----------	---------------------------------

Name of level II radiographer: \_\_\_\_\_ Signature: \_\_\_\_\_

#### SECTION 3: To be completed by level II radiographer & verified by Receiver prior to start

Documentation Checklist	Yes	No	Comments
Level II Certificate			
Decay Chart			
Radiation Safety Manual			
Emergency Telephone Numbers:			

#### SECTION 4: To be completed by level II radiographer & verified by receiver prior to start

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Equipment Checklist	Yes	No	Comments
---------------------	-----	----	----------

Survey Meter

Collimator

Radiation Warning signs

Audible warning devices

Warning tape/rope

Tongs

Extra shielding

Camera manufacturer:

Serial No:

Type of Isotope:

Curies:

Total Exposure Time

Finish Time:

#### SECTION 5: To be completed by level II radiographer & verified by receiver prior to start

Fire equipment available,

Work location barricaded for safe limit of 0.75MR

All concerned personnel shall be provided with film, badges &amp; dosimeter

Stand-by personnel in place to prevent others approach

#### Special Safety Instructions

The perimeter of the 'radiation area' shall be roped off and have 'warning signs' placed at 20 meter intervals along the perimeter and at each entrance into the area. The 'radiation area' must be clear of all non classified personnel prior to each exposure and must be under visual surveillance during each exposure.

Prior to use all equipment are to be inspected and after each exposure both the camera and guide tube are to be surveyed ensuring the source is in the shielded position. The radioactive source shall not be left unattended.

Radiography will not commence until all safety requirements have been confirmed.
--

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RECEIVER	ISSUER
Signature : _____ Date _____	Signature : _____ Date _____
Name: _____	Name: _____
Designation: _____ Tel. No.: _____	Designation: _____ Tel. No.: _____

## SECTION 6:

## COMPLETION

RECEIVER	ISSUER
Signature : _____ Date _____	Signature : _____ Date _____
Name: _____	Name: _____
Designation: _____ Tel. No.: _____	Designation: _____ Tel. No.: _____

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**Attachments and forms:**

Form: PIN LP-CHM-013 F01


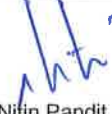
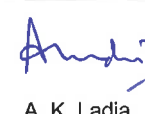
Validity  
Valid from: 12. 2018  
Valid until: 12. 2021

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**This procedure replaces HSE-CON-IN-013**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS-India Local IMS Standard	10/12/18		21/12/18	Indranil Chakraborty/ Rajnish Bhandari	21/12/18		31/12/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				Page 329 of 673				

PIN-LP-QMC-03 F01 E 2018-03

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### 1. Scope

This procedure is applicable for Radiography during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

This HSE procedure is aimed at providing guidelines and defining requirements for safe system of work for radiography. The purpose of this instruction is to describe which HSE relevant issues have to be followed before, during and after radiographic tests. The overall objective is to obtain required reliability for radiographic work to be carried out with minimized radiation, exposure to radiography crew and other personnel working on the site.

The procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements.

However, the most stringent requirement is to be implemented.

### 3. Definitions / Abbreviations

Contractor means the agency appointed by owner or tkIS India for carrying out specific work.

Owner / Client means the organisation which retains tkIS India for the purpose of the project.

Subcontractor means the agency which takes part of a contract from the contractor.

Vendor means a supplier who provides goods or services to Owner / tkIS India.

HSE Health Safety Environment

PPE Personal Protective Equipment

SSI Site Superintendent

SSV Site Supervisor

SM Site Manager

tkIS India thyssenkrupp Industrial Solutions (India) Private Limited

### 4. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI & SSV	Responsible to implement this procedure and to ensure: <ul style="list-style-type: none"> <li>(i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements.</li> <li>(ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods.</li> <li>(iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.</li> </ul>

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tkIS India Site HSE Personnel	<p>(i) Responsible to assist RCM in effective implementation of this procedure on site.</p> <p>(ii) To assist construction engineer identification, assessment, evaluation, control methods for likely hazards associated with the activity.</p> <p>(iii) To ensure necessary administration of records required by this procedure.</p>
Contractor Engineers/ Supervisors/ HSE Personnel	<p>(i) Carry out HIRA for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities.</p> <p>(ii) Ensure that personnel under their supervision understand and adhere to this procedure.</p> <p>(iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India</p>
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirement of this procedure and adhere to the requirement of this procedure.

## 5. Procedure

### 4.1 General

Radiography work shall be carried out by an authorized/ approved agency.

The agency shall have valid certification, training and registration with BARC or other applicable regulatory authorities.

The agency shall implement all safe operating procedures for radiological activities as required by BARC/ all applicable regulations.

Furthermore, Radiography agency shall submit the method statement or procedure prior to start of work for approval of tkIS India Client.

Note: Any radiography work shall only be carried out under a valid work permit.

### 4.2 Safety Precautions

The radiography with radioactive isotopes has potential hazards on human body cells from ionizing radiation.

Following measures shall be strictly adhered to:

Prior to any radioactive source being brought to site arrangements must be made for its safe and secure storage if it is planned and approved by tkIS India Site HSE Rep. The storage arrangements shall comply with the requirements of the appropriate authority e.g. Atomic Energy (Radiation Protection) Rules, 2004 in India and must be agreed with the tkIS India Site HSE Rep.

Storage areas for a radioactive source shall be isolated and well away from hazardous material such as explosives or corrosive substances. The sealed source shall be stored in a locked container in a locked compound and shall have warning notices in local languages and depicting the radiation symbol conspicuously displayed on all sides.

Radioactive sources must be returned to the secure storage area when not in use.

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The specialist company employed to carry out radiography will, prior to commencement of radiography operations provide the tkIS India Site HSE Rep with:

a copy of their license to undertake radiography works,

details of their radiation protection officer and radiography team, the measures they intend to take to protect other persons from being affected by their works,

transport arrangements around site,

emergency contact details and the arrangements to deal with any foreseeable emergency situation such as an accident involving a vehicle carrying a radioactive source, a fault in the winding mechanism whereby a radioactive source cannot be wound back in to its protective casing, a fire involving a radioactive source, loss of a source, theft etc.

Radiography shall only be carried by specialist Companies who are licensed by the appropriate authority, such as the Atomic Energy (Radiation Protection) Rules, 2004 in India to carry out radiography works.

Equipment that shall need to be on site prior to the arrival of a radiography source will include those items needed to deal with an emergency such as 4X2kg bags of lead shot, 1X1.5m long handling tongs, radiation monitoring instruments and a selection of hand tools. Other equipment will include adequate warning signs, hazard warning tape, flashing lights etc.

The vehicle used to carry a radiography source from its storage area to where it will be used and back must be in roadworthy condition, shall be conspicuously marked to show that it is carrying radioactive material and have a flashing roof light.

No person other than radiography workers wearing dosimeters shall be allowed in an area where radiography is being carried out.

All areas where radiography work is being carried out including above and below shall be cordoned off at a safe distance from the radiography source and warning notices in local languages and depicting the radiation symbol conspicuously displayed at the barriers. Persons other than radiography workers wearing dosimeters shall be prohibited from going beyond the barriers.

Radiography shall be carried out outside of normal working hours when the least number of workers are on site, which is usually at night between the hours of 2200 and 0600.

Requests for radiography works shall be submitted to tkIS India Site HSE Rep at least 48hours in advance of each occasion of radiography works (Mon to Sat), requests for weekend radiography must be submitted by 1800 hours on the Thursday leading up to the weekend. Shorter notice periods will be accepted for emergency radiography works but on no account is radiography works to proceed without written approval.

tkIS India Site HSE Rep within 24hours of receiving a request for radiography works will in writing either approve or reject the request.

If the radiography request is approved the tkIS India RCM shall notify, the Clients representative on site, tkIS India partners/participants and 1st tier subcontractors at least 12 hours in advance of radiography works except in the case of emergency radiography where shorter notice periods cannot be avoided. 1st tier subcontractors are to notify their subcontractors.

- Three basic principles i.e. time, distance and shielding shall always be observed to minimize the radiation absorb dose (RAD).
- No radiography shall be carried out without a valid radiographic permit.
- Barriers shall be erected at safe distance with visible and audible warning signs and flashers.
- Such an area shall hence be called as 'Radiation Area'.



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- The radiation area shall be monitored at all times as long as exposure is ongoing and no other person than the radiographer shall be allowed within the radiation area.
- Radiation Survey meter shall be used to monitor the radiation level during radiography.
- All radiography personnel shall wear appropriate protective equipment and film badges issued by BARC or other regulatory authorities.
- After each exposure, source retract back into isotope container shall be confirmed by radiation survey meter.
- Isotope container shall be locked and disconnected from crank cable, prior to movement from one place to another.
- Close body contact with isotope container shall be avoided.
- If the field radiography is to be done at the same location repeatedly, it is advisable to
- provide either a wire fencing around or a temporary brick enclosure.
- Cordoning distances are approximate actual distances are to be decided with consultation of Radiography Agency. Maximum exposure at nearest barrication point shall not exceed 0.75 m rem / Hr.(Or 0.0075 m Sv)
- Announcement to be made and removal of nonessential persons are to be ensured from cordoned off area before commencement of job. The barricading is to be done with warning tape with display of Radiation hazard symbol at site by the site radiographer after carrying out the radiation survey.
- The radiography should preferably be carried out at a time, when occupancy is least.
- Radiation source movement within the site is to be maintained as per BARC norms.
- The Level -2 supervisor shall be available at site during the radiography work.
- "Level-2 holder" means "Radiological Safety Officer" designated by the contractor and who in the opinion of the competent authority is qualified to discharge the functions under Rule-13 of The Gazette of India No.-44, Oct'30, 1971.
- The distance for barricading is decided by Level-2 Holder depending upon on strength of radiation source, occupancy factor and radiation work load
- Radiation warning signs shall be pasted all along the cordoned off area.
- Entry into the restricted area by unauthorized persons shall be strictly prohibited during exposure.
- The radiation level along with the cordon shall be monitored by a suitable and well calibrated radiation survey meter.
- Protection facilities such as manipulator rod, remote handling tongs, lead pots, radiation hazard placards and means of cordon off shall be available at each site.
- The radiography source shall never be touched or handled directly with hands.
- The package containing radiography cameras and sources shall never be carried by public transport like bus, train etc.,
- Radiography sources and cameras, when not in use, shall be stored inside a source
- pit with lock and key arrangement; pit and other arrangements as approved by BARC/ Atomic Energy (Radiation Protection) Rules,2004. The storage room shall preferably be located in an isolation area of minimum occupancy.
- Field radiography shall be done only during night or during lunch break when there is no occupancy around.
- A suitable area around the radiation source shall necessarily be cordoned off during field radiography, so that the radiation levels outside the area do not exceed the maximum permissible radiation levels.
- The distance to be cordoned off around the source is mainly decided by the nature and strength of the radiation source used. The appropriate cordon off distance may be selected from table as mentioned above.
- Entry into the restricted area by unauthorized persons shall be strictly prohibited during exposures.

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- Radiation warning symbols shall be conspicuously posted all along the cordon.
- Red warning lights shall be conspicuously displayed during night all along the cordon.(at least 3 lights.)
- The concerned radiographer shall remain physically present outside the cordoned area during exposures.
- All radiography exposures shall be as far as possible be given employing a radiography camera wherever practicable, field radiography work shall be limited to collimated exposures. Remember: "SHIELDED SOURCE IS LESS HAZARDOUS".
- Panoramic exposures shall be attempted only when deemed absolutely necessary.
- Suitable manipulating devices shall be used for handling the sources during panoramic exposures.
- The source pencil shall never be touched or handled directly with hands.
- The radiographer should always position himself as far away from the source as possible during exposures. In addition he may make use of the shielding provided by huge objects usually present in the radiography area.
- All personnel working with radiography sources shall wear appropriate personal monitoring badges during radiograph and in addition/or be provided with a pocket dosimeter which has a range of 200 mr. full scale. These dosimeters should be charged each day prior to use.

#### 4.3 Storage:

- The pit and the room for storage of radioactive source should be as per BARC norms.
- The radio active source storage room should be located in an isolated area of minimum occupancy. The room should remain locked and key with responsible person.
- The radiation level outside the storage room should not exceed 0.25 mR/hr.
- Radiation warning signs should be conspicuously posted on the entrance door of the storage room.
- Storage areas for a radioactive source shall be isolated and away from hazardous material such as explosives or corrosive substances. The sealed source shall be stored in a locked container in a locked compound and must have warning notices in local languages and English and depicting the radiation symbol conspicuously displayed on all sides.
- Equipment that will need to be on site prior to the arrival of a radiography source will include those items needed to deal with an emergency such as 4X2kg bags of lead shot, 1X1.5m long handling tongs, radiation monitoring instruments and a selection of hand tools. Other equipment shall include adequate warning signs, hazard warning tape, flashing lights etc.
- The vehicle used to carry a radiography source from its storage area to where it shall be used and back must be in roadworthy condition, must be conspicuously marked to show that it is carrying radioactive material and have a flashing roof light.
- Radioactive sources must be returned to the secure storage area when not in use

#### 4.4 Radiation Symbols/signs

The "tri-foil" is the international symbol for radiation. The symbol can be magenta or black, on a yellow background. This sign is posted where radioactive materials are handled, or where radiation-producing equipment is used. This sign is used as a warning to protect people from being exposed to radioactivity.

This symbol is used with other messages that describe the nature of the radiation hazard, as shown below. They are displayed at locations such as, radioactively contaminated sites during the clean-up process, the nuclear medicine area of a hospital, or in university or commercial research facilities.

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Figure 1



Figure 2

#### United Nations Symbol

In February of 2007, the United Nations introduced a new symbol to help reduce accidental exposure to large radioactive sources. The new icon is aimed at alerting anyone, anywhere to the potential dangers of being close to a large source of ionizing radiation. The new symbol will not be visible under normal use, but only if someone attempts to disassemble a device that is a source of dangerous radiation. It will not be located on building access doors, transportation packages or containers. The new symbol is the result of a 5-year project conducted in 11 countries around the world. It was developed by human factor experts, graphic artists, & radiation protection experts, and tested on a total of 1,650 individuals in Brazil, Mexico, Morocco, Kenya, Saudi Arabia, China, India, Thailand, Poland, Ukraine & the United States to ensure that its message of "danger - stay away" was crystal clear & understood by all."

#### 4.4.1 Specifications for radiation symbol/warning sign:

4.4.1.1 The radiation symbol for radioactive sources other than medical diagnostic and industrial x-ray radiography equipment shall conform to the specifications given hereunder;

- The relative dimensions of the trefoils and the central circle shall be as shown in Fig.3
- The trefoils and the circle shall be of magenta colour.
- The background of the above symbol shall be yellow.
- The symbol should be accompanied by appropriate legend in English, Hindi and local language indicating radiation hazard and restricted entry, e.g. CAUTION – RADIOACTIVITY.
- Small objects, containing radioactive material may, however, have on them only the aforesaid trefoil symbol engraved in a conspicuous colour when their dimensions do not permit compliance with (d) above.

4.4.1.2 The warning sign shall conform to the specifications given hereunder;

- The triangle shall be equilateral.
- The ratio of the outer to the inner sides of the triangle shall be 1.5.
- The area between the outer and inner triangle shall be in yellow colour on white background.
- The printing on the area between the outer and inner triangle and figure inside the inner triangle shall be bold, proportional and red in colour.
- The area between the outer and inner triangle should be accompanied by appropriate legend in English, Hindi and local language indicating radiation hazard and restricted entry.

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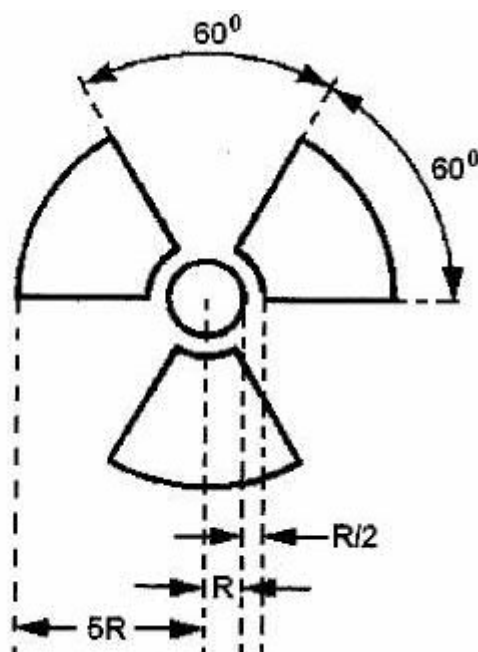


Figure 3

## Radiation Symbol for Radioactive Sources

## 4.5 Training

All persons on Site need to understand the dangers of being exposed to a radiography source.  
All persons on site need to understand what is meant when radiography signs are posted and that they must remain on the safe side of barriers cordoning off areas where radiation is taking place.

## 6. Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN LP-CHM-099.

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	Checklist For Scaffolding & Ladder	QM code PIN LP-CHM-014 F01
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Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location / Area: \_\_\_\_\_

Date & Time: \_\_\_\_\_

Sr. No.	Description	Observation Yes/No/NA	Remarks & Recommendations
01	Does the site have a practice of providing suitable and sufficient scaffolds so that the work could be safely done at a height?		
02	Is site engaging suitable/properly trained/experienced workmen for constructing / dismantling / shifting scaffolding works?		
03	Are scaffold platforms designed / constructed with a minimum safety factor of four?		
04	Is there a safe means of access to the working platform?		
05	Are scaffold structures on a solid base avoiding pavements & manhole covers?		
06	Is the scaffold structure is at a proper distance from excavation?		
07	Is verticality of the scaffold structure being properly maintained?		
08	Are ties for scaffold structure properly maintained (vertical as well as horizontal position)?		
09	Whether toe boards/guard rails are installed and are they secured?		
10	Whether platform units used for working platforms are wooden / metallic?		
11	Is there a system of inspecting scaffolds by a competent person at least once a week and also after every prolonged interruption in the work?		
12	Is there a system of inspecting materials of scaffolds on each occasion before erection?		

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Sr. No.	Description	Observation Yes/No/NA	Remarks & Recommendations
13	Is there a system of inspecting scaffolds at every spell of bad weather / heavy wind condition?		
14	Is awareness among workmen on the importance of load distribution on a given working platform?		
15	Is there a check for the condition and correct usage of fittings for scaffolds?		
16	Is the width of a working platform properly Maintained according to usage, viz. a) Minimum 450 mm for footing and not for deposit of materials. b) Minimum 900 mm for footing and deposit of Materials. c) Minimum 1000 mm when used for heavier loads or to support higher platforms. OR As advised by tkIS(INDIA)/Client.		
17	Are all the materials stored on the platforms properly secured or not?		
18	Whether platform units are tied using proper binding wires?		
19	Are openings in working platform kept safely covered / fenced?		
20	Are the scaffolds being erected on firm and level surface?		
21	Does the height of mobile scaffolds exceed four times the smaller base dimension?		
22	Are all materials stacked on platform properly secured while in motion?		
23	Is the safety rule: Not to ride on a scaffold while in motion, violated.		
24	Is there a system of checking for obstructions before the tower is moved?		
25	Is hanging platform secured?		

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26	Is there a provision of anchoring safety lanyards to be tied to appropriate lifeline?		
----	---	--	--

Sr. No.	Description	Observation Yes/No/NA	Remarks & Recommendations
	LADDERS		
27	Strong material & well maintained ladders as per relevant applicable Standard.		
28	Ladder not placed against loose boxes materials, sound objects, near electrical installation.		
29	Ladder of sufficient height used, on top tied down and man positioned at the foot at ladder.		
30	Ladder placed at an angle of 70 to 75 degrees		
31	Area of work barricaded so that no person can walk under the ladder		

tkIS India / Contractor Site HSE Representative

tkIS India SSI or SSV / Contractor Site Engineer

\_\_\_\_\_

(Name &amp; Signature)

\_\_\_\_\_

(Name &amp; Signature)

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## Attachments and forms:

Form: PIN LP-CHM-014 F01- Checklist for Scaffolding & Ladder

Validity  
Valid from: 12. 2018  
Valid until: 12. 2021

**This procedure replaces HSE-CON-IN-014**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS-India Local IMS Standard	19/12/18	Sahabuddin Ahmed	21/12/18	Indranil Chakraborty/ Rajnish Bhandari	21/12/18	Nitin Pandit	31/12/18	A. K. Ladia
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved



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### 1. Scope

This HSE procedure is applicable for Scaffolds and Ladders during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

The HSE procedure is aimed at providing guidelines and defining requirements for safe system of work for scaffolds and ladders. The construction of scaffolding is meant to allow people to execute their works at height in a safe way. Therefore, all scaffolding constructions will comply at least with current industry practices and applicable regulatory standards and this procedure. Special attention shall be paid to a number of minimal technical specifications, which are specified in this instruction.

The procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements. In addition to this procedure, client /owner applicable requirements are to be followed, however, the most stringent requirement shall be implemented.

### 3. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM) (tkIS India) & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI & SSV	Responsible to implement this procedure and to ensure:  (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements.  (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods.  (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site. (ii) To assist construction engineer identification, assessment, evaluation, control methods for likely hazards associated with the activity. (iii) To ensure necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/HSE Personnel	(i) Carry out HIRA(Hazards Identification & Risk Assessment) for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

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#### 4. Procedure

##### Terminology, Definitions, Abbreviations

**Authorised Person (Scaffold Inspector)** a person who received information, instruction, training and supervision to safely perform scaffolding work.

**Scaffolder** a person competent to erect, alter, repair and/ or dismantle a scaffold

**Scaffolding** a temporary structure (not including a trestle ladder) supporting a platform used to perform work.

**Scaffolding work** the erection, alteration or dismantling of scaffolding.

##### Planning

Site activities shall be planned to avoid, as much as possible, works at elevated places that require the erection of scaffolding. When the use of such structure is required, all necessary precautions shall be taken to ensure safe work conditions for persons:

- Erecting, dismantling and altering the scaffolding
- Using the scaffolding
- Near the scaffolding (for instance, other workers or public).

Two types of scaffolding most commonly used are:

- Self-Assembly (e.g. cuplock) scaffold
- Tube and Coupling scaffold

##### Hazard Identification & Risk Assessment

Another tool which can help to plan work and which must be completed prior to any high-risk construction activity is a risk assessment. A risk assessment should identify the hazards that have the potential to cause death or injury when working with scaffolding. These include:

- Work near power lines
- Mobile plant and traffic
- Mixing and matching scaffold components
- Falls from heights
- Falling objects
- Scaffold collapse
- Manual tasks

##### Authorized Persons

Only Authorised Persons shall erect, dismantle or alter scaffolds. Where training has been delivered on site, the training and assessment records, including a register of participants, must be kept on site.

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## Scaffold Plan

Scaffold Plan is required for;

- Tube Coupler Scaffolds over 125 feet (38 Meters) in height
- Fabricated Frame Scaffolding of 125 feet (38 Meters) in height
- Where brackets are used on Fabricated Frame Scaffolds used to support Cantilevered Loads in addition to workers.
- Under hung Scaffolds
- Special Scaffolds if any.

A scaffold plan shall be prepared and provided in consultation with:

- The scaffold authorised person– to discuss the design loads and the capability of the structure to support any additional loadings
- The construction team - to assess the location of underground drains or pits. The work should be planned so as to avoid excavating service trenches under, through or adjacent to scaffolds: and
- The HSE team regarding erecting, dismantling, maintaining and altering the scaffolding

The scaffold plan shall include a site layout plan, the elevations and sections of the scaffold. It is to be made available for inspection at the worksite. The scaffold plan should address the following issues:

- Basis of the design
- Foundations (including ground conditions and loadings)
- Supporting structure
- Access and egress
- Tying & bracing
- Type of scaffold
- Edge protection

## Fall Arrest Systems

Fall arrest systems such as harnesses and lanyards shall be worn and used at any time erecting, dismantling, and altering of scaffolding takes place or whenever a fall risk is identified during a risk assessment. When this is necessary, fall arrest systems shall be used in conjunction with suitable anchorage points that can support a load of 15kN. Workers shall be provided training in the safe and correct use of the fall arrest system.

A written procedure to be in place which shall be prepared and updated at site and communicated to ensure all concerned to the safe retrieval of a person in case of a fall. The rescue procedure must also consider:

- The safety of the persons involved in the retrieval
- The location and means of access for the rescuer
- Sufficient number of available personnel to perform the rescue

## Material Examination and Storage

All material must be examined upon arrival at site or during unloading. Any defective items should be removed from the site or put into a specially designated and marked storage area. Under no circumstances should these items be used on the construction site. All material to be used shall be properly stacked in a safe place.

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The below information relating to scaffolds on site shall be provided by contractors to tkIS India prior to its erection.

- General purpose of the scaffold to be erected
- Location
- Dimensions
- Forecast duration of use of the scaffold
- Name of the scaffolders and copy of site training certificates

## Regular Inspections

### Scafftags

All scaffolding must be tagged at each access point (ladder), indicating whether it can be accessed or not. The tag will be red and will indicate the scaffold is unsafe for use until the scaffold has been inspected and passed safe for use. When it is safe and inspected, a tag card will be inserted, indicating the date, name and signature of the authorized inspector. Arranging correct type of the scaffolding at site shall be the responsibility of the tkIS India / contractor Site Manager.

Before signing any Green Scaff Tag, "Scaffold and Ladder Checklist PIN LP-CHM-014 F01 shall be filled and if found okay then Green Scaff Tag shall be filled up and signed by Scaffolding Authorised Person

All scaffolding that shall remain in use longer than a week will be inspected weekly by an authorised inspector of the contractor. This shall be indicated on the tag by date of the inspection, together with a short signature of the inspector. Out of date scaffolding tags, will be removed, meaning that an "unsafe to use" message shall appear as tag indication.

Only after the re-inspection of the scaffold, the use of the scaffold shall be allowed again.

In addition to the above, all scaffolding must be re-inspected and confirmed as safe to use after bad weather or other incident that could affect its safety, e.g. high winds.

### Example of Scafftag

Figure 1



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## Scaffold Register

All erected Green tagged scaffold shall be recorded in a register with details of location, company owner, date of erection, next date of inspection and forecast date for dismantling.

### Scaffold Inspections

Once erected, an authorised person shall inspect scaffold prior to its first use.

Scaffolds appropriately erected shall be attributed with a Green tag (access allowed) whereas scaffolds requiring modification will be attributed with a red tag (forbidden access) put at each of its access ways.

Scaffolds shall be then inspected as minimum on a weekly basis or whenever a modification is made and an authorised person inspecting the scaffold shall place a signature and date of the inspection on the back of the green tag.. Inspection results shall be reported into the scaffold register. Inspections must also be carried out when a scaffold is substantially altered and after any event or incident likely to have affected the stability of the scaffold such as strong winds or being struck by a crane.

Any work carried out on a scaffold labelled with a red tag will be considered as a violation and disciplinary actions shall be taken against the concerned workers and supervisors as well as the concerned company.

### Scaffold modification / dismantling

Concerned Personnel of tkIS India shall be notified of any modification/dismantling undertaken on a scaffold. A red tag shall be placed at each access of the scaffold prior starting any modification. Only authorised scaffolders will be allowed to access the scaffold. They should wear at all time a full body harness with double lanyard and shall be attached to an appropriate lifeline at all the time.

## 5. General Scaffold Design

### 5.1 Principles of Design

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Scaffolds shall be erected according to IS 2750, 3796 and IS 4014 and BS 1139 or EN 74.

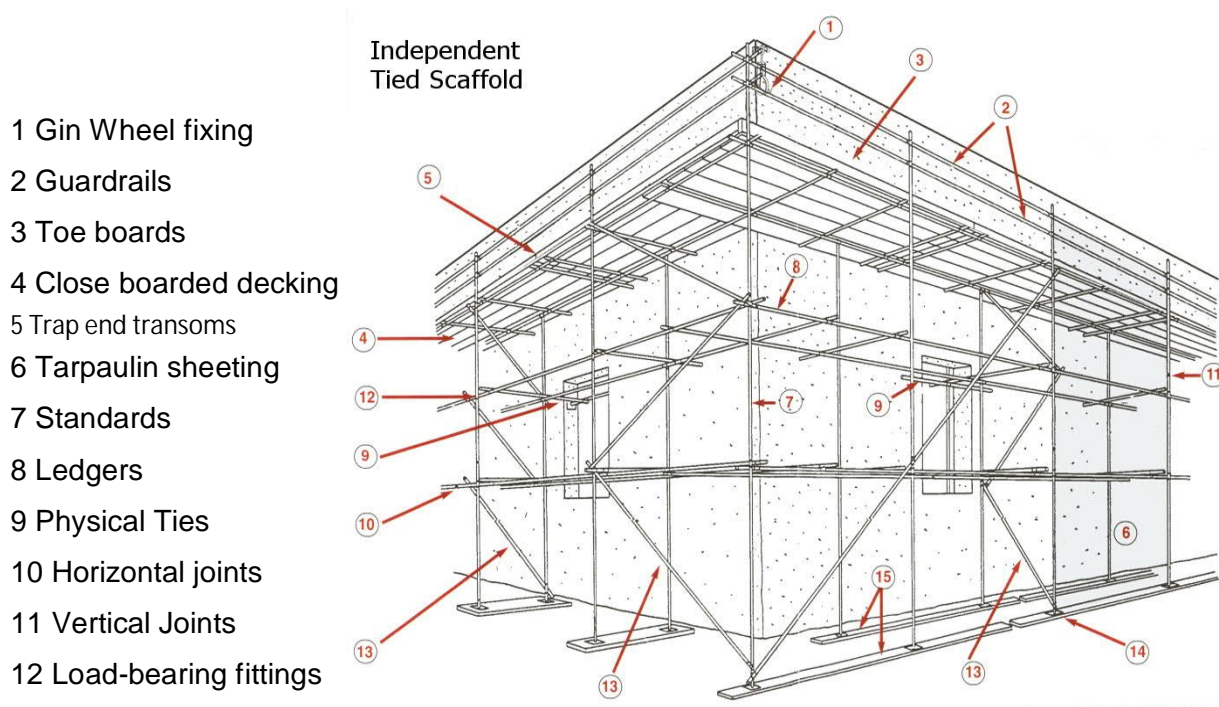


Figure-2

If the scaffolds are self-assembly scaffold, the manufacturer's erecting instructions shall be available and followed. Figure 1 & 2 details the components of an independent tied scaffold. This type of scaffold shall include as a minimum:

- Full platform
- Hand rails and middle rails
- Toe boards
- Bracing
- Base plates/Sole Boards
- Fixed access ladders with top extension approximately 1 meter above work platform
- Scafftag in place at all scaffold accesses

The scaffold authorised person before erecting the scaffold, shall take into account:

- The strength, stability and rigidity of the supporting structure
- The intended use and application of the scaffold
- The safety of the persons engaged in the erection, alteration, and dismantling of the scaffold
- The safety of the persons using the scaffold, and
- The safety of the persons in the vicinity of the scaffold

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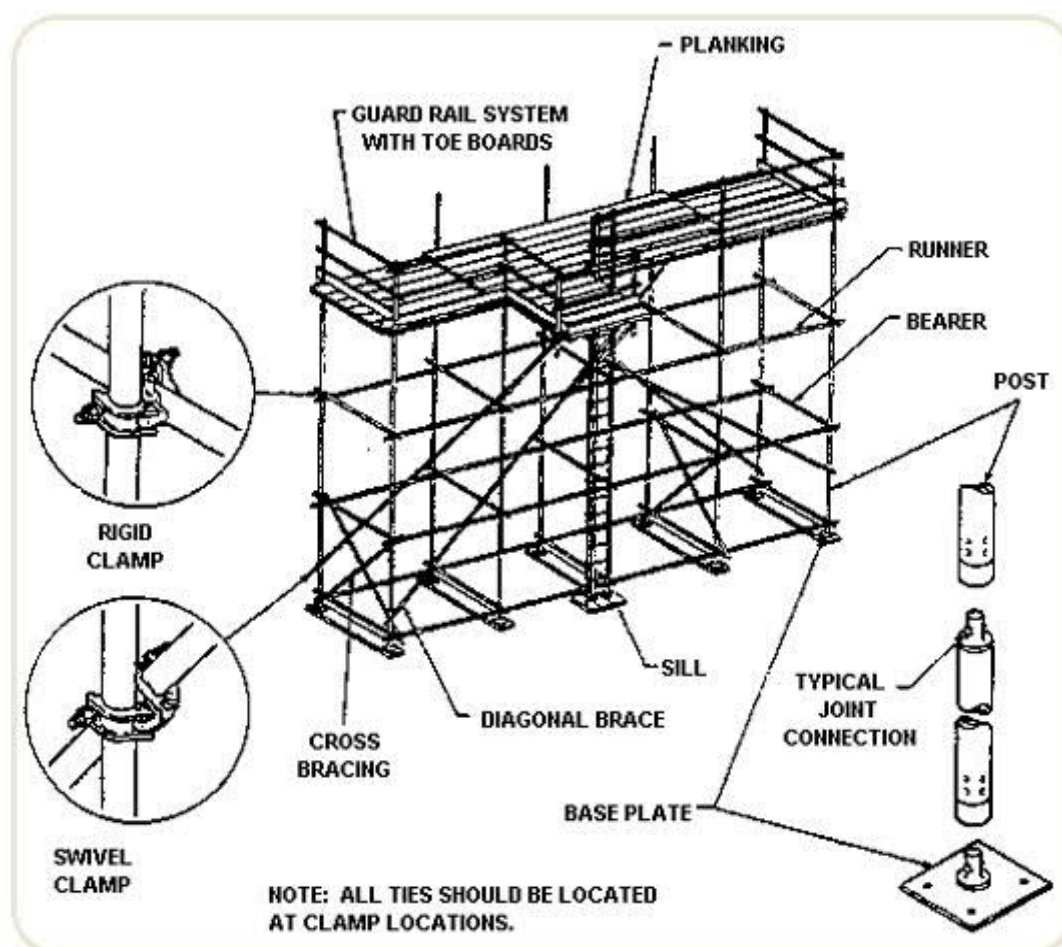


Figure-3

## 5.2 Basis of Design

### Scaffold Tubing and Fitting Specifications:

- Scaffold tubing shall be 48.3 mm (1.9 inch) nominal outside diameter – as per EN 74 standard or 40 mm nominal bore – as per IS 2750 – 1964.
- Scaffold tubing (for tube and coupler, system and fabricated tubular frame Scaffolds etc,) shall be welded or seamless structural steel pipe fabricated in accordance with any of the following pipe fabrication specifications as specified in: ASTM A500-Grade B; ASTM A53-Grade B; BS 1139, Part 1, Section 1.1, EN 10219 or IS: 2750 – 1964.
- As per IS: 2750 – 1964, steel tubes for individual component types scaffolding shall be of heavy class welded or seamless tubes of 40 mm nominal bore. The sizes of such tubes shall be governed by the design requirements and the minimum thickness of metal for such tubes shall conform to IS: 806 – 1968 'Code of Practice for Use of Steel Tubes in General Building Construction (first revision). As per 6.3.2 of IS:806-1968, for tubular steelwork painted with one priming coat of red oxide zinc chromate paint after fabrication and periodically painted and maintained regularly, wall thickness of tubes used for construction (i.e. for scaffolding) exposed to weather shall not be less than 4 mm, where structures

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are not readily accessible for maintenance, the minimum thickness shall be 5 mm. For other options in steel tube thickness and details, IS: 806 – 1968 can be referred.

- d. Steel tubing for tube and coupler scaffolds shall be hot-dip galvanized (not painted) in accordance with ASTM A123. Steel tubing for system and fabricated tubular frame scaffolds may be painted.
- e. Scaffold couplers shall be marked as conforming to BS 1139; EN 74 or as per IS: 2750 – 1964. Couplers may be either pressed or drop forged type. All fittings (including couplers, clamps, joint pins etc.) shall be galvanized or zinc coated to resist corrosion.
- f. Threaded parts of scaffold components and fittings shall be capable of attaining full thread engagement and shall be lubricated regularly.
- g. Always install scaffold components and fittings as per manufacturer's instructions.
- h. Girder couplers shall always be used in pairs.
- i. Individual couplers shall comply with the rated safe working loads (SWL) given in table given below. This shall be verified from the technical literature submitted by the manufacturer. Applied loads shall be less than 40% of the rated capacity (to ensure a safety factor of 4)

Table1: Safe Working Loads for individual Couplers

Type of Coupler	Type Load	EN 74 Class	Rated Safe Working Load (SWL)
Right angle coupler	Slip along tube	B	SWL = 9.4 kN (2,100 lb)
Adjustable Coupler also known as swivel coupler	Slip along tube	A	SWL = 5.3 kN (1,190 lb)
End to end coupler also known as sleeve coupler	Tension Bending	B B	SWL = 3.0 kN (675 lb) SWL = 0.59 kN-m (435 lb.- ft.)
Bearer Coupler also known as putlog or single coupler	Force to pull the tube axially out of the coupler	-	SWL = 0.53 kN (120 lb.)

- j. Every effort has been made to refer the most recent and updated Standard version, in case of any deviation, the newly updated Standard version shall supersede.

### 5.3 Foundations

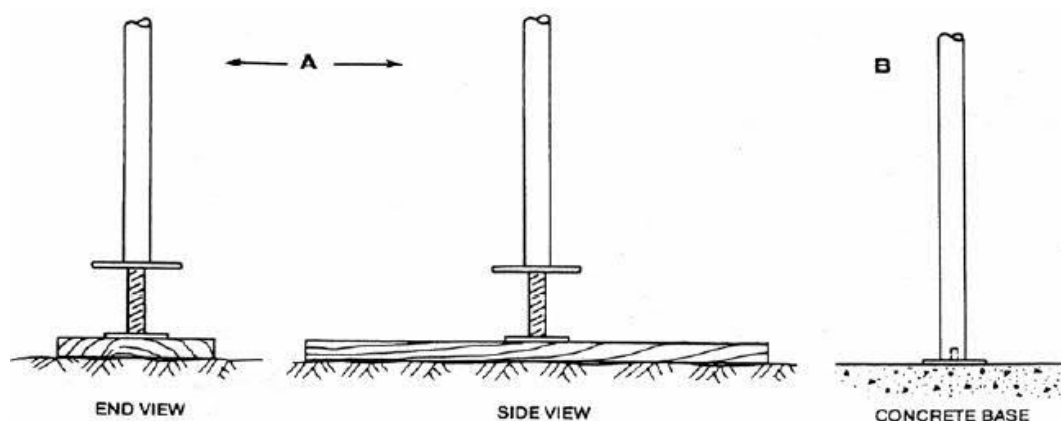
Scaffolding foundations must be able to carry and distribute all the weight of the scaffold, including any extra loads, for example, perimeter containment screens, placed on the scaffold. Scaffolding needs to be designed for the most adverse combination of dead, live and environmental loads that can reasonably be expected during the period the scaffold is in use.



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## Sills

The strength and stability of a scaffold is as dependent on the foundation it bears on as the scaffold itself. Many accidents involving scaffold collapses are due to poor foundations.

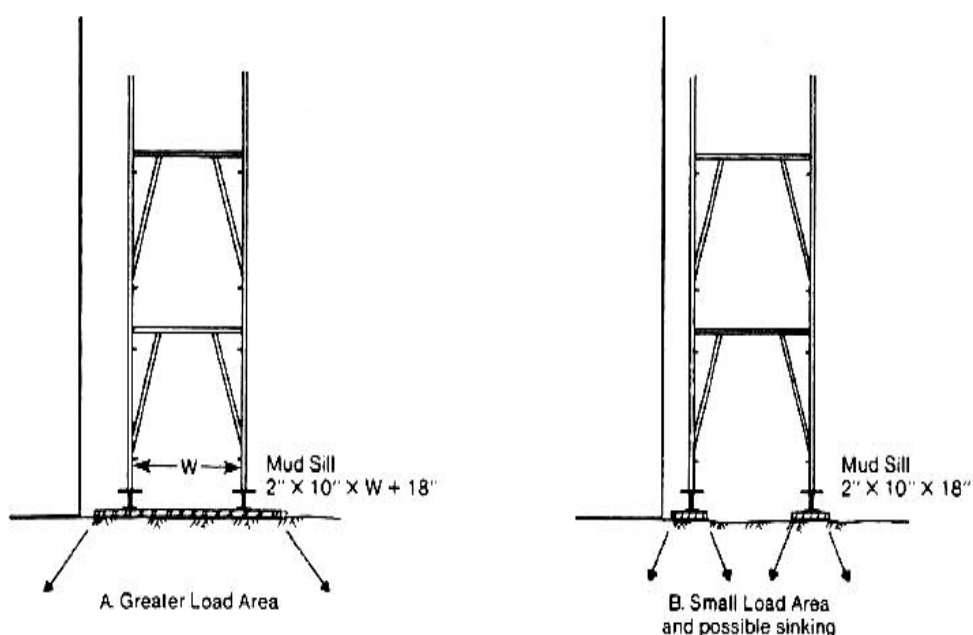


**Figure-4**

Foundations capable of carrying the desired load must be provided. Base plates must be placed under all legs. They must be securely fixed if there is potential for lateral movement.

When soil conditions are poor or frozen, it may be necessary to excavate the poor soil and replace it with good compacted material.

It is recommended to use a mudsill which is continuous under both legs of the scaffold.



**Figure-5**

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#### 5.4 Environmental Loads

Environmental loads are the effects of wind and rain on the scaffold particularly if perimeter containment screens or shade cloth are attached to the scaffold.

#### 5.5 Dead Loads

Dead loads refer to the self-weight of the scaffold structure and the components including stairways, ladders, access platforms, screens, sheeting, signs ropes, hoists and electrical cables.

#### 5.6 Live Loads

The live loads include the weight of persons, material, tools, and equipment, debris and impact forces. The live loads applied to a working platform should be in accordance with those specified in Table 2.

Table-2: Requirements for working platforms

	Design total load (kg per platform per bay)	Design concentrated load (as part of total load – to be applied in the most adverse position within the bay) (kg)	Minimum width of platform (mm)
Light duty ≥ 3 meters during housing construction work ≥ 2 meters during other construction work	225 (2.2kN)	100 (1kN)	450
Medium duty For example: finishing trades Where light materials are stacked on the platform	450 (4.4kN)	150 (1.5 kN)	900
Heavy duty For example: bricklaying and demolition work (special duty may be required for some demolition activities).	675 (6.6kN)	200 (2kN)	1000
Special duty	Seek guidance from designer, manufacturer, supplier or engineer		

Note: No materials are permitted on platforms 450 mm wide or less. All other scaffolds must have a clear platform width of at least 450 mm.

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## 5.7 Load Capacity

The maximum load capacity of a scaffold is determined by computing the maximum load being applied to the various components of the scaffold structure and ensuring these is less than the manufacturer's recommendations.

1. The number of work platforms which will be used simultaneously above each other. The sum of the loads per working platform must then be added and applied to the structure.
2. The height of the scaffold. The self-weight of all components of the scaffold must be added.

### Total load Applied

The total load applied is the sum of the working platform loads plus the self-weight of the scaffold.

Material loads shall be evenly distributed on platforms and not concentrated in one small area.

## 6. Erecting or Dismantling Scaffold

### 6.1 Safe Erection of Scaffolding

Once authorised, scaffolders shall initiate the erection of the scaffold by taking the appropriate measures to ensure safe erection of the scaffolds and as a minimum:

- Barricading of the area.
- Maintain the area tidy.
- Wear at all time full body harness with double lanyard and attach it to suitable anchor point.

The following figures and explanation shall summarises the prescribed work method for erecting scaffolding. Please note that the below figures meant for understanding of safe method of erecting scaffold work platform. However, safety requirement like wearing and tying of full body harness and fixing of ladder was not shown, which are to be used without fail.

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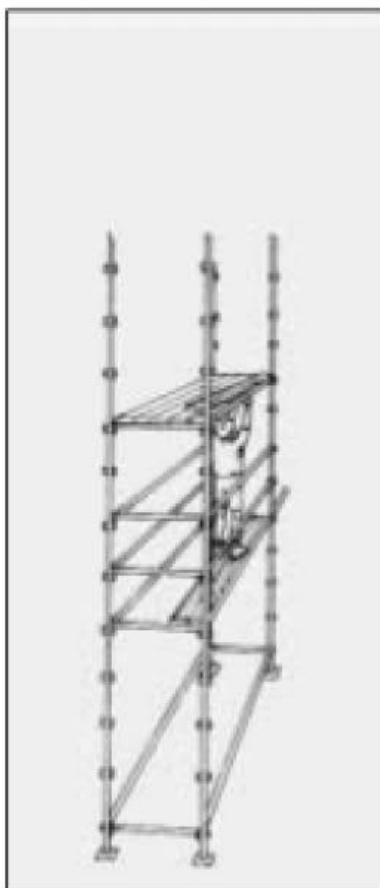


Figure 6 Work from a platform at least 450mm wide to install planks overhead. Platform does not need to be installed on the bottom level of the scaffolding

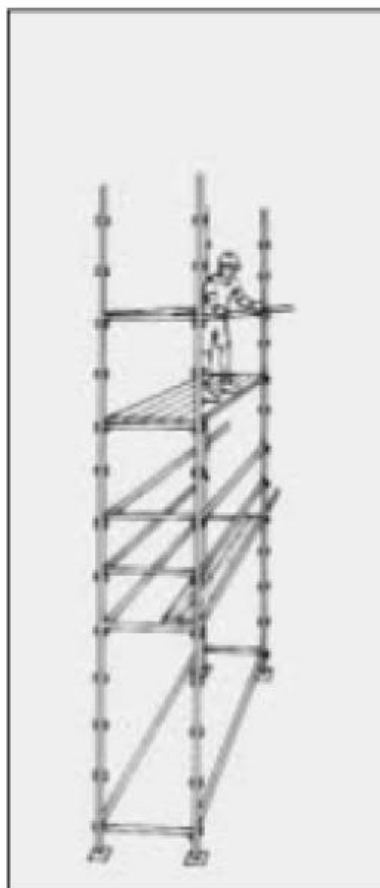


Figure 7 Immediately install edge protection after enough components of the scaffolding have been erected. A section of the platform may be left open to allow scaffolding components to be passed between lifts.

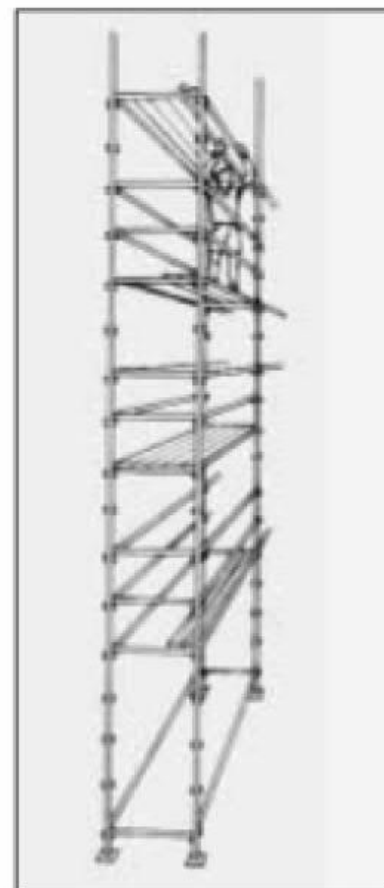


Figure 8 Worker on two planks must have fully decked platform positioned between beneath them at a distance of no more than 2 metres

#### 6.1.1 Additional Safe Work Practices

The following additional work practices shall be followed when erecting scaffold.

- Scaffold fittings and other connections should be securely tightened.
- All bracings, ties, guys and buttresses should be installed as the scaffold is erected.
- Limit the number of workers on a scaffold at any time.
- Work from a full deck of planks wherever possible.
- Do not climb on guardrails to gain extra height.
- Reduce risk of a fall from internal gaps on scaffolding by placing additional planks or provide edge protection.
- Loose working platform units be lashed down.

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## 6.2 Safe Dismantling

The following summarises the safe method for dismantling scaffold.

- Edge protection and any means of access can be removed as the scaffolding is dismantled, provided it is removed at the last possible stage.
- A platform of at least 450mm wide, at the level of dismantling has reached, is in place, where practicable.
- Ensure that when dismantling scaffold, the platform immediately below the level the worker is standing on, has a full set of planks across the width and is no lower than 2 metres.
- A section of the platform may be left open to allow the lowering of planks or other scaffolding components between levels.
- To prevent death, injury or damage to components, do not drop scaffolding components from heights when dismantling.

## 7. General Types of Scaffolding in Common Use

### 7.1 Frame Scaffolding

The primary steel scaffolding system it is primarily for rectangular jobs where access is not too restricted. Frame scaffolding is very popular with masons, plasterers, etc; Frame scaffolding is relatively simple and fast to erect, provided the surface is level, and the access is not restricted.

- Metal tubular frame scaffolds, including accessories such as braces, brackets, trusses, screw legs, ladders, etc., shall be designed and proved to safely support four times the maximum intended load.
- Scaffold vertical/standard shall be set on adjustable jacks or base plates placed on mud sills or wooden sills to support the maximum intended load.
- The railings shall consist of a top rail from 900 to 1050 mm above the platform level and intermediate rail halfway between the top rail and the platform. Toe-boards shall be a minimum of 150 mm in height.
- To prevent movement, the scaffold shall be secured to the building or structure at intervals, vertically every 8 meters (26 feet/ 4 lifts) or less and horizontally at intervals not to exceed 9 meters (30 feet) measured from one end towards the other as per OSHA.

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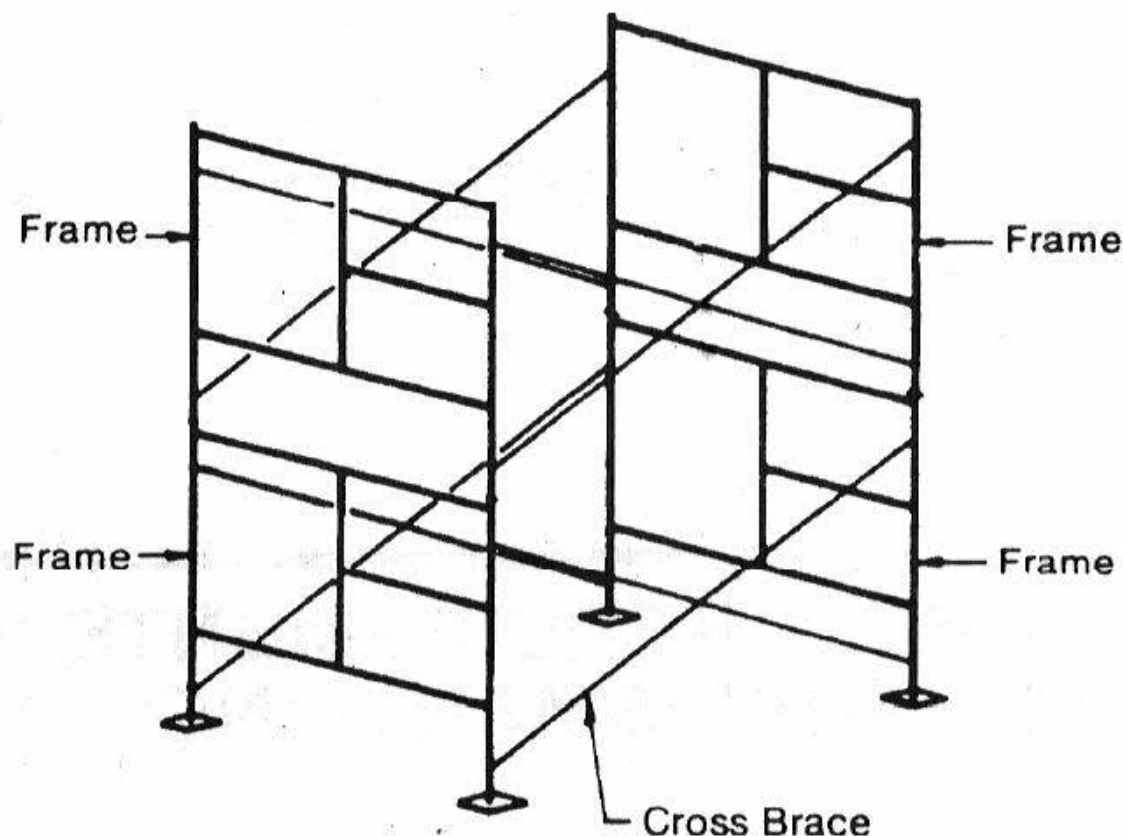


Figure 9 Frame Scaffolding

## 7.2 Tube and Clamp

To accommodate challenging work conditions like obstructions, limited access, and the need to scaffold non-rectangular shapes, tube and couplings scaffold shall be used.

Tube and coupling requires scaffold greater expertise to erect, and takes much longer to erect than frames.

- A light-duty tube and coupler scaffold shall have all posts, bearers, runners, and bracing of nominal bore steel tubing as per Standard. The posts shall be spaced as per the relevant standard.
- A heavy-duty tube and coupler scaffold shall have all posts, runners, and bracing of nominal bore steel tubing, with the posts spaced as per the relevant standard.
- The entire scaffold shall be tied to and securely braced as per the relevant standard.
- The railings shall consist of a top rail from 900 to 1050 mm above the platform level and intermediate rail halfway between the top rail and the platform.

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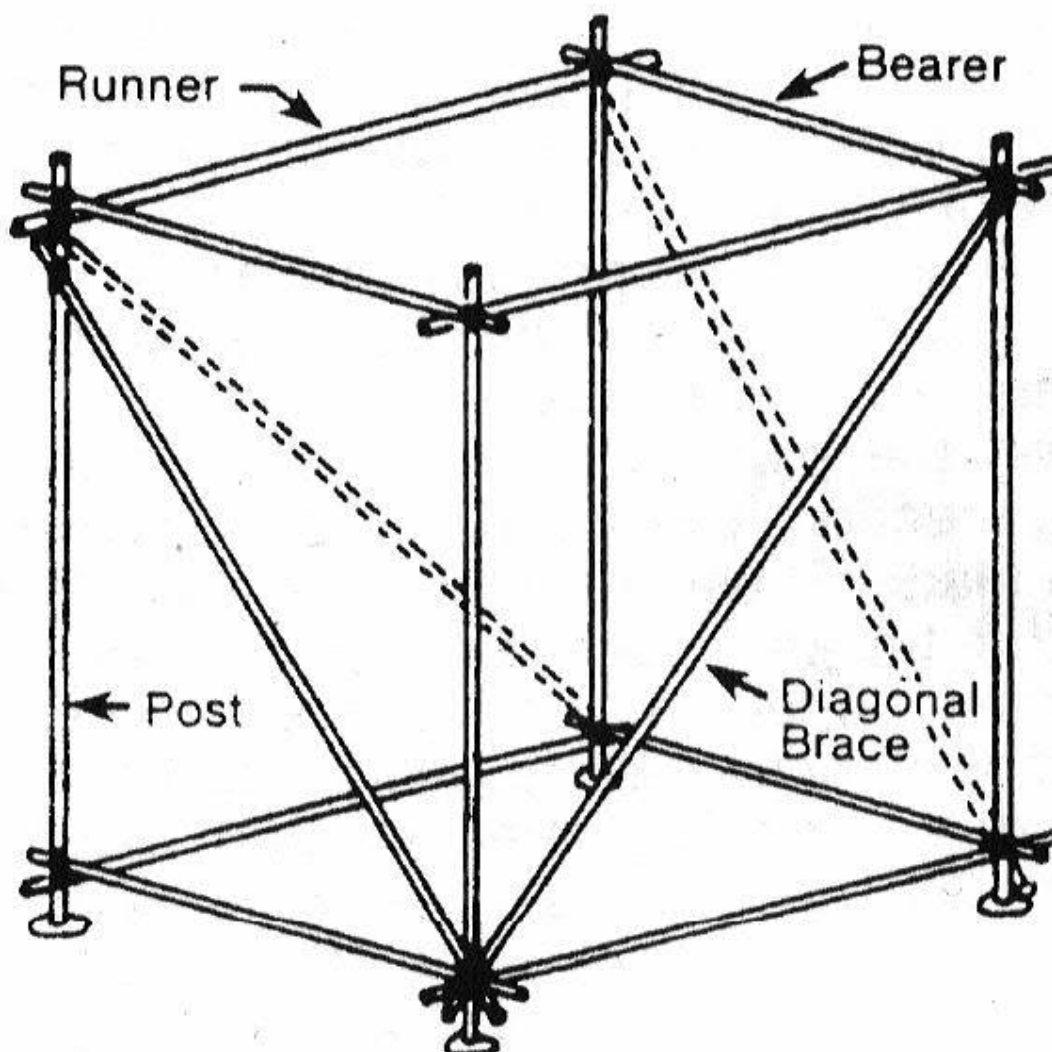


Figure 10

### 7.3 System Scaffolds (eg. Cuplock scaffold)

Systems Scaffolds, like tube and clamp, are used for applications where frames cannot be used or where it is not efficient to use frames (limited access, obstructions, and uneven surface, non-rectangular shapes). The advantage that Systems Scaffold have over tube and clamp is that they do not require the high degree of expertise that tube and clamp does.

With systems scaffold, the locations of the connections are fixed. As such, once the base is set, the erector does not have to worry about the location of connections (as he would with tube and clamp), and his erection time speeds up significantly.

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#### 7.4 Mobile Scaffold:

Mobile scaffolds or rolling towers are very useful tools, in construction and maintenance. They provide a safe, efficient, easily movable and relatively inexpensive portable work platform. The most common type of mobile scaffold is simply a single bay supported scaffold tower with casters. Mobile scaffolds may be constructed using tube and coupler scaffold, fabricated frame scaffold or modular type scaffold. As with any supported scaffold, however, it can be configured in many different ways. There are many items to keep in mind when designing, erecting and using mobile scaffold.

#### Requirements of Mobile Scaffolds

- The scaffold shall be erected with cross, horizontal or diagonal braces or a combination of these to prevent racking and provide a rigid structure.
- The scaffold shall be plumb, level and squared with all brace connections securely fastened.
- The scaffold casters shall have positive wheel and swivel locks to prevent movement of the scaffold when it is in use.
- The manual force used to move the scaffold shall be applied as close to the base as possible, but not more than 5 feet above the supporting surface.
- Employees shall not ride on scaffolding.
- Platforms shall not exceed outward beyond the base supports of the scaffold unless outrigger frames or equivalent devices are used to ensure stability.
- Casters and wheel stems shall be pinned or otherwise secured in scaffold legs or adjustment screws.

#### Design of Mobile Scaffold

- Since a mobile scaffold cannot be tied or guyed for stability, its height must not exceed three and half times (3.5 times) its minimum base in case mobile scaffolds used inside building; and three times (3 times) its minimum base width if it used out side the building i.e. at open space.
- Outriggers shall be used to provide a wider base.
- Horizontal diagonal braces shall be placed at the base of the scaffold and repeated at 21-foot vertical intervals. Fabricated decks with hooks may be substituted for horizontal diagonal braces at the platform level.
- The load rating of the casters shall limit the size, configuration and load capacity of the mobile scaffold.
- The platform shall not extend beyond the footprint of the base. In other words, do not use side brackets or cantilevered platforms on a mobile scaffold. This could cause the scaffold to tip.
- Prior to designing mobile scaffold, the designer shall know how and where the scaffold is to be used, what loads are intended to be placed on the platform, how it shall be moved, the size of the platform and the height of the platform.
- Mobile scaffolds shall only be used on hard level surfaces.
- Always follow the manufacturer's allowable loads for the casters, scaffold components and platforms, along with recommended bracing, to ensure a rigid and structurally sound tower.



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### Inspection of Mobile Scaffold

- Check to see that the platform height shall not exceed 3.5 or 3 times the smallest base dimension unless the tower is properly guyed or otherwise stabilized.
- Check to make sure the caster brakes are in good working condition and are properly applied when the tower is not being moved.
- Inspect to make sure horizontal diagonal bracing (plan bracing) has been placed as per the relevant standard
- Cross bracing has been installed on both sides of every lift.
- Check the area in which the tower is to be used to ensure that, there are no obstructions either in, on, or above the floor which will interfere with the proper and safe use of the rolling tower.
- Check for guardrails and toe boards.
- Check to see that all planking is properly installed.
- Check that the load on the caster does not exceed the capacity of the caster.
- Check that access ladder is correctly installed.

### 8. General Requirements for all Scaffolds

- Scaffolds shall be erected when work that cannot be done safely from the ground or from solid construction.
- The footing or anchorage for scaffolds shall be sound, rigid and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, concrete blocks should not be used to support scaffolds or planks.
- Any scaffold damaged or weakened from any cause shall be immediately repaired and shall not be used until repairs have been completed.
- Scaffolds shall not be loaded in excess of the working load for which they are intended.
- Nails or bolts used in the construction of scaffolds should be of adequate size and in sufficient numbers at each connection to develop the designed strength of the scaffolds. Nails shall not be subjected to a straight pull and shall be driven full length.
- All planking or platforms shall be overlapped (minimum 300 mm) or secured from movement.
- An access ladder or equivalent safe access shall be provided.
- Planking shall extend a minimum of four times the thickness of the board.
- Employees shall not work on scaffolds during storms or high winds.
- Tools, materials, and debris shall not be allowed to accumulate in quantities to cause hazard.
- Scaffolds cannot be erected, used, closer than 3m near energized power lines

#### 8.1 Bracing

The position and number of braces used on a scaffold not only restricts the amount of side movement, but also determines the strength of the scaffold.

#### 8.2 Ties

It is essential that every scaffold be adequately tied to the building structure throughout its entire length and height. If not, collapse of the scaffold will occur. Ties have dual purposes; they control the overall stability of the scaffold from forces such as wind loads and most importantly, brace the legs.

General rules for ties are:

- All ties shall be fixed with load bearing couplers.

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- The entire scaffold shall be tied and securely braced against the building at intervals as per relevant standard. (OSHA 26ft Vertically, 30ft Horizontally)
- Ties shall be as close as possible to the junction of the standard and ledger.

### 8.2.1 Common methods of tying

#### Through Ties (Positive Type)

A tube is taken through any convenient opening, such as a window, and coupled to vertical or horizontal tubes.

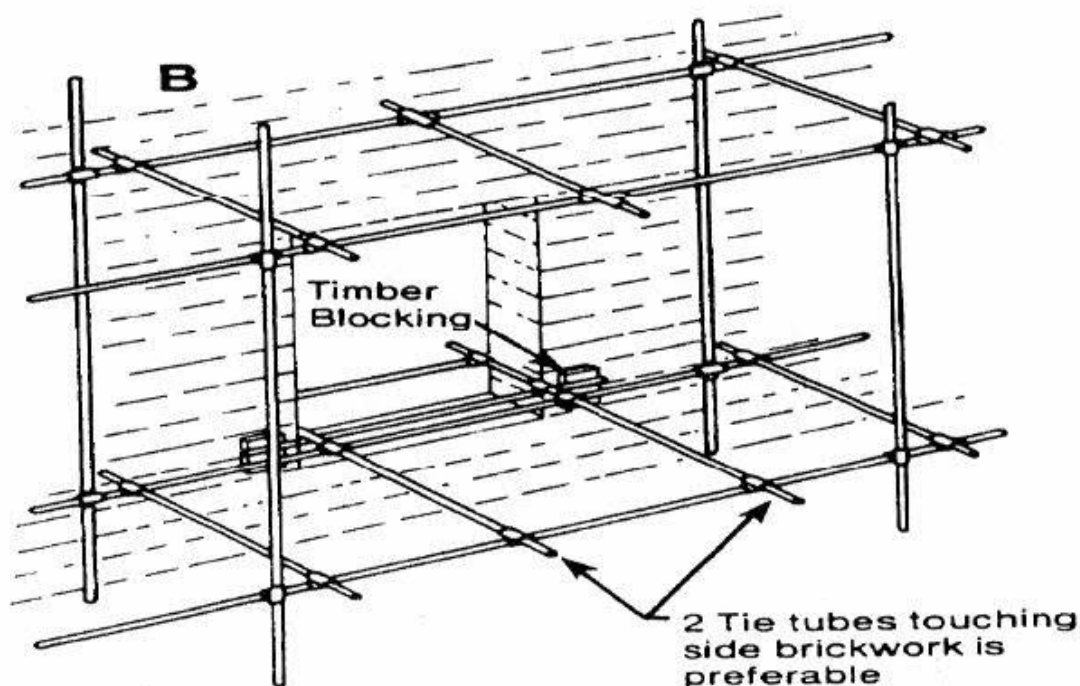


Figure 11

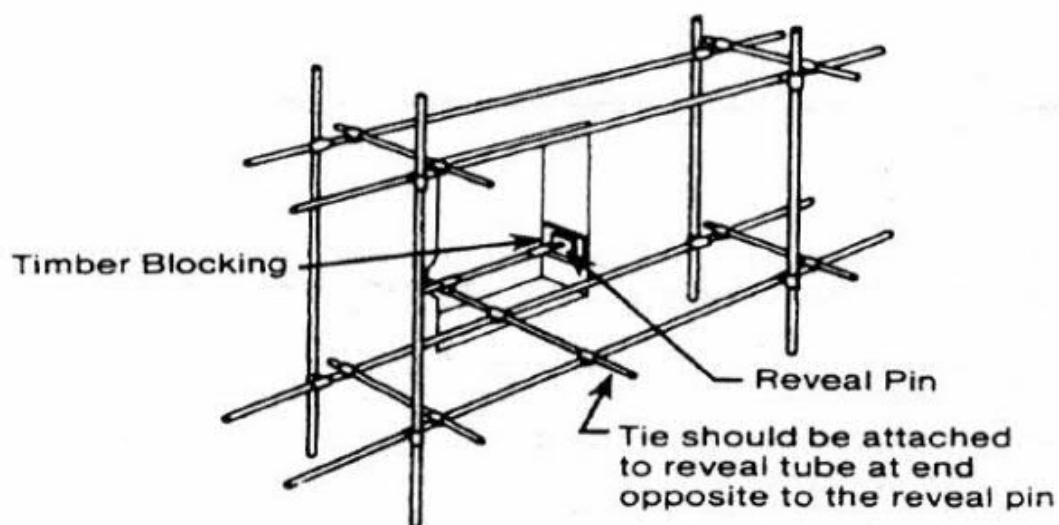


Figure 12

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### 8.3 Planking

#### 8.3.1 Steel Planks / Gratings

Steel scaffold planks / gratings shall be minimum 45 mm thickness to be used as per relevant standard.



Figure 13

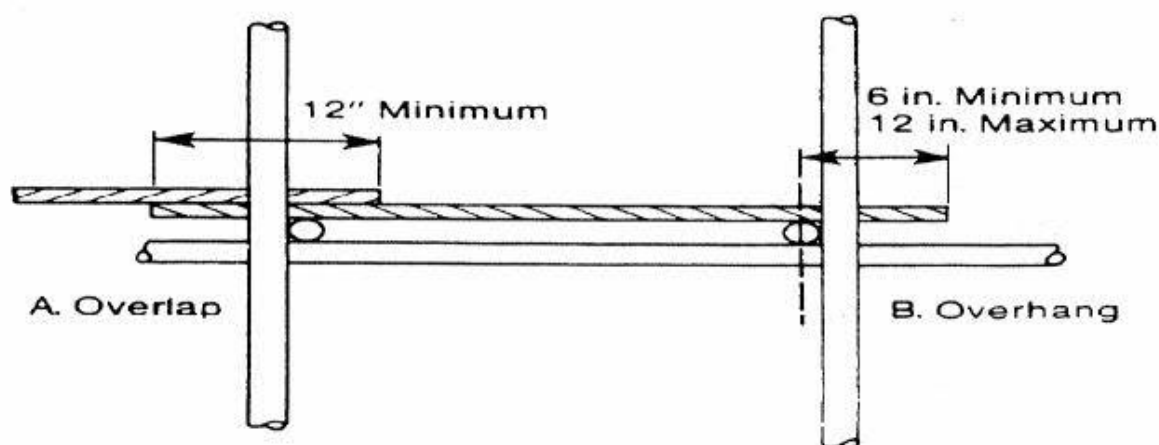
Specification of Walk Boards			
Size (mm)	Weight(kg/pc)	Size(mm)	Weight(kg/pc)
210X45X1.2X4000	14.306	210X45X1.1X4000	13.232
210X45X1.2X3000	10.774	210X45X1.1X3000	9.969
210X45X1.2X2000	7.242	210X45X1.1X2000	6.705
210X45X1.2X1000	3.71	210X45X1.1X1000	3.0442
240X45X1.2X4000	15.669	240X45X1.1X4000	14.501
240X45X1.2X3000	11.801	240X45X1.1X3000	10.927
240X45X1.2X2000	7.932	240X45X1.1X2000	7.349
240X45X1.2X1000	4.064	240X45X1.1X1000	3.772
250X45X1.2X4000	16.508	250X45X1.1X4000	15.277

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<b>250X45X1.2X3000</b>	<b>12.431</b>	<b>250X45X1.1X3000</b>	<b>11.508</b>
<b>250X45X1.2X2000</b>	<b>8.354</b>	<b>250X45X1.1X2000</b>	<b>7.739</b>
<b>250X45X1.2X1000</b>	<b>4.278</b>	<b>250X45X1.1X1000</b>	<b>4.435</b>

### 8.3.2

Wood scaffold planks shall be minimum 32 mm thickness and should be "Scaffold Plank Grade as per OSHA specification". Planking shall extend a minimum of four times the thickness of the board.



**Figure 14**

### 8.4 Platform Width :

1 .Where platform is not more than 2m above the ground :

- a. Painters, decorators / similar workmen - 300mm;
- b. Other Types (men & tools) - 500mm;

2. Where platform is more than 2m above the ground:

- a. Men, tools & material - 900mm;
- b. Men, tools, material & wheel barrows - 1200mm;

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## 8.5 Ladders

Generally, ladders shall only be used for gaining access or for performing simple tasks where there is no risk of falling. It is safer to set up and use work platforms, scaffolds or mobile platforms for heavy or lengthy work.

- Ladders used as access to and egress from scaffolds shall comply with the following requirements.
- Ladders shall be secured at the top and bottom to prevent the ladder from slipping or falling.
- Ladder access shall be provided to the scaffold platform.
- All access or scaffold ladders shall extend 1m past the step-off point to provide a solid handhold while moving on or off the ladder.
- Extendable ladders are not to be used as any part of a scaffold.
- Ladder access areas shall be maintained free from grease, oil, rubbish and debris.
- Where possible all ladders used on the Project should be tied at the top, and secured at the bottom.
- Straight ladders shall be fitted with "Approved" safety feet at the base.
- Select the correct ladder for the job. It shall comply with the following:
- It shall be used at a slope of no greater than 4 in 1 .
- It shall extend at least 1m above the platform to be reached; or
- The user stands no higher than 1m of the third rung from the top when in the working position.
- Metal ladders shall not be used in the vicinity of, electrical wires or equipment where there is the possibility of contact between live wires and the metal ladder
- Inspect all ladders prior to use.
- Broken or damaged ladders shall be removed from service and tagged 'Out of Service' immediately.
- Ladders shall not be placed on boxes or loose timber to gain height.
- Barriers shall be used to protect ladders from contact from mobile equipment, personnel and other hazards.
- Rungs shall be kept free of grease, oil and other contaminants.
- A register of all ladders used on site shall be maintained.
- When ascending or descending a ladder the user shall face the ladder and always maintain 3 Points Contact of limbs to ladder.

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## 9. Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN-LP-CHM-099

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**Attachments and forms: NIL**

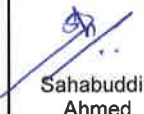



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Valid until: 12. 2021

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**This procedure replaces HSE-CON-IN-015**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS-India Local IMS Standard	10/12/18		21/12/18		21/12/18		21/12/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
No project-specific adaptation								
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### 1. Scope

This HSE procedure is applicable for site security and access control during the execution stage of project at construction sites. This procedure shall apply to all thyssenkrupp Industrial solutions India project sites. This document remains unchanged in all the projects.

These minimum requirements do not invalidate the applicable regulations. Therefore, if in some cases stricter regulations exist, they shall be given priority.

### 2. Aim

This HSE procedure is aimed to eliminate unauthorized entry of personnel and equipment to the site premises and thus ensuring a secure and safe environment for the project staff and to preserve the integrity of the project assets. Efficient access control will also aid the identification of all persons on site in the event of disasters or emergencies. The area into which access is to be controlled will be limited to site perimeter.

This procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements for site security and access control at sites. In addition to this procedure, client /owner applicable requirements are also to be followed. As a rule, the most stringent requirement shall be implemented.

### 3. Definitions / Abbreviations

Contractor means the agency appointed by owner or tkIS India for carrying out specific work.

Owner / Client means the organisation which retains tkIS India for the purpose of the project.

Subcontractor means the agency which takes part of a contract from the contractor.

Vendor means a supplier who provides goods or services to Owner / tkIS India.

COM Commissioning Manager

HSE Health Safety Environment

PPE Personal Protective Equipment

SSI Site Superintendent

SSV Site Supervisor

SM Site Manager

tkIS India thyssenkrupp Industrial Solutions (India) Private Limited



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#### 4. Responsibilities

The responsibilities of site personnel related to this procedure is given below:

Site Manager (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India Site Superintendent (SSI) / Site Supervisor (SSV)	Responsible to implement this procedure and to ensure: (i) that relevant personnel are informed about this procedure, and other relevant statutory training requirements. (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods. (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India site HSE personnel	(i) Responsible to assist SM in effective implementation of this procedure on site. (ii) To assist SSI / SSV in identification, assessment, evaluation and control methods for likely hazards associated with the activity. (iii) To ensure that necessary administration of records required by this procedure.
Contractor engineers/ Supervisors/ HSE personnel	(i) Carry out hazard identification & risk assessment for activity, as applicable and submit to tkIS India for comments / approval prior to commencement of the respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

#### 5. Procedure

Site specific access control procedure shall be developed in accordance with project requirement and based on the following guidelines.

All access control requirements shall be communicated to relevant personnel.

##### 5.1 Site premises

Site premises should be fully secured by appropriate fencing or boundry wall, with access gate and security arrangement. Till the installation of fencing or boundry wall, proper security arrangements are to be made to secure the site.

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## 5.2 Entry procedure

- The minimum requirement is that access control arrangements shall be in place to ensure that only identifiable project related personnel, who have completed necessary HSE induction training, are allowed unsupervised access to the work location.
- All other persons shall be identified before entry is allowed and shall be supervised/ accompanied by authorized personnel whilst on site.
- All persons whilst on site shall wear suitable visible means of identification as per tkIS India minimum PPE requirement at site.
- All persons upon entry to site may be subject to security check.
- Generally, site Identification badges shall be provided to personnel who will work at site for long term.
- Temporary passes shall be issued to all visitors and temporary personnel working at site, which shall be displayed or produced as required.

## 5.3 Site Identification badges

Identification badges shall be issued to employees and authorized contractors who have completed their HSE induction training.

Identification badge as a minimum shall provide information on:

- Issue and control arrangements (medical examination, HSE induction and other site specific requirements if any)
- Validity
- Lost, found, replacement and destruction as per site specific requirement.
- Identification badge recovery arrangements as per site specific requirement.

## 5.4 Temporary passes

The issuance, control and display of temporary passes for visitors, temporary employees and contractors shall be as per item 5.2 / 5.3 of this document or as applicable at site.

Temporary pass holders shall be briefed on safety and security instructions. The validity of such security instruction will be of 6 months or after any major change in the site or hazards. On arrival, their visit shall be authenticated with their host and they shall be escorted whilst on site. Temporary passes shall always be recovered at the end of their validity period.

## 5.5 Vehicle and mobile equipment access control and parking arrangements

Vehicle and mobile equipment access shall be controlled using a manned barrier or as per site requirement and shall be subject to inspection.

All heavy construction mobile equipment shall only be permitted to enter site upon providing a valid legal documents as applicable. They shall be subject to independent inspection on-site as required.

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All vehicles and mobile equipment shall be monitored in and then directed to their specific parking or unloading areas.

Wherever possible, a separate access controlled parking area for tkIS India's vehicles with vehicle pass displayed shall be made available.

Vehicle parking area shall be identified and communicated.

Vehicles and mobile equipments shall not obstruct emergency access routes or facilities.

#### 5.6 Beyond normal working hours access

Requirement of any person who may have to be on site after normal working hours or on official holidays and weekends is to be informed to tkIS India site management for approval.

Arrangement to supervise their work and security of the site and office shall be arranged accordingly.

#### 5.7 Prevention of unidentified personnel at site

All tkIS India staff can check anyone on site whom they do not recognize or who do not produce any identification document issued by site management, or who is not escorted by a tkIS India colleague or authorized client/contractor representative.

The person(s) shall then be politely asked to identify themselves.

The presence of any unauthorized person or vehicle on site shall be reported to site management for further action.

#### 5.8 Access records

It is a sensible practice to be able to identify who and what vehicle is on site at any given moment, especially if an emergency evacuation of the site is required. Nevertheless, any records that are made shall be kept for at least six months, so that if any breach of security occurs, investigation to establish who was on site at the time can be carried out, if appropriate.

#### 5.9 Power of search

Random but recorded searches of personnel and vehicles both in and out of the premises may be carried out. Local regulations shall be applied and the following points shall be considered:

- It is acceptable to deny access to any person who does not agree to search vehicle or personnel. (A person needs to give his consent before being searched.)
- An individual also has the right to withdraw his consent to be searched at any time. This right shall be respected, however tkIS India reserves the right to deny entry.
- More detailed searching shall only be carried out by persons who have been trained and comply with the applicable local rules and laws. A person of the same sex shall only search an individual. If necessary, searching shall be carried out privately in a separate room with at least one searcher and one witness.
- Searching of individuals and their vehicles is a very sensitive operation, which must and shall be conducted with extreme tact and courtesy.
- Relevant details shall be recorded.

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#### 5.10 Exit procedure

Exit procedure shall be an exact reversal of access procedure, whether the systems are manual or computer controlled. Site management shall insist that exit procedure is adhered to, and passes returned where necessary. Searches of individuals shall be carried out as appropriate.

Site management shall be responsible to make certain that locking up procedure is in place to ensure the security of all offices and installations at the end of the working day.

#### 5.11 Removal of property

If a person or visitor is authorized to remove property or sensitive information from site, he shall be issued with the appropriate written authority, which shall be produced when necessary.

### 6. Records

Following records shall be maintained at site:

- list of vehicles;
- random inspection for personnel and vehicles.

Additional records if any as required by this procedure shall be maintained.

### 7. References

Nil

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## Attachments and forms:

Annex: Appendix 1 - Hazards of Air Contaminants

Appendix-2 - Alternative methods for abrasive blasting

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Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS India Local QM Standard	10.12.18	Sahabuddin Ahmed	21.12.18	Indranil Chakraborty/Ra jnish Bhandari	21.12.18	Nitin Pandit	31.12.18	A. K. Ladia
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
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### 1. Scope

This HSE instruction is applicable for spray painting and abrasive blasting during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

This HSE instruction is aimed at providing guidelines and defining requirements for safe system of work for spray painting and abrasive blasting.

The instruction sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements.

However, the most stringent requirement shall be implemented.

### 3. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India Construction Engineer	Responsible to implement this procedure and to ensure: (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods. (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site. (ii) To assist construction engineer identification, assessment, evaluation, control methods for likely hazards associated with the activity. (iii) To ensure that necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ HSE Personnel	(i) Carry out HIRA for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

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#### 4. Procedure

##### 4.1 Spray Painting

Spray painting refers to the process by which a liquid coating substance, such as paint, is converted into a mist or aerosol in order to apply a coating onto an object or surface. This process is widely used in the automotive, aircraft, furniture, metal fabrication and construction industries.

Its hazards include exposure to hazardous substances contained in paints, fire, explosion, noise and manual handling.

Health and safety can be affected by exposure to substances through inhalation of vapors, injection of paint and by skin contact. The health effects are significant as both short and long term illness and diseases may result. In addition, serious injuries may occur from fire and explosion arising from the spraying process.

##### 4.1.1 Special needs of Workplace

The following guidelines set out certain minimum standard for spray painting; however no two workplaces are exactly the same. The program to manage spray painting at work shall depend on specific work activities the operations require. To determine the action to be taken; the following three basic steps shall be followed:

Look for the hazards in the workplace (Identifying the hazard) – the things that can cause harm, e.g. solvents, two pack paints, epoxies, resins, ignition sources, spray equipment etc.

Work out how serious the health and safety problems might be (Assessing risk) – Decide who might be in danger (e.g. concerned worker, employees, customers), the factors contributing to the risk, what injuries or impact on health and safety could result (e.g. allergic contact dermatitis, occupational asthma, MSDS data), and how likely this is to occur.

Eliminate or control hazards by making change that protects people (eliminating or controlling the risk). For example, always use a spray booth, substitute a hazardous substance with a less dangerous one, install appropriate exhaust ventilation, develop agreed safety procedures and always use protective equipment to support other control measures.

Follow the above 3 steps for every health and safety issue that requires attention for work involving a spray painting. This method helps to work out, the action which shall most effectively safeguard employees.

Looking for hazards is the first step and to get that use Table No. 1 – Common Spray Painting Hazards Tool, which outlines some of the hazards which can cause problems:

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HAZARD	TYPICAL PROBLEMS	TYPICAL SYMPTOMS/ INJURY/ILLNESS/DISEASE
Hazardous substances	Exposure to hazardous substances (e.g. paints, solvents, dusts, powders, resins) because of poor ventilation, faulty equipment, poorly designed spray zones or use in a confined space	Short term effects such as nausea, skin irritation and rashes; long term illness like occupational asthma, lung cancer and sensitisation (in effect becoming allergic to the paint).
Fire and explosion	Spray painting mists containing flammable substances ignited by heat sources like sparks from inappropriate electrical equipment or hot surfaces.	Shock, burns, loss of consciousness, death
Electricity	Contact with electrical current when undertaking wet work.	Shock, burns, loss of consciousness, death
Plant	Malfunction of ventilation, electric shock	Respiratory disease, burns, electrocution
Manual handling	Holding a heavy spray painting gun above shoulder height for extended periods; awkward twisting or bending to spray object; moving the item being sprayed; handling large paint drums.	Sprains, strains, fractures
Noise	Noise from pumps, motors or compressed air spraying the paint	Hearing loss, fatigue

Table No. 1: Common spray painting hazards tool

This Tool is not a comprehensive guide to spray painting hazards. It provides examples of typical problems created by spray painting and some of the injuries, illness or diseases that can result. At site, there may be hazards other than those listed at Table No.1.

#### 4.1.2 Health and Safety Risks

The hazards associated with spray painting can be identified during three key stages:

Preparation (Overall set up of job, paint and surface preparation, mixing and pouring)

Use (spray painting operations and work practices)

Clean up (cleaning, maintenance and storage)

In each of these stages, the things likely to cause most harm to employees are the substances used in the spraying process. Most of the paints, solvents, dusts and powders used commonly in spray painting are classified as hazardous substances.



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Hazardous substances shall be managed carefully, following the manufacturer's guidance for use, including precautions that must be taken. In some cases it may be required to keep a check on the health of employees working with particular hazardous substances.

Whilst all the hazards mentioned in the common spray painting tool require an assessment to work out how serious a problem is, managing hazardous substances requires some very specific steps which are outlined below.

#### Assessing the Risks of using hazardous substances in spray painting: Preparation

Hazardous substances can be identified by their labels and Material Safety Data Sheet (MSDS). The MSDS shall provide information about a substance, including:

A statement that the substance is hazardous.

Chemical and physical properties of the substance (such as boiling point, solubility in water);

Its ingredients (and their proportions)

Short and long term health effects;

How the substance can enter the human body (called "routes of entry")

- by inhalation (e.g. vapours from spraying)
- by ingestion (e.g. unlabelled substance mistakenly );
- by skin contact or absorption (e.g. use of solvents in clean up)
- by injection (e.g. of paint in high pressure spray painting);

Precautions for use and recommended personal protective equipment;

First aid information;

Exposure standards that set out the airborne concentration of a substance within a person's breathing zone. These standards might relate to acceptable levels for a period of 8 hours per day, or to shorter periods (e.g. 15 minutes) for substances known to create immediate danger to health.

tkIS India / Contractor shall obtain the MSDS for a hazardous substance before, or on the first occasion it is supplied. The MSDS shall be readily accessible to any employee. The MSDS shall be kept up to date by the manufacturer.

The information in the MSDS is vital to safe and healthy spray painting operations. tkIS India /Contractor shall have the MSDS for each substance they use. The information in MSDS shall be communicated to all employees who may be exposed to the substance and documented up to date.

The 'preparation' assessment factors that shall be taken into account include:

The way the substance could enter the body

Surface preparation can create dusts that contain hazardous substances such as lead and carbon fibres that could be inhaled by workers. Pouring liquids from one container to another could also release vapours that could be inhaled. Inhalation of vapours and aerosols, injection by high pressure equipment and skin contact are the most likely ways substances used in spray painting can enter the human body. The MSDS provides this information.

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#### The health effects of the substance

The MSDS shall provide the basic information about possible short and long term health effects. Isocyanates, commonly found in two pack paints, are skin and eye irritants. Inhaling them can cause respiratory 'sensitisation' (asthma like symptoms).

#### Other hazards related to the substance

Many of the substances used in spray painting are flammable and the risks of fire and explosion need to be considered. Dust generated by sanding or grinding operations may also create health effects, especially respiratory problems.

#### The nature of the work

Exposure to hazardous substances needs to be considered in relation to different stages in the process:

Preparation such as wet/dry sanding and rust conversion

Mixing two pack paints, for example, may present a risk of inhalation and skin contact

Colour matching involving spraying could lead to inhalation and skin contact

Spray painting releases aerosols and vapours which present risks to health

Clean up using solvents could result in high level, short term inhalation and skin contact

Working out the risk involved at each stage shall depend on the practices which are currently in use to minimise exposure.

#### The number of people who could be exposed

Consider how many employees are in an area where they could be exposed to hazardous substances through any of the "routes of entry" to the body.

#### How often and for how long people are exposed

For the typical spray painting jobs, work out how often all, or some of employees, are exposed to hazards. Work out the length of time people are exposed to hazardous substances. The outcome of this assessment factor shall also depend on what measures are currently being used to prevent exposure.

These assessment factors shall be considered when setting up your spray painting health and safety plan. If you are still unsure about whether the substances you are using create risks, it is recommended that you get expert assistance to monitor the atmosphere where spraying is being done. This will give you a more detailed basis for deciding how to fix identified problems.

#### Assessing the risks of using hazardous substances in spray painting: Use and Work Practices

tkIS India / Contractor shall ensure that:

- spray painting is carried out in a spray booth; and
- no persons (other than persons required to be in the spray booth as part of the spraying process)
- any persons in a spray booth during spray painting are wearing appropriate personal protective equipment.

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The assessment of risks in the planning and preparation stage may only need once. If the product used is changed or the work practices involved; or new information becomes available, then it shall be reviewed.

It is the combination of the substances, the jobs they are applied to and the work practices that determines the safeguards which need to be put in place.

It is necessary to look at what is being currently carried out to protect employees. The use and work practices assessment factors shall include:

The nature of the object being sprayed

The size and shape of the object, and the ease of moving it, shall be considered. More importantly. The location of the object in relation to the painter and other employees shall be looked at. The direction of the stream of ventilating air is critical in assessing risks. Direction of airflow can increase risk where the overspray blows back to the operator or is directed toward other employees.

The nature and effectiveness of booths used to isolate people from spray hazards

Some workplaces use fully automated spray painting, in which objects are fully enclosed in a booth and employees are separated from hazardous substances. Automotive spraying, for example, requires a fully enclosed booth. In most cases combination of booths and personal protective equipment shall be required. The likelihood of exposure is greatest where the enclosure does not effectively isolate the painter or other employees.

On a construction site sometimes spray painting may not be practicable in a booth. Measures to protect employees and others in the area shall be dealt with potential for exposure.

Where spray painting is undertaken outside a booth, a zone shall be designed to isolate the activity from other people and from potential sources of ignition. This zone can be both physical barrier to restrict access or a time period over which concentrations of hazardous substances shall break down to an acceptable level.

These considerations shall depend on the assessment done in the preparation stage.

The type of ventilation used to minimise exposure to hazardous substances

Effective ventilation can reduce the risk of inhalation of substances and reduce contact with skin and eyes. It has the additional benefit of reducing fire and explosion hazards.

A down draft spray booth is considered the most effective form of ventilation and produces lower levels of overspray. Filtered air enters through the ceiling of booth and exit through the floor. Fully enclosed standard wet wall or filter type booths are also highly effective and commonly used.

Local exhaust ventilation draws contaminants into a hood and captures the overspray and vapour as close to the source of spraying as possible.

Dilution ventilation is the displacement of contaminated air by fresh air and may be achieved by mechanical supply fans or by natural air currents.

The ventilation system which shall be more effective as per site conditions shall be selected and implemented.

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### The type of spray painting undertaken

There are various techniques which may be used in spray painting. These techniques shall vary according to the job and the type of coating used. Each has characteristics that shall be understood to undertake work safely.

Conventional Compressed Air (low pressure) spray painting creates problems with extensive overspray, whilst airless (high pressure) spray painting reduces overspray and requires less solvent in the paint.

Electrostatic spray painting reduces rebound and overspray; however, the ignition of vapours by an electrical discharge is a hazard involved with this process. Earthing and isolation of electrical equipment and measures to prevent electrostatic builds-ups are essential.

The specific safety requirements for electrostatic spray painting are – equipment shall have automatic power disconnection and warning device that activate if any conveyor carrying articles through the high voltage field stops; hand held equipment shall be effectively earthed along with the articles being painted, metal work of a booth and any metal articles inside or within 2 meters of the booth; A sign bearing the words DANGER – HIGH VOLTAGE shall be clearly attached to equipment used in electrostatic spray painting and an exhaust system shall be in operation whilst any electrostatic spray painting is undertaken.

### Spray Painting Work Practices

Using correct equipment and techniques shall reduce employee exposure to hazardous substances. Good work practices include:

- Adjusting the spraying distance to reduce overspray
- Adjusting spraying pressure to reduce overspray
- Selecting appropriate spray nozzles to minimise overspray
- Selecting the best spray method for the job.

### Use of personal protective equipment (PPE)

In general, poorly chosen PPE and the inappropriate use of PPE, are the factors contributing to greater exposure to hazardous substances.

PPE is an essential part of reducing risks and shall be used as an additional measure to booths. Over reliance on PPE may be a risk factor that shall be assessed when developing reliable ways to limiting exposure to hazardous substances.

The PPE used shall follow the recommendations on the MSDS and the properly fitted and maintained. Consultation with the PPE supplier can also assist in matching equipment to the spray painting process to be used. Employees shall be consulted on the choice of PPE and trained in its correct use.

It is important to wear the appropriate PPE to minimise the risk from equipment and materials during spray painting. Through out the preparation, application, clean-up and maintenance stages the following precautionary steps shall be taken:

A long sleeve, long-legged cotton overall shall always be worn. This shall be preferably be a minimum of 60% cotton and shall be white preferably for work in hot climates. A second disposable overall with a hood shall be worn over the cotton overalls. Overalls shall be fit well and not impair movement.

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Chemical-resistant, long-sleeve gloves or gauntlets which overlap the overalls shall be worn. They can protect against exposure from solvents and also help minimise physical damage from cuts and bruises. They shall fit well and not impair dexterity.

Safety shoes shall be worn

Eye protection is mandatory for all members of the application team. A full-face mask, safety goggles or safety spectacles shall be worn. The lens or face mask material shall be resistant to the solvent being used.

Anyone likely to come into contact with spray paint mists or vapours shall wear appropriate respiratory protection.

Assessing the risks of using hazardous substances in spray painting: Clean Up and Maintenance

The risks associated with spray painting do not cease when spray painting job is completed. It is also important to look at problems involved in the clean up and maintenance stages.

The clean up and maintenance stage assessment shall consider the following factors:

Labelling of unused or surplus liquid

When a substance like paint or thinner is poured from one container to another and is not used immediately, the container shall be labelled. The label shall include the product name and the 'risk and safety phrases' outlined in the MSDS.

Where there is surplus product not used immediately, it shall be returned to a labelled container designated for that substance.

Storage of spray painting supplies

Only the minimum quantity of supplies shall be kept in readiness near the spray zone. All other product shall be stored in a separate room or storage cabinet. Flammable substances shall be kept in tightly closed, clearly labelled containers.

Cleaning and maintenance of spray booths and associated equipment

Spray guns and associated plant shall be regularly cleaned and checked in accordance with manufacturer's instructions. Hoses and lines conveying flammable liquids also need to be regularly maintained. Employees shall be protected in the clean up process to minimise contact with substances.

If not regularly cleaned and maintained, spray booths shall gradually become ineffective in providing protection. In addition the build up of dried overspray on surfaces contributes to an increased fire hazard.

Ventilation systems shall also be cleaned and maintained. Filters and hoses shall be regularly checked.

Personal clean up practices

The use of solvents to clean the hands or body likely to lead to absorption through the skin: water based cleaners are more appropriate. Cleaning rags saturated with paint or solvent and left in open bins create both an inhalation risk and fire risk. The use of lidded wet bins is recommended.

The number of factors need to be considered, highlights the range of problems spray painting presents, and the many ways in which people can be exposed to hazards, often resulting in harmful health effects.

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#### 4.1.3 Spray painting safety requirements

Having worked out how serious the HSE issues are, it is necessary to take action to fix these issues. The more thorough the risk assessments are conducted, as mentioned earlier (4.1.2.1, 4.1.2.2 and 4.1.2.3), we shall have more options for eliminating or controlling risks. This is because the issues are closely related to each other; this shall be kept in mind when we try to fix any one of them.

For example, using poorly adjusted spray equipment shall result in more overspray and potential exposure for the employees. In turn, this shall lead to a build up of paint on surfaces and increased risk of fire. In addition, inefficient spraying shall raise costs and encourage people to cut corners to meet margins. This vicious cycle can pose a serious threat to the health of employees.

The following safety requirements are drawn from the assessment factors set out in the three stages and include:

Follow the recommendations on the MSDS

The MSDS outlines the basic plan to reduce risks associated with hazardous substances used in spray painting. Use MSDS for each substance as the starting point and fine tune the site specific plan so that it addresses the circumstances which shall apply to the specific site/workplace.

Keep records of the hazardous substances in use at site and their corresponding risk assessment

Maintaining records of hazardous substances in use at site and their risk assessment is also statutory requirement. In any case it is an essential part of risk control plan, as it provides a ready reference as to how things shall be managed.

Minimise the use of most hazardous substances if any, where site construction team can decide about the use of substance.

There may be a number of options for minimizing the use of hazardous substances:

Try to replace solvent based cleansers with water based cleansers

Use water based paints where possible, minimising the use of polyurethane and acrylic lacquers and 2 pack paints.

Where it is required to use highly hazardous substances like Isocyanates (found in hardners), adapt spray techniques which minimise the level of overspray and rebound.

Look at alternative ways of applying paint for some jobs.

Separate people from the hazard by establishing a spray zone

A spray zone is a specific area for spray painting that limits entry by use of physical barriers or time delays. The size of the spray zone and the time delay shall depend on the nature of the substances being used. The spray zone can be within an enclosure or booth or may be applied in an open air situation. In either circumstance, the zone shall be designated with warning signs (e.g. 'SPRAY ZONE: UNAUTHORIZED PEOPLE KEEP OUT. NO SMOKING, NAKED FLAMES OR OTHER SOURCES OF IGNITION')

Barriers to restrict entry of unprotected persons to the zone shall be constructed and ignition sources (e.g. lit cigarettes, abrasive grinding) shall be removed.

The spray zone shall be clear of substances not immediately needed, and wastes shall be removed from the area to minimise fire risks. A spray zone can only provide limited protection to painters and other people and shall only be an option where a spray booth is not practicable.

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Install suitable ventilation to reduce exposure to hazardous substances

Ventilation is a primary means of reducing the level of vapours and aerosols in the atmosphere in which spray painting work is done. It also reduces the risk of fire or explosion. Where practicable a spray booth shall be used as this is the most effective way of reducing hazards. The types of ventilation in order of effectiveness are:

Down draft spray booth

An open spray booth

Local exhaust ventilation (exhaust fan extraction)

Dilution ventilation (use fans or natural air currents to displace contaminated air)

Even though down draft spray booths are the most effective, other measures like PPE shall still be required.

For the less effective dilution ventilation system, there are practices that shall be followed to achieve a minimum level of safety. They include:

ensuring the operator is always between the air inlet supply and the source of vapours;

ensuring the exhaust outlets are as close to the spray painting as possible;

setting up the system to ensure the air flows through the spray zone and does not re-enter the work area.

Minimise electrical safety risks and ignition sources

All equipment located within the spray painting zone shall be checked to ensure that it is safe and suitable for use in such an area. Normal domestic electrical equipment, motors, power tools, heaters etc., may become dangerous as ignition sources.

Some spray painting processes, like electrostatic painting and airless spray painting, can produce static electricity: all equipment and containers shall be earthed.

Use practices that minimise the exposure of the spray painter

Whatever other measures are used (booths, PPE) additional protection can be gained by adopting work practices that further minimise exposure. The painter shall avoid being positioned between the object being sprayed and the exhaust. This can be achieved by:

using 'in line' spray booths, to ensure operators do not spray towards each other or other persons.

rotating objects on turntables or hooks to avoid spraying against the airflow.

Keeping spray below shoulder height when using down draft booths.

Use clean up and storage practices that minimise exposure and fire risks

Use of water based cleansers, soaking cleaning rags in "wet bins", and ensuring surplus or unused product is correctly labelled and sealed are among the standard practices that shall be adopted. Make sure suitable wash up facilities are available.

Storage of substances shall also take into account their other properties (as flammables or combustibles). Use of separate storage areas and storage cabinets shall be required to meet legal

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obligations in regard to Dangerous Goods. Waste paint, solvents and clean up materials shall be safely disposed off as per statutory requirement.

Use and maintain Personal Protective Equipment (PPE) in addition to other measures

The MSDS shall state what PPE is appropriate: its recommendations shall be followed where applicable. Recommended PPE might include: Air supplied respirators, half face particulate respirators, eye protection, suitable gloves and overalls, hearing protection. This equipment shall be used in conjunction with other risk control measures.

Employees need to be involved in the selection of fitting of PPE and trained in its correct use. PPE shall be suitably stored away from sources of contamination and regularly inspected for signs of wear and tear. Filters shall be regularly checked and replaced when necessary. All the PPE shall be of applicable National Standard.

Be prepared for emergencies

Leaks, spills or uncontrolled release of hazardous substances may occur despite the best efforts and emergency plans shall be developed for such an eventuality. Correct labelling and availability of MSDS shall make any situation easier to deal with and provide the basis for procedures that staff can be trained in. Fire protection measures shall be in place, first aid and emergency plans shall be included as part of the plan.

## 4.2 Abrasive Blasting

Abrasive blasting is the operation of forcibly propelling a stream of abrasive material against surface under high pressure to smooth a rough surface, roughen smooth surface, shape surface or remove surface contaminants. A pressurized fluid, typically air or a centrifugal wheel is used to propel the media.

In the construction industry, abrasive blasting is the most common surface preparation technique used to remove old paint and other surface materials such as rust, mill scale, dirt and salts. Abrasive blasting shall be conducted during structural steel fabrication, vessel fabrication (e.g. on piping, steel plates and steel members used in structural assemblies and other miscellaneous materials) and during any plant maintenance and repair/shutdown operations that include blasting and painting.

Generally, in abrasive blasting, compressed air is used to propel abrasive material from a blast pot, through a blasting hose to a nozzle, where it is directed to the work area at high velocity by the operator. Air pressure is typically, at 100 pounds per square inch and nozzle velocities can approach 650 – 1700 feet per second. Abrasive blasting is usually conducted manually with in a blasting booth.

### 4.2.1 Hazards

Employees who engage in abrasive blasting are at an increased risk of exposure to toxic dusts, high noise levels and a range of other safety and health hazards like slips and trips; Heat; working at height; confined spaces; vibration and other ergonomic hazards; high-pressure etc. Helpers (e.g. the "pot tender" and cleanup personnel) and others may also be at risk if they work in vicinity of areas where abrasive blasting is conducted.

Air contaminants

Potential exposure to dust and air contaminants is the primary health hazard associated with abrasive blasting. Abrasive blasting can generate large quantities of dust that can contain high levels of toxic air contaminants. The source of the air contaminants includes the base material being used, the surface coating(s) being removed, the abrasive being used, and any abrasive contamination from previous blasting operations. This means that employees can have exposures to multiple air contaminants from both the abrasive and the surface being blasted. Potential air contaminants that might be associated with abrasive blasting and their sources are listed in Table 1.



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SOURCE	POTENTIAL AIR CONTAMINANTS
Base Material  (e.g. steel, aluminium, stainless steel, galvanized steel, copper-nickel and other copper alloys)	Aluminum, cadmium, chromium, iron, lead, manganese, nickel and zinc
Surface Coatings  (e.g., pre-construction primers, anticorrosive and antifouling paints)	Copper, barium, cadmium, chromium, lead, tributyl tin compounds, zinc
Abrasive Blasting Media  (e.g., coal slag, copper slag, nickel slag, glass, steel grit, garnet)	Arsenic, beryllium, amorphous silica, cadmium, chromium, cobalt, crystalline silica, lead, manganese, nickel, silver, titanium and vanadium

Table 1: Potential Air contaminants associated with abrasive blasting

#### Base materials

The base materials used to fabricate steel include iron-containing (e.g. carbon steel) and non-iron-containing metals. Various grades of mild and high strength steel are used for the structural framework. Other materials such as galvanized steel, stainless steel and copper alloys are also used as per project specific requirements. Depending on the base material being blasted, potential air contaminants might include cadmium, chromium, copper, iron, lead, aluminium, manganese, nickel and zinc.

#### Surface coatings

The interior and exterior surfaces of marine steel structures are protected with coatings that include zinc-based pre-construction primers (shop primers) and metal-based anti-corrosive and antifouling paints. Antifouling paints are used on the marine steel structures to prevent the build up of marine organisms and typically include copper-based and tributyl tin-based paints. Metal based paints are used to protect steel structures from corrosion and can contain up to 30% heavy metals. Lead compounds, such as lead chromate and red lead tetra oxide, have been used extensively in marine paint. Depending on the surface coating being blasted, potential air contaminants might include barium, cadmium, chromium, copper, lead and zinc, organotin compounds and other types of air contaminants.

#### Abrasive blasting media

Common blasting abrasives used for paint removal and surface preparation include coal slag, copper slag and other metallic grit and shot.

The use of non-silica abrasives, such as coal and smelter slags and metallic (e.g., steel shot, cast iron grit, cast iron shot) and mineral abrasives (e.g. garnet, olivine and staurolite), results in non-detectable or lower levels of air borne crystalline silica; but levels of other hazardous air contaminants can be elevated, depending on the abrasive. Hence a careful selection of abrasive blasting media shall be carried out.

#### 4.2.2 Control Measures

Exposure to hazardous air contaminants during abrasive blasting can be controlled through the combined use of the following control measures:

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Engineering controls, work practices, personal hygiene, waste management and prevention programs and personal protective equipment (PPE).

#### Engineering Controls

**Substitution** - The easiest way to eliminate hazardous air contaminants associated with abrasive media is to select a safer abrasive blasting agent that is appropriate for the work which shall be performed. Refer Appendix 1, in which OSHA and BoCW Central Rules 1996, personal exposure limits (PEL) of various air contaminants and their corresponding hazards are given, which can be used in selecting the safe blasting media.

There are important things to keep in mind, which are given below, when selecting an alternative blasting agent:

Depending on the abrasive, alternative abrasive agents can result in elevated levels of other hazardous air contaminants, such as heavy metals.

Alternative abrasive agents containing small amounts of crystalline silica (one percent or less) might result in elevated levels of airborne crystalline silica if used in confined or enclosed spaces, such as tanks, vessels etc.

The use of alternative agents for abrasive blasting can reduce but might not eliminate silica exposures if silica-containing substrates are blasted, such as silica-containing coatings; and

The use of appropriate procedures for the cleanup and disposal of waste material.

#### Isolation or enclosure

It is recommended that abrasive blasting operations be isolated to minimize exposure to employees and prevent exposure to others in work area and the environment.

**Blasting Cabinets** - For small objects a properly designed, sealed and ventilated cabinet can be used to eliminate operator and bystander exposure to hazardous air contaminants.

**Blasting Rooms/booths** - For transportable objects too large for blasting cabinets, a blasting booth where blasting is done manually by one or more operators working inside the booth shall be considered. Blasting booths shall have sufficient ventilation to: (1) provide good operator visibility, (2) prevent dust from settling and accumulating in the room, (3) reduce dust concentrations so that PPE provides adequate protection, and (4) prevent the escape of contaminants into adjacent work areas or the environment. Operators working inside abrasive blasting booths shall be protected by hoods and abrasive blasting airline respirators or by positive-pressure blasting helmets as per applicable National/International Standard.

**Temporary Enclosures** - For large objects or structures that cannot be transported, or fixed structures, temporary enclosures shall be used. Where possible, objects or structures shall be fully enclosed. When full enclosure is not possible, extend screening above object or structure and blast downwards. Air monitoring shall be used to ensure that employees outside the enclosure are not exposed to elevated levels of air contaminants. If high level of air contaminants are detected outside the enclosure; (1) employees shall be excluded from these areas through the use of warning signs and barricades or provided with appropriate PPE and (2) better control measures shall be investigated and implemented.

**Exclusion Zones** - When open air blasting shall be conducted, exclusion zones can be used to protect employees and others in the vicinity from exposure to elevated levels of hazardous air contaminants. Exclusion zones can also be used in conjunction with blasting booths and temporary enclosures. The extent of the zone shall be based on the risk of all unprotected people and the weather conditions at the time of blasting. Exclusion zones shall be posted with appropriate warning signs and restricted to those employees wearing respiratory protection.

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### Process or Equipment Change

If site has control over the selection of process or equipment, refer Appendix-1

### Ventilation

All blast-cleaning enclosures shall be adequately ventilated. Abrasive blasting booths, portable blast-cleaning equipment and temporary containment structures shall have sufficient exhaust ventilation to: (1) prevent a build up of dust-laden air and reduce the concentrations of hazardous air contaminants; (2) prevent any leakage of dust to the outside. Exhaust ventilation systems shall be constructed, installed, inspected and maintained. The exhaust air from blast-cleaning equipment shall be discharged to the outside through an appropriate dust collector to protect the workplace, environment and surrounding community from hazardous air contaminants. The dust collector shall be set up so that the accumulated dust can be emptied and removed without contaminating work areas.

### Work Practices

By using good work practices, the risk of exposure to toxic air contaminants and other safety and health hazards associated with abrasive blasting can be minimized. Such practices shall include:

Using vacuums equipped with High Efficiency Particulate Air (HEPA) filters or wet methods when removing dust.

Scheduling blasting when the least number of people would be exposed;

Blasting in a specified location that is as far away as possible from other employees;

Stopping other work while blasting is taking place;

Cleaning up paint chips, dust and used abrasive daily or as soon as possible after blasting has finished;

Avoiding blasting in windy conditions; and

Posting warning signs to mark the boundaries of work areas contaminated with blasting dust and alerting employees to the hazard and any required PPE.

### Personal Hygiene

Proper personal hygiene practices are to be followed by the concerned employees. These practices are an important control measure for protecting employees from exposure to hazardous contaminants generated during abrasive blasting. Some contaminants, such as lead, are hazardous when inhaled or ingested. Others, such as beryllium, may be hazardous through inhalation and skin contact. Good personal hygiene practices to limit exposure to abrasive blasting dust include the following:

Prohibiting eating, drinking, using tobacco products or applying cosmetics in abrasive blasting areas;

Washing hands and face before eating, drinking, smoking or applying cosmetics;

Changing into clean clothing before leaving the worksite; and

Parking cars where they will not be contaminated with abrasive blasting dust.

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## Personal Protective Equipment (PPE)

### Respiratory Protection

tkIS India requires controls, such as substitution, isolation and ventilation as the primary means of preventing or minimizing exposures to airborne contaminants during activities such as abrasive blasting. However, when such controls cannot keep exposures below the Personal Exposure Limits (PEL), employees shall use NIOSH certified respirators or as per National Standard appropriate respirators for the types of concentrations of airborne contaminants present during abrasive blasting. In all cases, respirators shall be donned before entering contaminated work areas and removed only after leaving.

Abrasive blasting operators shall wear NIOSH-certified type CE abrasive blasting respirator or applicable National standard blasting respirator when:

Working in enclosed or confined spaces; or

Using abrasive media that contains more than one percent crystalline silica.

When not working in enclosed and confined spaces or where abrasives containing less than 1% crystalline silica are used, still abrasive blasters shall be protected with Type CE abrasive blasting respirator or equivalent National Standard blasting respirator or air-purifying respirators with HEPA filters. The respirator selected shall be based on the highest anticipated exposures as determined by an evaluation of the hazards to which employees shall be exposed.

As a minimum, respiratory protection for heavy metals and silica dusts require an air-purifying respirator with HEPA filters. However, if workplace conditions for airborne contaminants or their concentrations are highly variable or are not well understood, respiratory protection with a higher level of protection shall be used.

Appropriate respiratory protection shall be provided for other employees working in areas where concentrations of abrasive materials and dusts are present; and for short, intermittent or occasional dust exposure such as cleanup, dumping of dust collectors or unloading shipments of abrasives.

When respirators are used, it is necessary to establish a comprehensive respiratory protection program. The important elements of this program shall be:

designating a program administrator;

evaluating workplace exposures;

selecting appropriate respirators as per applicable Standard;

medically evaluating employees to determine their ability to perform the work while wearing respirator;

conducting respirator fit testing;

developing procedures for cleaning, inspecting, maintaining and storing respirators;

training employees at least annually;

### Other PPE

In addition to respiratory protection, additional PPE is required for abrasive blasting operators for specific operations. This additional PPE may include:

eye and face protection (if the respirator does not provide this protection);

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a protective helmet (if the respirator design does not provide this protection and there is potential for head injury)

heavy canvas or leather gloves and aprons (or equivalent protection) to protect from the impact of abrasives;

Safety shoes

Hearing protectors to reduce noise levels below the PELs

Fall protection (if working at height)

Other employees, such as the pot tender and abrasive recovery men, working in blasting areas where there is an unsafe condition of abrasive materials and dusts be protected with appropriate eye and respiratory protection.

However, it is required to perform HIRA of worksite to determine the hazards to which employees are exposed to, or likely to be exposed to, that will necessitate issuing PPE. From this assessment, it is necessary to identify PPE that each employee shall need in order to complete the task in a safe and healthful manner.

#### Waste Management and Prevention

Pollutants and wastes typically generated by dry blasting include:

particulate emissions of blasting abrasives and paint chips; and

Large quantities of spent abrasives mixed with paint chips that can enter waterways through storm water or by some other way.

Both of these waste streams can be hazardous to people and the environment because they might contain toxic metals. In addition, cleanup and disposal costs of spent abrasive can be high, especially if it is contaminated with hazardous paints. Such waste shall be disposed as per applicable local statutory requirements.

#### Medical surveillance

Specific substances requiring medical surveillance that might be encountered in abrasive blasting include arsenic, cadmium, hexavalent chromium and lead. Depending on the levels of these air contaminants, it may need to be complying with the requirements of one or more substance-specific standards, including the provision of medical surveillance. Medical surveillance requirements vary depending on the substance and may include: work and medical histories, smoking histories, chest X-rays, blood and urine testing, medical examinations and other tests.

However, it is recommendable that all contractors engaged in abrasive blasting, evaluate the risks of abrasive blasting dusts present to exposed employees and determine what medical surveillance, if any, is required.

#### Training and Information

It is necessary to provide information and training to employees who engage in abrasive blasting activities. Typical information and training shall include:

The location and availability of the written hazard communication program and material safety data sheets (MSDS) for abrasives;

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Instruction about the purpose and set-up of regulated areas marking the boundaries of blasting areas containing hazardous materials, sand and dusts;

Methods and observations that may be used to detect the presence or release of hazardous air contaminants, such as workplace air sampling outside of the blasting area;

Results of any air sampling the contractor or others have conducted for levels of hazardous air contaminants in the workplace;

The physical and health hazards of the air contaminants employees are exposed to;

Discussion about the importance of engineering controls, work practices and personal hygiene in reducing exposure to hazardous air contaminants;

Instruction about the need, use, limitations and care of appropriate PPE (including protective clothing, and respiratory, hearing, and fall protection)

Other controls the contractor has implemented to protect employees from exposure to hazardous air contaminants, such as medical surveillance programs;

Information regarding applicable Standards and Legislations, other safety and health hazards and the control measures implemented to protect employees.

Contractors engaging in abrasive blasting shall research the relevant training requirements to ensure that their employees are protected. The above listing may not be all-inclusive.

#### Other Safety and Health Hazards

##### Exposure to Noise

Abrasive blasting produces noise levels that can cause permanent hearing loss in unprotected employees and others close to the blasting process. The main source of noise is the discharge of compressed air at the blast nozzle. Other noise sources during manual blasting include:

the supply air inside the operator's helmet;

the impact of the abrasive on the surface being blasted;

air compressors;

exhaust ventilation systems; and

air releases during grit pot blow-down.

Small abrasive blasting cabinets are also significant sources of noise exposure for operators. In India, the current PEL is 90 dB(A) (as per Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Central Rules, 1998) for 8 hour time-weighted average. As per OSHA it is 85 dB(A) for 8 hour time-weighted average.

For those employees exposed to elevated levels of noise, noise safety requirements shall be implemented, which include provisions for engineering and administrative controls, employee noise monitoring, audiometric testing, hearing protectors, training and record keeping.

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### High-Speed Particles

Employees engaged in abrasive blasting can be struck by high-speed particles from the blasting media or the surface being blasted (substrate). Potential injuries can include particles becoming embedded in the skin, eye damage, severe cuts and burns.

Control measures to prevent these injuries include:

never pointing a blast nozzle at a person;

using a dead-man control device at the nozzle end of the blasting hose;

ensuring, where possible, that only one employee operates each blast nozzle;

installing guards to protect the operator from high-speed particles;

conducting abrasive blasting in a blasting booth or an enclosure or an area isolated from the workplace to reduce the possibility of employees and others being struck by high-speed particles; and

using appropriate personal protective equipment (PPE) when blowing off with 30 psi (pounds per square inch) air.

### High-Pressure Hazards

Abrasive blasting operators and other employees in the blasting area can be exposed to high-pressure hazards through contact with high-pressure air or water streams, uncontrolled high-pressure hoses and air or water leaks in the equipment. Injuries can be very serious and include loss of sight and body parts (e.g. fingers and hands).

Preventive measures include the following:

Controlled access to the blasting area;

Use of a dead-man control on the blast nozzle;

Use of metal nozzle and hose couplings;

Use of hose-couplings safety locks and hose whip checks;

Inspection of all hoses and connections prior to use; and

Use of appropriate PPE

### Static Electricity

Static electricity can be generated by abrasive blasting equipment, the surfaces being blasted and exhaust ventilation systems (fans and duct work). Static electricity can shock employees and cause fires and explosions by igniting flammables/combustible atmospheres or materials.

The build-up of static electricity can be prevented through the proper use of bonding and grounding. Additionally, blast hoses can be constructed with anti-static rubber linings or fitted with a ground wire or similar mechanism to dissipate static electrical charges.

### Vibration and Other Ergonomic Hazards

Abrasive blasting operators are exposed to hand-arm vibration from the force of the abrasive moving through the blast hose. Prolonged use of abrasive blasting equipment can damage the nerves and blood

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vessels in the fingers and result in a condition known as vibration syndrome (also known as vibration white finger and Reynaud's disease). The signs and symptoms of vibration syndrome include numbness, tingling, blanching (fingers turning pale and ashen), pain and flushing. In advanced cases, individuals lose their manipulative skills (dexterity) and the ability to distinguish between hot and cold objects. If exposure to vibration continues, skin necrosis and gangrene can occur.

Preventive measures for vibration syndrome include:

the use of vibration-reduced equipment such as vibration-isolating handles incorporated into blasting nozzles;

reducing the extent and duration of continuous exposure to vibration through job rotation or more frequent breaks (e.g., a 10 minute break after each hour of continuous blasting);

frequent and careful maintenance of blasting equipment according to manufacturer's recommendations; and

the use of protective gloves to keep hands warm and dry while on the job. Certain gloves designs also reduce vibration.

### Confined Spaces

Confined and enclosed spaces in vessels or vessel section etc., can contain dangerous atmospheres resulting from oxygen deficiency or enrichment and flammable, combustible, toxic, corrosive or irritating substances. Abrasive blasting is a spark-producing operation that is considered "hot" work unless it is physically isolated from a flammable or combustible atmosphere. Abrasive blasting in confined and enclosed spaces can also introduce additional air contaminants such as heavy metals from the abrasive media and/or the surfaces blasted.

In addition, other hazards inherent in the work performed in confined and enclosed spaces may include limited access, ladders, scaffolds, electrical circuits, unguarded openings and others. Such hazards shall be addressed and specific safety practices followed to ensure that spaces are entered and worked in safely. For details of confined space safety please refer the HSE Instruction PIN LP-CHM-023, Confines Space Entry.

### Working at Heights

Falls are a leading cause of fatalities in Construction Industry. If abrasive blasting is carried out at height due to some valid reason, fall hazards for abrasive blasters include:

surges from drops in pressure in the hose line that can be sufficient enough to throw the blaster from the work surface;

shocks from static electricity that might cause the blaster to lose balance and fall when working at heights; and

blasting hoods that visually restrict the vision of the blaster.

Preventive measures include:

protecting the blaster with proper fall protection when adequate protection against falling cannot be provided by guard railings;

bonding and grounding blasting equipment and wearing appropriate gloves and boots to insulate from static electricity; and

Working from scaffolds, not from ladders.



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Other preventive measures include covering or guarding holes, providing adequate lighting so that blasters can see the physical limits of the work surface and all control devices and frequently removing abrasive media from all horizontal surfaces on staging or other elevated work surfaces.

### Slips and Trips

Abrasive blasting operators are exposed to tripping hazards and slippery work surfaces. High levels of airborne dust can also obstruct the blaster's vision.

Cluttered work areas can lead to accidents and cause worker injuries, due to slips, trips and falls, being struck by falling objects, impeded access to exit routes and fire fighting equipment and fires because of improper disposal of flammable /combustible materials (such as rags, paper, cardboard etc.,)

Preventive measures include:

Good housekeeping conditions shall be maintained at all times.

Adequate aisles and passageways shall be maintained in all work areas.

Hoses and electric conductors shall be elevated over or placed under the walkway or working surfaces or be covered by adequate crossover planks.

All working areas shall be kept reasonably free from debris.

Slippery conditions shall be eliminated as they occur.

Means of egress shall be maintained at all times to all exits and to fire extinguishing equipment.

Oils, paints thinners, solvents, waste, rags or other flammable substances shall be kept in fire –resistant covered containers when not in use.

### Heat

Abrasive blasting operators are at risk of heat-related illnesses due to the PPE that is worn (blast helmets and protective suits, some times for long periods of time), the work activity or physical demands of the job and environmental conditions (i.e., temperature, humidity and air movement).

Preventive measures include:

Increased general ventilation

Local exhaust ventilation at points of high heat production or moisture

Reflective shields to redirect radiant heat

Insulation of hot surfaces

Employees shall have adequate potable water close to the work area and shall drink small amounts frequently

Rather than being exposed to heat for extended periods of time, employees shall wherever possible, be permitted to distribute the workload evenly over the day and incorporate work/rest cycles.

Rotating job functions among workers can help minimize overexertion and heat exposure

Employees shall be trained about the hazards of heat exposure and their prevention.

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Additional specific safety requirements

#### Abrasive Blasting Equipment

Regular inspection and maintenance is particularly important for abrasive blasting equipment, as the equipment is self-destructive by nature.

Plant and equipment shall be checked daily by the operator for wear and tear.

Logbooks and inspection check sheets containing a full history of service and repairs of plant and equipment shall be maintained by the service provider

Only trained and competent personnel shall operate abrasive plant and equipment.

#### Air Compressors and Blast Pots

All pressure vessels shall be designed to comply with applicable regulatory standards.

Planned inspection and maintenance of these vessels shall be carried out by trained and competent personnel.

A safety release valve shall be fitted to the compressor or air supplies system and regularly checked.

All valves shall be of a rating equivalent to the pressure vessel and be correctly attached.

It is recommendable to provide muffler to blast pots to reduce noise from escaping air when the machine is depressurised.

Portable blast pots shall be fitted with wheels and be ergonomically designed.

#### Nozzles

Where dry blasting is being conducted, an efficient means for discharging the static electrical charge from the blast nozzle and the object being blasted must be provided.

Abrasive equipment must be fitted with self-actuating cut off devices (dead man) under the direct control of the operator, which can quickly stop the flow of material to the blast nozzle.

The nozzle lining and threads shall be checked for wear and damage daily.

Nozzles washers shall be used and replaced when they show any signs of wear.

#### Dead-man Controls

Dead-man controls must be located near the nozzle so that they can be activated by the operator.

Dead-man controls can either be pneumatic or electric.

Pneumatic controls are only recommended up to 40 metres distance, because of the lag in response time.

Over 40 meters distance, electric controls shall be fitted to ensure immediate response.

Dead-man controls shall be checked every day.

Dead-man controls or the parts shall never be removed/ modified or substituted.

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Movement of dead-man controls shall never be taped down or restricted.

Blast Hoses, Hose Whips and Couplings

Blast hose shall be designed for the purpose.

Blast hose safe working pressure shall never be exceeded.

Hoses shall be constructed with anti-static rubber lining or fitted with earth wire or similar mechanism to prevent electric shock.

Hoses shall be kept as straight as possible – never blast with a curled hose.

Hose whip check or coupling safety locks or both must be fitted to hoses.

Use safety cables to support the weight of suspended hoses.

Do not patch damaged hoses.

Store blast hoses away from oils, corrosives and chemicals.

Water Blasting Equipment

Nozzles must be fitted with a dead-man control.

High-pressure hoses must be secured not more than 3 metres from the operator.

All bypass valves shall be fitted with pressure release valves.

Water blasting equipment must have a flow rate sufficient to prevent dust getting formed on the surface being blasted.

Inhibitors containing chromate, nitrate and nitrite must not be used.

Temporary Enclosures

Where possible, the object shall be fully enclosed, where this is not possible, the enclosure should extend 2 metres above the object and the blasting shall be conducted downward.

Enclosures shall be made of puncture and tear resistant material such as woven polypropylene fabric. Shade cloth will not prevent the escape of fine dust and shall not be used for temporary enclosures to contain work generating toxic dusts.

Respirators and Supplied Air for Respiratory Equipment

People inside blasting chambers or enclosures must wear a blasting helmet with an air supply and respirator.

Supplied air to respirators must be at a rate of at least 170 litres/min; it must contain not less than 19.5% but not more than 22% oxygen by volume.

Supplied air must be passed through a purifying device to ensure that it does not contain objectionable or nauseating odours.

It must be passed through a condensate trap to remove free water and through a circulator-controlled leak to remove stale air.

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The compressed air equipment shall also have a thermostatically controlled interlock to cut off the air supply if it overheats.

Hose connection must be of a type that will prevent accidental disconnection.

Hose shall not be placed where they can be run over by vehicles.

Eye, Skin and Foot Protection

Eye, skin and foot protection must be worn by people engaged in blasting activities.

Protective equipment shall comply with national standards.

PPE (Personal Protective Equipment)

Following is the summary of PPE generally required in abrasive blasting and spray painting process.

However, the final selection of PPE shall be on the basis of HIRA.

Respiratory Protection – Abrasive blasting helmets with fresh air blower, Dust respirators, Chemical cartridge, Air fed helmet or respirator and nuisance dust masks.

Eye Protection – Safety goggles, Full-face visors and safety glasses.

Hearing protection

Protective Clothing – Overalls; dustcoats; disposable coveralls; rubber, leather or chemical-proof gloves.

Compressor Hoses - to have wire restraining lines, correct air filters and water traps.

All PPE supplied for use on the Project shall comply with the relevant national standard

## 5. Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN LP-CHM-099.

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### Appendix 1

#### Hazards of Air Contaminants

Contaminant name as per OSHA	Contaminant name as per BOCW Central Rules, 1998	Potential health hazards	OSHA PEL (mg/m3)	BOCW PEL TWA – 8 hrs mg/m3
Aluminum	NA	Occupational over exposure to aluminum can lead to respiratory irritation	15 (total dust) 5 (respirable dust)	NA
Arsenic (metal)	Arsenic & soluble compounds (as As)	Occupational overexposure to arsenic can increase the risk of skin, lung and possibly lymphatic cancers and lead to peripheral neuropathy and vascular disease (Reynaud's phenomenon)	0.01	0.2
Barium (insoluble dust)	NA	Occupational overexposure to barium dust can lead to respiratory irritation	5 (respirable dust)	NA
Beryllium	Beryllium & Compound as (Be) (Suspected human carcinogen)	Occupational overexposure to beryllium can lead to immune-mediated lung disorder known as chronic beryllium disease, increase the risk of lung cancer and can cause allergic skin reactions upon dermal contact.	0.002	0.002
Cadmium	Cadmium Dust & Salts (as Cd)	Occupational overexposure to cadmium can lead to degeneration of the renal tubules (kidney damage) manifested by increased protein in the urine (proteinuria); increased blood pressure contributing to hypertension; objective lung diseases like chronic bronchitis, pulmonary fibrosis and emphysema; and increase the risk of lung and prostate cancer	0.005	0.05

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Contaminant name as per OSHA	Contaminant name as per BOCW Central Rules, 1998	Potential health hazards	OSHA PEL (mg/m3)	BOCW PEL TWA – 8 hrs mg/m3
Chromium (metal)	NA	Occupational overexposure to chromium may lead to skin irritation and increase the risk of lung fibrosis	1	NA
Chromium (III) (trivalent)	NA	Occupational overexposure to trivalent chromium may lead to respiratory irritation and allergic dermatitis upon skin contact.	0.5	NA
Chromium (VI) (hexavalent)	NA	Occupational overexposure to hexavalent chromium can increase the risk of lung cancer and occupational asthma, damage nasal tissue and cause	0.005	NA
		Allergic dermatitis with skin contact.		
Cobalt	NA	Can lead to chronic lung inflammation and pulmonary fibrosis, increase the risk of lung cancer, and cause allergic contact dermatitis with skin contact.	0.1	NA
Copper	Copper fume	Can lead to respiratory irritation	1	0.2
Iron	Iron Oxide fume (FeO) (as Fe)	Can lead to siderosis (mildly fibrotic lung disease)	10	5
Lead	Lead, inorg. dusts and fumes (as Pb)	Can cause subclinical and clinical peripheral neuropathy (muscle weakness, pain and paralysis of extremities), disruption of hemesynthesis and anemia, loss of kidney function, increased blood pressure, nephropathy, reduced sperm count and male sterility and increase the risk of cancer.	0.05	0.15
Manganese	Manganese dust and compounds	Can lead to subclinical /clinical manganism, a 'Parkinson's – like' movement disorder manifested by	5 (ceiling limit)	5

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Contaminant name as per OSHA	Contaminant name as per BOCW Central Rules, 1998	Potential health hazards	OSHA PEL (mg/m3)	BOCW PEL TWA – 8 hrs mg/m3
	(as Mn)	Reduced reaction time, loss of steadiness, walking difficulties and emotional instability		
Nickel	Nickel Carbonyl (as Ni)	Can increase the risk of lung and nasal cancers and cause occupational asthma and allergic dermatitis with skin contact.	1	0.35
Crystalline Silica	NA	Can lead to the chronic lung disease, silicosis and increase the risk of lung cancer	10 (% SiO <sub>2</sub> +2) (respirable quartz)	NA
Silver	NA	Can lead to argyria, a gray pigmentation disorder of the skin and eye.	0.01	NA
Tin (organic)	NA	May lead to headaches and subclinical neurological disturbances.	0.1	NA
Titanium	NA	Can lead to lung inflammation. Chronic bronchitis and pulmonary fibrosis.	15	NA
Vanadium (ceiling limit)	NA	Can lead to lung inflammation, chronic bronchitis and pulmonary fibrosis.	0.5	NA
Zinc and Copper	Zinc Dust (total dust) & copper fume	Can lead to metal fume fever (acute 'pneumonia-like' symptoms).	15 (total dust) 5 (respirable dust)	10.0(total dust) 0.2 (respirable just)

Note: BOCW - The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Central Rules, 1998

NA - Not Available

PEL - Permissible Exposure Limit

TWA - Time-weighted average concentration for 8 hours in mg./m3

OSHA PEL - Occupational Safety and Health Administration, USA, PEL for TWA 8 hours unless mentioned.

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## APPENDIX-2

## Alternative methods for abrasive blasting

It is recommended that alternative techniques to dry abrasive blasting be used to reduce or eliminate the amount of dust generated during surface preparation. These techniques include wet blasting, hydro-blasting, centrifugal wheel blasting, vacuum blasting and blasting with dry ice pellets. Cleaning techniques that do not use abrasive blasting and are suitable for smaller jobs include thermal, chemical and mechanical stripping methods. Other removal techniques that may reduce or eliminate toxic dust levels during surface preparation include blast cleaning with baking soda (sodium bicarbonate), reusable sponge abrasives or plastic media, cryogenic stripping (immersing small parts into liquid nitrogen, followed by gentle abrasion), and laser paint stripping (generates no waste and uses a pulsed carbon dioxide laser as the stripping agent)

## Alternative methods for abrasive blasting

**Wet Abrasive Blasting:** - includes systems where a mixture of abrasive and water is propelled by compressed air and an alternative method where water is added to conventional abrasive blasting nozzles via an adapter (retrofit water curtain device). Inhibitors may need to be added to the water to minimize "flash rusting" surface areas that rust when bare metal is exposed to the elements between removal of old coating and application of new coating. Additives (such as Blastox) can be added to wetted grit to bind heavy metals and form silicates (limiting employee and environmental exposure to heavy metals).

**Advantages/Limitations** - Can be used in most instances where dry abrasive blasting is used. Produces substantially lower dust emissions and lessens the amount of containment required (compared to dry blasting). For example, airborne dust can be reducing 50-75% by a simple water curtain device that fits around the blasting hose nozzle.

Surface cleaning rate can be lower compared to dry abrasive blasting because most wet abrasive blasters mix water with abrasive prior to impact on the surface. To address this problem a retrofit (water curtain) device that minimizes premixing of the water with abrasive blast was developed to fit over the end of conventional abrasive blast nozzles.

Can generate waste water contaminated with paint chips and surface contamination.

**Hydro-blasting (water jet stripping):**- A cavitating high-pressure water jet stripping system that uses an engine-driven high pressure pump, a large volume of water, high pressure hose and a gun equipped with a spray nozzle. Abrasives may also be introduced into this type of system. Systems may use pressures as high as 50,000 psi (ultra high pressure washing). Inhibitors may need to be used to prevent flash rusting.

**Advantages/Limitations** - Can be used in most instances where abrasive blasting is used. Removes most paints. Excellent method for removing hard coatings from metal substrates. Primary application is for older, rusted surfaces; not new steel.

Can be used for removing deposits and scale from heat exchangers and removing rubber liners. Does not require complex containment necessary for dry grit blasting and produces substantially lower dust emissions. Permits more flexible scheduling of maintenance projects on dust-sensitive components.

Avoids to need to dispose a large quantity of contaminated spent grit. Paint chips can be gathered with a wet vacuum. Recirculating water systems produce very little waste. Waste water is usually suitable for sewer disposal after paint particles are removed. Not always as efficient as abrasive grit blasting and has high capital and maintenance costs. Production rate is lower with ultra-high pressure blasting; but containment and cleanup costs are lower. For viscous coatings, production rate exceeds that of dry grit blasting. Water blasted at ultra-high pressures can damage operator's limbs. Work is also very strenuous. Frequent rotation of employees is necessary to prevent fatigue. Major problem with hydro-blasting is flash rusting.



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Centrifugal wheel blasting: - Uses high-speed rotating blades inside an enclosure equipped with a dust collector to propel abrasive against the surface to be cleaned. Removes rust, paint and mill scale. Abrasives include steel shot, steel grit, cut wire and chilled iron grit. Surface to be cleaned is usually passed through the enclosure while rotating blade assembly remains fixed. Can also be used in the field with special adaptors where rotating blade assembly moves across a stationary work surface.

Advantages/Limitations - Enclosed systems typically used for uniform-sized parts (e.g. valves, pipes or steel sections). Small hand-held units developed for use on bridges and similar structures. Field versions used for large, flat, horizontal surfaces. Some designed for use on large vertical surfaces (storage tanks). Abrasives are retrieved and recycled (continuously recovered, cleaned and reused).

Vacuum Blasting: - Removes paint and surface coatings by abrasive blasting and simultaneously collects and recovers spent abrasive and paint debris with a vacuum capture and collection system surrounding the blast nozzle. Uses a standard blast nozzle inside a vacuum recovery head that forms a tight seal with the work surface. A variety of heads (different sizes) are available for different work surfaces (e.g. flat surfaces, side corners). Abrasives typically include aluminium oxide, garnet, steel shot, steel grit and chilled iron grit.

Advantages/Limitations - Abrasive is automatically reclaimed and reused as work progresses. When used properly, cleans effectively with minimum dust. However, operators do not always use the appropriate head and break the vacuum seal by lifting the apparatus to clean inaccessible surfaces and odd shapes. This work practice defeats the purpose of the vacuum exhaust system and exposes employees to blasting dust and debris. Heavy and awkward to use.

Dry Ice Pellets: - Abrasive blasting with ice pellets (solid carbon dioxide). After use, the dry ice evaporates leaving only paint chips/scales and rust that can be vacuumed or swept up and placed in containers for disposal. Applications include cleaning aircraft parts and exotic metals.

Advantages/Limitations - Waste is minimized and includes paint chips/scales and rust; no media waste. Capital costs can be high (i.e., dry ice, handling and storage equipment costs).

Can provide excellent surface preparation.

Multiple passes may be needed to fully remove paint.

May be an asphyxiate hazard. System may cause employee fatigue.

Thermal Stripping: - Uses a flame or stream of superheated air to heat and soften paint, allowing for easy removal.

Advantages/Limitations - Generates one waste stream (i.e., waste paint). Limited in its application. Effective for small parts; not suitable for heat-sensitive surfaces. More labour intensive than other stripping methods.

Chemical Stripping: - Immersing small parts in dip tanks containing a stripping solution. Chemical stripping solutions include organic (e.g., methylene chloride-based solutions) and inorganic (e.g., caustic soda solutions) strippers. Parts shall be rinsed to remove stripping solution residue.

Advantages/Limitations - Effective for small fibreglass, aluminum and delicate steel parts. Requires adequate ventilation and other safety measures. Generates multiple waste streams including contaminated rinse water and hazardous waste strippers.

Organic strippers typically used for coated parts; inorganic strippers typically used for non-coated parts. Key problems with inorganic strippers: flash rusting of non-coated parts and waste stripper that must be discarded as hazardous waste. Chemicals, such as methylene chloride, may cause adverse health effects.

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Mechanical Stripping:- Chipping, grinding, sanding or scraping the coating off small parts or surfaces through the use of needle guns, chipping hammers, sanders and grinders. Some power tools may be equipped with dust collection systems.

Advantages/Limitations - Generates paint waste and airborne particulate emissions. May be less costly for small jobs.

#### Wet Methods

It is recommended that wet methods be used to reduce or eliminate the amount of dust generated during surface preparation. All wet blasting techniques (such as wet abrasive blasting and hydro-blasting) produce substantially lower dust emissions compared to dry abrasive blasting. If a wet blasting technique is not feasible, consider installing a water hose to wet down the dust at the point of generation.

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## Attachments and forms: Nil

### Validity





Valid from: 12. 2018

Valid until: 12. 2021

## This procedure replaces HSE-CON-IN-017

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS-India Local QM Standard	10/12/18		24/12/18		24/12/18		31/12/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				No project-specific adaptation				
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### 1. Scope

This HSE Procedure is applicable for vehicles and mobile equipment during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

This HSE Procedure is aimed at providing guidelines and defining requirements for safe system of work for vehicles and mobile equipment. The instruction is also aimed to establish the technical instructions to ensure a safe operation of vehicles and mobile equipment at the construction sites as well as the labor health and environmental protection.

The Procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements.

However, the most stringent requirement shall be implemented.

### 3. Definitions / Abbreviations

Contractor means the agency appointed by owner or tkIS India for carrying out specific work.  
 Owner / Client means the organisation which retains tkIS India for the purpose of the project.  
 Subcontractor means the agency which takes part of a contract from the contractor.  
 Vendor means a supplier who provides goods or services to Owner / tkIS India.

HSE Health Safety Environment

SSI Site Superintendent

SSV Site Supervisor

SM Site Manager

tkIS India thyssenkrupp Industrial Solutions (India) Private Limited

### 4. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India Site Superintendent (SSI) / Site Supervisor (SSV)	Responsible to implement this procedure and to ensure: (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods.

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	(iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist Site Manager in effective implementation of this procedure on site.  (ii) To assist construction engineer identification, assessment, evaluation, control methods for likely hazards associated with the activity.  (iii) To ensure that necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/HSE Personnel	(i) Carry out HIRA for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities.  (ii) Ensure that personnel under their supervision understand and adhere to this procedure.  (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Drivers/Operator s	(i) Display a responsible attitude.  (ii) Be familiar with the motor vehicle operated.  (iii) To carry out daily inspection and report defects if any.  To carry all the relevant documents all the time while in vehicle.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

## 5. Procedure

### 4.1 Earth moving equipment and vehicles

The tkIS India /Contractor shall ensure at a construction site that:

- all vehicles and earth moving equipment are made of good material, proper design and sound construction and are sufficiently strong for the purpose for which such equipment are used and are maintained in good state of repair and are properly used in accordance with standard safe operating practices;
- all transport or earth moving equipment and vehicles shall be inspected at least once a week by a responsible person and in case any defect is noticed in such equipment or vehicle, it is immediately taken out of use;
- power trucks and tractors are equipped with effective brakes, head lights and tail lamps and are maintained in good repair and working order;

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- side stanchions on power trucks and trailers for carrying heavy and long objects are:
  - of sound construction and free from defects;
  - provided with tie chains attached to the top across the loads for preventing such stanchions from spreading out; and
  - kept in position while loading and unloading;
- safe gangways shall be provided for to and from movement of employees engaged in loading and unloading of lorries, trucks, trailers and wagons;
- trucks and other equipment shall not be loaded beyond their safe carrying capacity which shall be clearly marked on such trucks and other equipment;
- handles of hand trucks are so designed as to protect the hands of the employees working on such trucks, or such handles are provided with knuckle guards;
- no unauthorized person rides the transport equipment employed in such work;
- a driver of a transport equipment maneuvers such equipment under the direction of a signaller;
- adequate precaution such as isolating the electric supply or erecting overhead barriers of a safe height shall be taken when earth moving equipment or vehicles are required to operate in dangerous proximity to any live electric conductor;
- vehicles and earth moving equipment shall not be left on a slope with the engine of such vehicles or equipment running;
- all earth moving equipments, vehicles or other transport equipment shall be operated only by such person who are adequately trained and possess such skill as are required for safe operation of such equipment, vehicle or other transport equipment.

#### 4.2 Power shovels and excavators

The tkIS India /Contractor shall ensure that:

- a shovel or an excavator used at site shall be tested and examined as required under any law for the time being in force and the relevant national standards;
- excavator equipped for use as a mobile crane is:
  - examined and tested in accordance with the requirements for such mobile crane under these rules; and
  - fitted with an automatic safe working load indicator;
- buckets or grabs of power shovels are propped to restrict the movement of such buckets or grabs while being repaired or while the teeth of such buckets or grabs are being changed.

#### 4.3 Bulldozers

The tkIS India /Contractor shall ensure that:

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- an operator of a bulldozer before leaving such bulldozer:
  - applies the brakes;
  - lowers the blade and sipper; and
  - puts the shift lever into neutral;
- a bulldozer is left on level ground at the close of the work for which such bulldozer is used;
- the blade of a bulldozer is kept low when such bulldozer is moving uphill;
- the bulldozer blades are not used as brakes except in an emergency.

#### 4.4 Scrapers

The tkIS India /Contractor shall ensure that:

- a tractor and scraper is joined by safety line at the time of its operation;
- the scraper bowls are propped while blades of such scraper are being replaced;
- a scraper moving downhill is left in gear.

#### 4.5 Mobile asphalt layers and finishers

The tkIS India /Contractor shall ensure that:

- a mixture elevator shall be within a wooden or sheet metal enclosure with a window for observation, lubrication and maintenance;
- bitumen scoops have adequate covers;
- when asphalt plants are working on a public road, adequate traffic control shall be established on such road and the employees working with such plant are provided with reflecting jackets;
- a sufficient number of fire extinguishers shall be kept in readiness on such work place where fire hazards may exist;
- the materials are loaded on the elevator after the drying drain has warmed up of such elevator;
- no open light shall be used for ascertaining the level of asphalt;
- inspection opening shall not be opened till there is a pressure in the boiler which may cause injury to a building worker.

#### 4.6 Pavers

The tkIS India /Contractor shall ensure that, pavers shall be equipped with guards suitable to prevent employees from walking under the skip of such pavers.

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#### 4.7 Road rollers

The tkIS India /Contractor shall ensure that:

- before a road roller is used on the ground, such ground shall be examined for its bearing capacity and general safety, especially at the edges of slopes such as embankments on such grounds;
- a roller shall not be moved downhill with the engine out of gear.

#### 4.8 General safety

The tkIS India /Contractor shall ensure that:

- every vehicle or earth moving equipment shall be equipped with:
  - Silencers;
  - Tail lights;
  - Power and hand brakes;
  - Reversing alarm; and
  - Search light for forward and backward movement, which are required for safe operation of such vehicle or earth moving equipment;
- the cab of vehicle or earth moving equipment shall be kept at least one meter from the adjacent face of a ground being excavated;
- when a crane or shovel are travelling, the boom of such crane or shovel shall be in the direction of such travel and the bucket or scoop attached to such crane or shovel shall be raised and without load, except when such travelling is downhill.

#### 4.9 Additional Safety Requirements

##### 4.9.1 Vehicles Entering at the Construction Site:-

- Shall be subject to a pre-inspection that shall include safe and good operating condition of the vehicle, as well as compliance with all site environmental requirements.  
Any remedial works needed shall be re-inspected and certified as complete, before the vehicle is permitted to enter the site.
- Drivers/Operators shall have the required certification or licenses to operate the equipment.  
They shall be provided with safety induction training related to the site HSE requirements.

##### 4.9.2 The Requirements for Motor Vehicles and Mechanical Equipment Shall include:-

- Vehicles with cabins shall be equipped with windshields and powered wipers.
- Cracked and broken glasses of cabins shall not be permitted.
- Vehicles operating in areas/under conditions that cause fogging or frosting of the wind shields, shall be equipped with operable defogging/defrosting devices.



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- Haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, must have adequate protection to the operator from falling or shifting material
- Trucks with dump bodies shall have the proper devices to lock in position the body to prevent accidental lowering while in operation, inspection or maintenance.
- All rubber-tired motor vehicle shall have mud flaps, spare tire and the necessary hand tools to repair minor problems.
- All vehicles shall have at least the following in operable condition:
  - Two headlights
  - Two taillights
  - Brake lights
  - Audible warning device at operator's station
  - Backing horn (unless prohibited by local regulations)
  - Seat belts properly installed and in accordance with the number of seats for occupants.
  - Seats, firmly secured, for the number of persons carried
  - Service, parking and emergency brake system

Any deviations in operation of vehicles and mobile equipment shall be eliminated by means of corrective and preventive action in order to ensure conformance with regulations. Likewise, the site manager or his representative shall carry out in coordination with the various contractors and works packages at site the required corrective and preventive actions to prevent people from hindering or even endangering each other.

#### 4.9.3 Verification At Site

Contractor shall inspect all vehicles prior to mobilizing the vehicles to the project. Contractor shall present vehicles to tkIS India /Client HSE Department for inspection and submit driver's/operator's license, registration documents, fitness certificate and insurance documents for review.

tkIS India /Client shall issue a vehicle access pass if vehicle meet the safety requirements, is road worthy, licensed and all documentation is valid.

All mobile equipment shall be inspected and verified by the concerned driver/operator at the beginning of each shift to ensure that the following parts, equipment and accessories where applicable are in safe operating condition and free from apparent damage that could cause failure while in use:

- Equipment and accessories are in safe operating condition and free of any apparent damage that could cause failure while in use.
- Oil, coolant and other applicable fluid levels.

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- Service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes);
- Pressure and conditions of the tires
- Horn
- Steering mechanism
- Coupling devices
- Seat belts
- Operating controls
- Safety devices.
- Head Lights
- Hazard Light (Flash Light)
- Fire Extinguisher
- Reverse Signal Alarm
- Windshield Wipers
- Tail and Brake Lights
- Tires
- Reflectors

Supervisory personnel shall ensure that all machinery and equipment is inspected prior to starting the shift to ensure that each equipment is in safe operating condition.

Records of inspection shall be maintained.

#### 4.9.4 Equipment Operation

- Equipment shall be operated only by operators:
  - who have been trained in the operations of the particular equipment,
  - Have required certification or licenses
  - Have received HSE related induction on site regulations and vehicle and mobile equipment.
- Equipment shall be used only for the purpose it is manufactured for.
- Operator shall not use motor equipment that has an obstructed rear view unless:
  - Vehicle has an audible reverse signal alarm

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- Vehicle is backed up only with the assistance of an observer signaling when it is safe to do so.
- Vehicles used to transport personnel must have seats firmly secured and adequate for the number of personnel to be carried.
- Tools and material shall be secured in order to prevent movement when transported in the same compartment with personnel.
- When vehicle or mobile equipment is stopped or parked, parking brake shall be set. Equipment on inclines shall have wheels locked as well as having parking brakes.
- Equipment left unattended at night, adjacent to the site roads, must have lights, reflectors, and/or barricades to identify location of the equipment.
- Supervisory personnel must ensure that all machinery and equipment is operated following the safety practices, site regulations and by qualified operators.

#### 4.9.5 Transporting Employees on a Project/Site

Vehicles shall have seats that are firmly secured and adequate for the number of employees to be carried. Tools and materials will be secured to prevent movement when they present a hazard. Seat belts must be worn at all times by the driver and recommendable for all passengers in the vehicle cab.

All vehicles shall be equipped with a fire extinguisher, red emergency triangles, flash light and first aid kit.

## 6. Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Procedure PIN LP-CHM-099.

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>COLD WORK PERMIT</b>	QM code PIN LP-CHM-018 F01
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Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Work clearance from: \_\_\_\_\_ Hrs. of date \_\_\_\_\_ to \_\_\_\_\_ Hrs. of Date \_\_\_\_\_

Issued to (Department/ Section/ contractor) \_\_\_\_\_

Exact Location of work (Area/ Unit/ Equipment No. etc.) \_\_\_\_\_

Nearest Fire Alarm Point (if applicable): \_\_\_\_\_

Description of work: \_\_\_\_\_

PERMIT TYPE	NORMAL	BLANKET	Please tick [✓] in required permit type
-------------	--------	---------	---

Name & Sign. of Receiver

**THE FOLLOWING ITEMS SHALL BE CHECKED BEFORE ISSUING THE PERMIT**

(Tick mark in the appropriate box)

Sr No	Item	Done	Not Reqd	Sr No	Item	Done	Not Reqd.
1	Equipment / Work Area inspected			6	Equipment water flushed		
2	Surrounding area checked, cleaned and covered			7	Equipment properly steamed / purged		
3	Equipment blinded/disconnected / closed / isolated / wedge opened			8	Proper ventilation and lighting provided		
4	Equipment properly drained and depressurized			9	Area cordoned off & caution boards / tags provided.		

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>COLD WORK PERMIT</b>	QM code PIN LP-CHM-018 F01
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5	Equipment electrically isolated and tagged vide Permit no. _____			10	Gas test: HC / Toxic etc. HCs = % LEL Toxic gas = PPM		
---	--	--	--	----	---	--	--

**Remarks:**

1. The activity has the following expected residual hazards (Tick the relevant items):

Lack of Oxygen		Toxic Gases		Pyrophoric Iron		Corrosive Chemicals		Others, if specify	
H2S Gas		Combustible gases		Steam Condensate					

2. Following additional PPE to be used in addition to standard PPE (Helmet, Safety Shoes) (Tick the relevant items):

Face Shield	Dust Respirator	Lifeline	Compressed Air Set	Others
Goggles	Fresh Air Mask	Safety Harness	Earmuff	

3. Additional precaution if any:

---



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RECEIVER	ISSUER
Signature : _____ Date _____	Signature : _____ Date _____
Name: _____	Name: _____
Designation: _____ Tel. No.: _____	Designation: _____ Tel. No.: _____

**Closing of the work permit:**



Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>COLD WORK PERMIT</b>	QM code PIN LP-CHM-018 F01
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**General Instructions:**

1. The work permit shall be filled up carefully and accurately in clear handwriting ensuring that complete information is provided in all the sections / subsections and none of column is left blank. Sketches shall be provided wherever possible to avoid miscommunication.
2. Appropriate safe guards and required personnel protective equipment (PPEs) shall be determined by a careful analysis of the potential hazards and the operations to be performed prior to starting the work.
3. Requirement of standby personnel from Contractor if any shall be mentioned in the additional requirement.
4. In case of fire alarm all work shall immediately be stopped. In case of Emergency Sirens, all work must be stopped and all nonessential personnel must leave work site and processed to designated areas.
5. For renewal of work clearance, the issuer shall ensure that the conditions are satisfactory for the work to continue. If the conditions have changed, it may be necessary to issue a new permit or amend the existing permit.
6. This permit shall be valid for a period of 8 hours only, unless it is renewed/ extended. This clearance on the same permit can be renewed / extended up to a maximum of seven calendar days.
7. Permit Copy must be available at work site at all times.
8. On completion of the work, the permit copy shall be closed and returned to the issuer.
9. The permit shall be issued in Triplicate. Original permit (White) shall be retained by the Issuer and duplicate (Blue) shall be issued to the Receiver, another copy (Green) tkIS - India HSE Dept.
10. Safety Toolbox talk has to be ensured by receiver before starts of work and record for the same shall be maintained.
11. Obtain separate permit for "Working at Height", if required.

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b><u>PERMIT FOR HOT WORK</u></b>	QM code PIN LP-CHM-018 F02
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Project number: \_\_\_\_\_ Project: \_\_\_\_\_

Sr. No.: \_\_\_\_\_ Permit Registration No.: \_\_\_\_\_ Registered by \_\_\_\_\_ (Sign)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

PERMIT TYPE	NORMAL	BLANKET	Please tick [✓] in required permit type
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Work Clearance from \_\_\_\_\_ Hrs. of date \_\_\_\_\_ To \_\_\_\_\_ Hrs. of Date \_\_\_\_\_ (Valid for the shift unless renewed)

Issued to (Department / Section / contractor) \_\_\_\_\_

Work order No. \_\_\_\_\_ Exact Location of work (Area / Unit / Equipment No. etc.) \_\_\_\_\_

Nearest Fire Alarm No. \_\_\_\_\_

Description of work \_\_\_\_\_

Name of Receiver \_\_\_\_\_ Date & Time: \_\_\_\_\_

Signature of Receiver: \_\_\_\_\_



Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>PERMIT FOR HOT WORK</b>	QM code PIN LP-CHM-018 F02
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**FOLLOWING ITEMS SHALL BE CHECKED BEFORE ISSUING THE PERMIT**

[Please put tick [√] in the appropriate box. Checklist items marked with asterisk (\*) shall be complied by receiver.]

Sr. No.	Item	Done	Not Reqd	Sr. No.	Item	Done	Not Reqd
<b>A</b>	<b>General points</b>			<b>12</b>	Gas Test: HCs = % LEL; O2 = % Toxic gas = ppm,		
<b>1</b>	Equipment / Work Area inspected			<b>13*</b>	Running water hose / Fire extinguisher provided. Fire water system available.		
<b>2</b>	Surrounding area checked, cleaned & covered			<b>14*</b>	Area cordoned off and Precautionary tags / Boards provided.		
<b>3</b>	Sewers, Manholes & hot surfaces nearby covered			<b>B</b>	<b>For Hot work</b>		
<b>4</b>	Considered hazard from other operations & concerned persons alerted.			<b>1</b>	Proper ventilation and Lighting provided		
<b>5</b>	Equipment blinded / disconnected / closed / isolated / wedge opened			<b>2</b>	Proper means of exit / escape provided		
<b>6</b>	Equipment properly drained & depressurized			<b>3</b>	Standby personnel provided from Contractor.		
<b>7</b>	Equipment properly steamed / purged			<b>4</b>	Checked for oil and Gas trapped behind the lining in Eqpt.		
<b>8</b>	Equipment water flushed			<b>5*</b>	Shield provided agt. spark		
<b>9</b>	Free access for approach of fire tenders has been maintained.			<b>6*</b>	Portable equipment / nozzles properly grounded		
<b>10</b>	Iron sulfide removed / kept wet			<b>7</b>	Check for Earthing / ELCB of all temporary electrical connections being used for welding		
<b>11</b>	Equipment electrically isolated and tagged vide			<b>8</b>	Welding machine checked for safe location		

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>PERMIT FOR HOT WORK</b>	QM code PIN LP-CHM-018 F02
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	permit no.						
				<b>9</b>	Permit taken for working at height vide permit no.		

Sr. No.	Item	Done	Not Reqd	Sr. No.	Item	Done	Not Reqd
	<b>For Vehicle Entry</b>						
<b>1*</b>	Approved type Spark Arrestor on the mobile equipment / vehicle provided.						

**Remarks:**

1. The activity has the following expected residual hazards [Tick (✓) the relevant items]:

O2 Deficiency		Toxic Gases		Others		Please specify others
H2S Gas		Combustible gases				

2. Following PPEs shall be used in addition to standard PPEs i.e. Helmet, Safety Shoes [Tick (✓) the relevant items]:

Face Shield		Dust Respirator		Lifeline		Compressed Air set		Others (if any),
Goggles		Fresh Air Mask		Safety Harness		Ear Muff		Please specify

3. Additional Precautions [if any] \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Recipient	Signature	Designation	Name	Date	Tel. No.
Functional Head**					
RCM**					

Process <b>Construction HSE Management</b>		
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- \*\* Functional HOD /SM/ COM shall sign when Hot Work is needed beyond normal working hours / round the clock / Sundays & holidays.
- SM/COM shall sign if the Job requires blanket permit where clearance renewal is not required.

<b>Recipient</b>	<b>RECEIVER</b>	<b>ISSUER</b>
<b>Signature</b>		
<b>Name</b>		
<b>Date &amp; Time</b>		

#### Closing of Work Permit

<b>Attributes</b>	<b>Receiver</b>	<b>Issuer</b>
<b>Declaration</b>	Certified that the subject work has been completed / stopped and area cleaned.	Verified that the job has been completed and area cleaned and is safe from any hazard
<b>Signature</b>		
<b>Name</b>		
<b>Designation</b>		
<b>Date</b>		
<b>Time [hrs.]</b>		

#### **General Instructions:**

1. Work Permit shall be filled up carefully and no column shall be left blank. Provide sketches, if required.

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<b>thyssenkrupp Industrial Solutions (India)</b>	<b><u>PERMIT FOR HOT WORK</u></b>	QM code PIN LP-CHM-018 F02
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2. Appropriate safe guards and PPEs shall be determined by analysis of the potential hazards prior to starting the work.
3. In case of fire alarm all work must immediately be stopped. In case of Emergency Sirens, all work must be stopped and all non-essential personnel must leave work site and proceed to designated areas
4. Only certified vehicle / engines and permitted type of electrical equipment and tools are allowed in operating areas.
5. Welding machines shall be located in non-hazardous and ventilated areas.
6. No hot work shall be permitted unless the explosive meter reading is Zero.
7. For renewal of work clearance, the issuer shall ensure that the conditions are satisfactory for the work to continue. If the conditions have changed, it should be necessary to issue a new permit or amend the existing permit.
8. Permit shall be considered issued for job after "Clearance renewal" is signed. This clearance on the same permit can be renewed / extended up to a maximum of seven calendar days. Blanket permit may be issued for a maximum period of 30 days.
9. During the registration period of permit, if job is not done for a day or more (except holidays / Sundays), receivers shall enter in prescribed register at Fire Station in advance about the discontinuity of job.
10. This permit shall be available at work site at all times.
11. On completion of the work, the permit must be closed and submitted to HSE as record by receiver.
12. Hot work shall include welding, grinding, gas cutting, burning, open flame, soldering, shot blasting, chipping, riveting, drilling, camera flashing, power tools, IC engines, Mixer machines, vehicle entry or any other activities which may generate heat or spark.
13. The permit shall be issued in triplicate. Receiver shall retain pink copy, Original (white) shall be retained with issuer and second copy (Green) shall be remained with HSE.
14. Permit Issuing authority, Receiver, SM & HSE personnel or any authorized personnel can cancel the permit on safety norms violation any time.
15. Enclose important Do's and Don'ts duly signed with each permit.
16. All precautions given in permit must be clearly adhered by the Receiver.
17. Daily Toolbox talk / safety briefing to be ensured by the Receiver before start of job. A register on toolbox talk shall be kept at site as record and signed by personnel associated with the work.
18. Pre-use check of portable gas testers must be done to ensure its operability by Issuer before the gas test at work site.

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**Clearance Renewal:**

Date	Time [hrs.]		Gas Test Values for HC, Toxic & O2 etc. [write names Of toxic gases _____ _____ _____]	Additional Precautions [if any], Otherwise mention "NIL"	Signature With Name and Designation		Signature of	
	From	To			Receiver	Issuer	Functional Head	SM/COM
			Gas Test: HC:       % LEL Toxic:     PPM O2:       %					
			Gas Test: HC:       % LEL Toxic:     PPM O2:       %					
			Gas Test: HC:       % LEL Toxic:     PPM O2:       %					
			Gas Test: HC:       % LEL Toxic:     PPM O2:       %					

Note: When Work Permit has been issued for Normal Working Hours but work is anticipated to be extended beyond Normal Working Hours, concerned functional HOD shall endorse permission with signature

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>EXCAVATION PERMIT</b>	QM code PIN LP-CHM-018 F03
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Project: \_\_\_\_\_

Project number: \_\_\_\_\_

Sr. No.: \_\_\_\_\_ Permit Registration No.: \_\_\_\_\_ Registered by \_\_\_\_\_ (Sign)

1A Exact Location of Excavation		..... ..... ..... (Attach marked up drawing)	
_____ In Plant Area	_____ Tank Dyke	_____ Along Pipe way	_____ Along Cable way
_____ Across Road/Footpath	_____ In Open Ground	_____ Across Drainage Flume	_____ Others
1B. Size of Excavation (Approx)		..... m deep, .....m wide .....m long	
1C. Purpose: .....			
2A. Commencing Date..... Time ..... Expiry Date..... Time.....			
2B. Executing Dept..... Contractor.....			
2C Name of Receiver with Designation..... Signature ..... Employee. No.....			
3. Permission is granted as described above :			
3A. Excavation Clearance is obtained and attached :    Yes <input type="checkbox"/> No <input type="checkbox"/>			

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thyssenkrupp Industrial Solutions (India)	<b>EXCAVATION PERMIT</b>	QM code PIN LP-CHM-018 F03
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<b>4. Associated permits/ Safety Requirements:</b>		
Cold Work Permit	Hot Work Permit	Confined space permit (Depth >1.2 m)
Hand Excavation Only	Provide warning sign	Provide flashing light (FLP in case of hazardous area)
Barricade	Provide shoring	Batter the sides to 45 degree or less
Provide Fire Extinguisher	Provide means of access	Excavated soil 1 m min. away from edge
Body harness/ lifeline	Gumboot/ safety suit	Any other (specify): .....
Expected residual hazards	1..... 2.....	
<b>Permit Issuer (Name &amp; Designation)</b> .....	<b>Signature</b> ..... <b>Date</b> .....	
<b>HOD of issuing Dept. for road cutting Name and Designation</b> .....	<b>Signature</b> ..... <b>Date</b> .....	
<b>SM of tkIS India for dyke cutting Name and Designation</b> .....	<b>Signature</b> ..... <b>Date</b> .....	

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5. Excavation Renewal (shift wise)				
Renewed up to Date Hours	Requested by (Name & Sign)	Additional precautions, if any	Receiver name & signature	Issuer name & signature

<b>6. Excavation closure :</b>	
Excavation site restored to normal / safe condition	Yes
Backfilled Yes/No	Properly compacted Yes/No
Reasphalted/repared with concrete Yes/No	Facilities/ supports restored Yes/No
Remarks :	
Receiver Name .....	Signature..... Date.....
Agree that excavation restored to our satisfaction.	
Remarks :	
Issuer Name .....	Signature..... Date.....

**Note:**

Keep the Excavation clearance attached with permit.



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Permit must be available at site all the time during the work.

Permit shall be in triplicate. Original in White color shall be for issuer, first copy (blue) for receiver and second copy (green) for HSE

The permit shall be issued normally for a maximum period of 30 days.

The PPE such as Safety Helmet, Safety shoe, is mandatory for work.

Daily Safety tool box talk including key point tipping to contractor personnel shall be carried out by Executor before commencement of work and the record of same shall be maintained

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>EXCAVATION CLEARANCE</b> (THIS IS NOT AN EXCAVATION PERMIT)	QM code PIN LP-CHM-018 F04
		Page 1 of 3

Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Exact Location of work (Area/ Unit/ Equipment No etc.).....

Description of work .....

Sketch of the area of excavation enclosed.

Permission is solicited from .....Hrs. on (date).....to.....Hrs. on (date).....

Signature of tkIS India/Contractor Representative  
.....

Name and Designation of tkIS India/Contractor Representative .....

1. **Underground Power Cable:** \_\_\_\_ Existing \_\_\_\_ Not existing

Permission given: \_\_\_\_ Yes \_\_\_\_ No

Precaution, if any  
.....

tkIS India/Client Representative Name -----Signature .....Date .....

2. **Underground Telecommunication Cable:** \_\_\_\_ Existing \_\_\_\_ Not existing

Permission given: \_\_\_\_ Yes \_\_\_\_ No

Precaution, if any  
.....

tkIS India/Client Representative Name -----Signature .....Date .....

3. **Underground Firewater Line:** \_\_\_\_ Existing \_\_\_\_ Not existing

Permission given: \_\_\_\_ Yes \_\_\_\_ No

Precaution, if any .....

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>EXCAVATION CLEARANCE</b> (THIS IS NOT AN EXCAVATION PERMIT)	QM code PIN LP-CHM-018 F04
		Page <b>2</b> of <b>3</b>

tkIS India/Client Representative Name -----Signature .....Date .....

---

- 4. Underground Oil/Sewer Line, Drinking Water line,  
Above Ground Open Drain:** \_\_\_\_ Existing \_\_\_\_ Not existing

Permission given: \_\_\_\_ Yes \_\_\_\_ No

Precaution, if any  
.....

tkIS India/Client Representative Name -----Signature .....Date .....

---

- 5. Underground Computer Cable:** \_\_\_\_ Existing \_\_\_\_ Not existing

Permission given: \_\_\_\_ Yes \_\_\_\_ No

Precaution, if any  
.....

tkIS India/Client Representative Name -----Signature .....Date .....

---

- 6. Underground Product Line, Utility Line:** \_\_\_\_ Existing \_\_\_\_ Not existing

Permission given: \_\_\_\_ Yes \_\_\_\_ No

Precaution, if any  
.....

tkIS India/Client Representative Name -----Signature .....Date .....

---

- 7. Underground Instrument Cable:** \_\_\_\_ Existing \_\_\_\_ Not existing

Permission given: \_\_\_\_ Yes \_\_\_\_ No

Precaution, if any  
.....

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>EXCAVATION CLEARANCE</b> (THIS IS NOT AN EXCAVATION PERMIT)	QM code PIN LP-CHM-018 F04
		Page <b>3</b> of <b>3</b>

tkIS India/Client Representative Name -----Signature .....Date .....

8. **Underground Cathodic Protection Cable** : \_\_\_\_ Existing \_\_\_\_ Not existing

Permission given: \_\_\_\_ Yes \_\_\_\_ No

Precaution, if any

.....

tkIS India/Client Representative Name -----Signature .....Date .....

### **INSTRUCTION:**

1. The excavation clearance is required for all excavations including road and dyke cutting. Obtaining this clearance is prerequisite for EXCAVATION PERMIT.
2. This clearance shall be obtained from client for a maximum period of 1 month.
3. This clearance shall be kept attached with Excavation permit at site.
4. The clearance shall be issued in triplicate, original (white) for issuer, first copy (pink) for receiver and second copy (green) for HSE. The clearance shall be initiated by executor.
5. Original copy shall be with Issuer, duplicate copy with Receiver and record copy with tkIS India HSE. Department.
6. When job is completed, the receiver shall collect the permit copy, and enclose it with closed copy of Excavation Permit before handing over to permit issuer.
7. For cutting of road in addition to this clearance, format for Road Closure and Excavation permit shall be required.
8. All road cuttings shall be properly barricaded with precautionary signs and alternate routes shall be displayed at the site by the executor.



Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>PERMIT FOR ROAD CLOSURE</b>	QM code PIN LP-CHM-018 F05
		Page <b>1</b> of <b>1</b>

Project: \_\_\_\_\_ Project number: \_\_\_\_\_ Date & Time: \_\_\_\_\_

1A. Exact Location of road  
blockade

.....(Attach marked up drawing)

1B. Purpose: .....

1C. Commencing Date. .... Date of completion.....

1D. Contractor.....

1E. Permit for the job to be executed has been obtained: ☐ Yes ☐ No

2. Permission is granted as described above with following safety precautions:

Display of Speed limit ☐ Use traffic cone & barricading tape ☐ Mark alternate route ☐

Display other safety signs ☐ Display blinker light ☐

Display of safety sign ☐ Any other requirement (Specify) .....

Receiver			Issuer		
Name	Date	Signature	Name	Date	Signature

#### **Important Notes:**

1. Permission for road blockade shall be obtained in triplicate. Original (in white color) shall be with issuer, first duplicate (pink in color) shall be issued to receiver and second duplicate in green color to HSE Dept.
2. The permission shall be obtained at least one day before commencement of work.
3. The information about road blockade shall be sent to all concerned officers in prescribed format.
4. Provision of road blockade, diversion of traffic, display of safety signs etc. as per procedure shall be arranged by executor /receiver.

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>FORMAT FOR INFORMATION ABOUT MAIN ROAD CLOSURE</b>	QM code PIN LP-CHM-018 F05A Page <b>1</b> of <b>1</b>

Project: \_\_\_\_\_

Project number: \_\_\_\_\_

From : tkIS – India Site Manager	To : All Concerned
Ref:	Date of issue:
A. Road closure permission given for Road No.	
B. Location of Road	
C. Duration of closure	From.....to.....
D. Alternate route	
Sketch of road to be cut and alternate route:	
Note : 1. All drivers, using the route shall be advised to exercise caution and use alternate route by their controlling departments.	
2. This information can be circulated through mail.	
Signature of tkIS - India Site Manager	Date

Process <b>Construction HSE Management</b>		
<b>thyssenkrupp Industrial Solutions (India)</b>	<b><u>PERMIT TO WORK AT HEIGHT</u></b>	QM code PIN LP-CHM-018 F06
		Page <b>1</b> of <b>2</b>

Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location: \_\_\_\_\_

Permit require from time: \_\_\_\_\_ to time: \_\_\_\_\_ Date \_\_\_\_\_

<b>Risk Control measures to prevent Fall of Person</b>	<b>Yes</b>	<b>No</b>	<b>Not Reqd</b>
1. Whether Safe access to work place is provided?			
2. Whether the edge protection provided is adequate?			
3. Is the work area away from the vicinity of moving objects?			
4. Whether work platform is adequate with respect to strength and dimension?			
5. Is the working platform fully boarded/decked?			
6. Whether Work platforms are provided with guard rail, mid rail and top rail?			
7. Are the workmen screened for working at height?			
8. Whether Adequate fall protection arrangement made (Static line, Double Lanyard harness, Fall Arrestor, Safety Net)?			
<b>Risk Control measures for avoiding Fall of Materials</b>			
1. Whether Work at more than one elevation at the same segment is restricted?			
2. Whether Walkways, aisles & all overhead workplaces cleared of loose material?			
3. Whether all tools & tackles inspected before use?			
4. Whether hand tools and handling materials secured against accidental fall?			
5. Whether Workmen provided with bag / box to carry bolt, nuts & hand tools?			
6. Whether area below, where the height work being performed is cordoned and unauthorised entries are avoided. ?			



Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b><u>PERMIT TO WORK AT HEIGHT</u></b>	QM code PIN LP-CHM-018 F06
		Page <b>2</b> of <b>2</b>

<b>Permit Receiver</b>	<b>Permit Issuer</b>
Name :	Name :
Designation:	Designation:
Signature:	Signature:
<b><u>Closing of the Permit</u></b>	
Time _____ & Date _____ at which the permit is closed.	
<b>Permit Receiver</b>	<b>Permit Issuer</b>
Name:	Name:
Designation:	Designation:
Signature:	Signature:

**Note:** Frontline supervisor of the gang performing the activity should have PTW copy with him. Original shall be retained by the issuing Authority. The permit is valid till the issue time, extension of permit may suitably obtained before expiry of permit. Once the activities are over work place shall be left safe.

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<b>Medical Certificate</b> <b>Form for Medical Check Up for the Workman engaged by</b> <b>the Contractor</b> <b>(Working at Heights)</b>	QM code PIN LP-CHM-018 F07
		Page 1 of 1

Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location: \_\_\_\_\_ Date & Time: \_\_\_\_\_

Certified that I \_\_\_\_\_ have examined Shri \_\_\_\_\_ Age \_\_\_\_\_ who has signed below in my presence. The details of his examination as required are given in the enclosed medical examination report. I certify that all clinical and pathological tests were done in my hospital/dispensary under my instructions and I find him fit. General and physical examinations of Shri \_\_\_\_\_ do not reveal any abnormality. He does not suffer from any acute / chronic skin disease or any contagious or infectious disease. He is medically fit to work at height of 1.8 meters and more since he is free from Vertigo, Epilepsy or Fits, general giddiness and height related disease. His B.P., Pulse, Eye sight etc. are normal.

In my opinion Shri \_\_\_\_\_ is physically and mentally fit for job in \_\_\_\_\_

**Signature and Rubber stamp of medical practitioner with name**

- 1) Name of the Medical practitioner:
- 2) Qualifications:
- 3) Registration Number:
- 4) Designation:
- 5) Address

\_\_\_\_\_  
Signature of the workmen /Left Thumb Impression

Date: \_\_\_\_\_

Note: This certificate is to be given on the letter head of the registered medical practitioner who is possessing allopathic qualification as recognized by the Indian medical council.

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b><u>RADIOGRAPHY PERMIT/REQUEST</u></b>	QM code PIN LP-CHM-018 F08
		Page 1 of 3

Project: \_\_\_\_\_ Project number: \_\_\_\_\_ Date & Time: \_\_\_\_\_

Start time:

Time valid to:

Serial No.

Date:

### SECTION 1: To be completed by the contractor requesting the radiography

Contractor requesting permit:

NDE Contractor:

Date requested:

Date required

Proposed start time:

Proposed finish time:

Location of radiography

Equipment/line number:

Print Name:

Signature:

A PLOT PLAN IDENTIFYING THE PROPOSED WORK LOCATION MUST BE ATTACHED TO THE PERMIT

### SECTION 2: To be completed by the NDE contractor's level II radiographer

Names of technician(s)

NDE level

Badge No

Dosimeter (0-200 mr/h)  
Start

Name of level II radiographer:

Signature:

### SECTION 3: To be completed by level II radiographer & verified by Receiver prior to start

**Documentation Checklist**

**Yes**

**No**

**Comments**

Level II Certificate

Decay Chart

Radiation Safety Manual

Emergency Telephone Numbers:

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b><u>RADIOGRAPHY PERMIT/REQUEST</u></b>	QM code PIN LP-CHM-018 F08
		Page <b>2</b> of <b>3</b>

**SECTION 4: To be completed by level II radiographer & verified by receiver prior to start**

Equipment Checklist	Yes	No	Comments
Survey Meter			
Collimator			
Radiation Warning signs			
Audible warning devices			
Warning tape/rope			
Tongs			
Extra shielding			
Camera manufacturer:			Serial No:
<b>Type of Isotope:</b>			Curies:
Total Exposure Time			Finish Time:

**SECTION 5: To be completed by level II radiographer & verified by receiver prior to start**

Fire equipment available,

Work location barricaded for safe limit of 0.75MR

All concerned personnel shall be provided with film, badges & dosimeter

Stand-by personnel in place to prevent others approach

**Special Safety Instructions**

The perimeter of the 'radiation area' shall be roped off and have 'warning signs' placed at 20 meter intervals along the perimeter and at each entrance into the area. The 'radiation area' must be clear of all non-classified personnel prior to each exposure and must be under visual surveillance during each exposure.

Prior to use all equipment are to be inspected and after each exposure both the camera and guide tube are to be surveyed ensuring the source is in the shielded position. The radioactive source shall not be left unattended.

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<u>RADIOGRAPHY PERMIT/REQUEST</u>	QM code PIN LP-CHM-018 F08
		Page <b>3</b> of <b>3</b>

Radiography will not commence until all safety requirements have been confirmed.

RECEIVER	ISSUER
Signature : _____ Date _____	Signature : _____ Date _____
Name: _____	Name: _____
Designation: _____ Tel. No.: _____	Designation: _____ Tel. No.: _____

## SECTION 6:

## COMPLETION

RECEIVER	ISSUER
Signature : _____ Date _____	Signature : _____ Date _____
Name: _____	Name: _____
Designation: _____ Tel. No.: _____	Designation: _____ Tel. No.: _____

1. Name of the person	2. Address of the person	3. Date of birth
4. Date of death	5. Date of burial	6. Date of interment

7. Name of the person who buried the body

8. Name of the person who buried the body	9. Name of the person who buried the body
10. Name of the person who buried the body	11. Name of the person who buried the body
12. Name of the person who buried the body	13. Name of the person who buried the body
14. Name of the person who buried the body	15. Name of the person who buried the body

16. Name of the person who buried the body

17. Name of the person who buried the body	18. Name of the person who buried the body
19. Name of the person who buried the body	20. Name of the person who buried the body
21. Name of the person who buried the body	22. Name of the person who buried the body
23. Name of the person who buried the body	24. Name of the person who buried the body

25. Name of the person who buried the body	26. Name of the person who buried the body
27. Name of the person who buried the body	28. Name of the person who buried the body
29. Name of the person who buried the body	30. Name of the person who buried the body
31. Name of the person who buried the body	32. Name of the person who buried the body

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Electrical Isolation / Energisation Permit</b>	QM code PIN LP-CHM-018 F09
		Page <b>1</b> of <b>2</b>

Project: \_\_\_\_\_ Project number: \_\_\_\_\_ Date & Time: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location: \_\_\_\_\_

**Section-A: Isolation Permit.**

Sl. No. \_\_\_\_\_

Request for Isolation: Date: \_\_\_\_\_ Time: \_\_\_\_\_

**Department / Section / Area issuing the permit**

Equipment number to be isolated: \_\_\_\_\_

Name of the equipment / circuit to be isolated: \_\_\_\_\_

The above-mentioned equipment / circuit shall be de-energized and isolated from all live conductors to carry out the maintenance work by \_\_\_\_\_ section / for operational requirement.

**Receiver Name/ Designation / Signature**

\_\_\_\_\_

**Issuer Name / Designation / Signature**

**Certificate of Isolation:**

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Certified that Equipment / Circuit no. \_\_\_\_\_ of \_\_\_\_\_ plant has been electrically isolated by switches / isolators / links / fuses (tick as applicable) and the danger tag is put on the supply panel. Actions in respect of electrical isolation have been recorded in the electrical shift logbook.

**Name of Authorized Person/ Designation / Signature**

**Section-B: Energisation Permit**

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Electrical Isolation / Energisation Permit</b>	QM code PIN LP-CHM-018 F09
		Page <b>2</b> of <b>2</b>

Sl. No. \_\_\_\_\_

**Request for Energisation:**

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Department / Section / Area issuing the permit \_\_\_\_\_

Equipment number to be energized: \_\_\_\_\_

Name of the equipment / circuit to be energized: \_\_\_\_\_

Work on the above mention equipment / circuit has been completed and all the applicable permits closed.

This equipment / circuit may be energized.

\_\_\_\_\_  
**Receiver Name / Designation / Signature**\_\_\_\_\_  
**Issuer Name / Designation / Signature****Certificate of Energization:**

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Certified that Equipment / circuit no. \_\_\_\_\_ of \_\_\_\_\_ plant has  
 Been electrically energized and the danger tag removed from the supply panel. This is also recorded in the  
 Electrical shift logbook.

\_\_\_\_\_  
**Name of Authorized Person / Designation / Signature**



Process <b>Construction HSE Management</b>		
<b>thyssenkrupp Industrial Solutions (India)</b>	<b>PRE ERECTION CHECKLIST FOR SCAFFOLDS</b> (To be filled up and complied before erection of scaffold at site, before giving permit to start the erection)	QM code PIN LP-CHM-018 F10
		Page <b>1</b> of <b>3</b>

Project: \_\_\_\_\_ Project number: \_\_\_\_\_ Date & Time: \_\_\_\_\_

Type of scaffold to be erected: Independent scaffold \_\_\_\_\_ Independent tied scaffold \_\_\_\_\_

Mobile scaffold \_\_\_\_\_ Quick fix scaffold \_\_\_\_\_ Birdcage scaffold \_\_\_\_\_

System scaffolds \_\_\_\_\_ Any other (specify).....

<b>A. Exact location of work: (Unit/ Area/ Equipment No.)</b> ..... ..... .....									
<b>B. Description of work to be performed</b> ..... ..... .....									
<b>C. Expected date and time to start erection.....</b> Expected date of completion.....									
<b>D. Maximum No. of persons allowed on scaffold after erection: ...</b> ..... .....									
<b>E. Associated Permit :</b> Hot Work Permit _____ Cold Work Permit _____ Confined Space Entry Permit _____ Radiography Permit _____ Excavation Permit _____ Electrical isolation/ Energiation Permit _____ Working at height Permit _____									
<b>F. For the scaffold sufficient quantity of materials are available at site:</b>									
<b>S. N</b>	<b>Items</b>	<b>Yes</b>	<b>No</b>	<b>Not Required</b>	<b>S N</b>	<b>Items</b>	<b>Yes</b>	<b>No</b>	<b>Not Required</b>
1	Scaffold Pipes				9	Scaffold Couplers			
2	Deck boards				10	Base late			
3	Sole plate				11	Toe board			

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>PRE ERECTION CHECKLIST FOR SCAFFOLDS</b> (To be filled up and complied before erection of scaffold at site, before giving permit to start the erection)	QM code PIN LP-CHM-018 F10
		Page <b>2</b> of <b>3</b>

S. N	Items	Yes	No	Not Required	S N	Items	Yes	No	Not Required
4	Reveal pin				12	Std. aluminum ladder (as per IS/BS)			
5	Mettle Wire to fix ladder				13	Tags (RED & GREEN)			
6	Toe board clip				14	Joint pin			
7	Approved full Body safety harness with lanyard/ life line				15	Double lanyard with energy absorber			
8	Fall arrester				16	Safety Net			

**Working at Height Personnel:**

S. N	Name	Trained on	S. N	Name	Trained on

G. Name of trained scaffold supervisor: 1..... 2 .....

**H. Quality of scaffold materials available at site:**

S. N	Items	Yes	No	S. N	Items	Yes	No
1.	Are scaffold tubes not damaged / deformed?			2.	Are scaffold boards / sole plates damaged / deformed?		
3.	Is couplers suitable type and free from defects?			4.	Are base plates free from defects?		
5.	Are standard metal wires available for tying ladder?			6.	Are Standard aluminum ladder(s) free from defects, deformity and temporary repairs?		

Name and designation of Contractor site engineer

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>PRE ERECTION CHECKLIST FOR SCAFFOLDS</b> (To be filled up and complied before erection of scaffold at site, before giving permit to start the erection)	QM code PIN LP-CHM-018 F10
		Page <b>3</b> of <b>3</b>

**I. Safety check by issuer :**

S. N	Items	Yes	No	Not Required	S N	Items	Yes	No	Not Required
1.	Area inspected for erection of scaffold and found surface consolidated/hardened				2.	Is safety harness (s) with lanyards available and in good condition?			
3.	Are other PPE such as fall arrester available?				4.	Is Safety net available?			
5.	Is 100% safety briefing given by Site engineer before start of work?				6.	Are scaffold materials properly stacked at site, without obstruction approach routs?			
7.	Are warning signs, barricading tapes available at site?				8.	Is medical certificate for persons working at a height of 1.8m and above available?			

Receiver	Issuer
Date ..... Time.....	Date..... Time.....
Signature:	Signature:
Name..... Designation.....	Name..... Designation.....

**IMPORTANT NOTES:**

- ♦ This pre erection checklist shall be filled up by Receiver and verified by issuer before start erection of each scaffold.
- ♦ Pre-erection checklist shall be filled in triplicate and submit to issuer for further check. On further check by issuer, the executer shall comply with all requirements as mentioned in checklist.
- ♦ Duplicate copy shall be with receiver and the original with the issuer.
- ♦ Check-list points marked as "NO" must be attended and addressed in this format.

<p>1. The first part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>		<p>2. The second part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>	
<p>3. The third part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>		<p>4. The fourth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>	
<p>5. The fifth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>		<p>6. The sixth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>	
<p>7. The seventh part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>		<p>8. The eighth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>	
<p>9. The ninth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>		<p>10. The tenth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.</p>	

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>Ladder Inspection Checklist</b> (This inspection shall be carried out weekly by a team of Site Engineer, Site HSE Rep and Stores Rep)	QM code PIN LP-CHM-018 F11
		Page 1 of 1

Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location: \_\_\_\_\_

<b>Ladder ID no.:</b>	<b>Date of Inspection:</b>
-----------------------	----------------------------

IS THERE EVIDENCE OF:	YES/ NO	COMMENTS
<b>(encircle whichever relevant)</b>		
Cracked, split, worn or broken stiles?	Yes / No	
Twisted or distorted stiles?	Yes / No	
Cracked, split, worn or broken rungs?	Yes / No	
Loose rungs (considered loose if they can be moved by hand)?	Yes / No	
Twisted, distorted or missing rungs?	Yes / No	
Rusted, corroded, damaged, worn or missing fittings/screws/nails etc?	Yes / No	
Missing or damaged feet	Yes / No	
Paint or other substances that could hide damage	Yes / No	
Home made ladder	Yes / No	If Yes, it shall be removed immediately from the site.
<b>COMMENTS</b>		
<b>IS LADDER SAFE FOR USE? YES/NO</b>		
Date: _____ Time: _____		
<b>NAME</b>	<b>DESIGNATION</b>	<b>SIGNATURE</b>
	Site Engineer	
	Site HSE Rep	
	Stores Rep	

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b><u>PERMIT TO OPEN MANHOLE COVERS / GRILLS / GUARDRAILS</u></b>	QM code PIN LP-CHM-018 F12
		Page <b>1</b> of <b>1</b>

Project: \_\_\_\_\_ Project number: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location: \_\_\_\_\_

### **I. Work Permit Issue**

#### **A) To be filled in by receiver when required to open Manhole Covers/Grills/Guardrails**

1. Location of manhole / Grill / Guardrails etc.
2. Permission required to keep Manhole Cover / Grill / Guardrails open

**Date:** \_\_\_\_\_ **From hrs** \_\_\_\_\_ **to hrs.** \_\_\_\_\_

#### 3. Purpose

- i) Has the area been fenced/cordoned off? Yes/No
- ii) Have the red flags (red lights at night) been displayed Yes/No
- iii) Has proper illumination been arranged Yes/No?

Name: \_\_\_\_\_ Designation: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(Receiver) (Receiver)

#### **B) To be filled in by the work permit Issuer permitting to open the manhole cover / grill / Guardrails after ensuring that safety precautions have been made at the proposed area for opening the cover.**

Name: \_\_\_\_\_ Designation: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(Issuer) (Issuer)

### **II Work Permit Closure**

**A. To be filled in by Receiver** who had asked for the permission to open the Manhole Cover / Grill / Guardrails  
stating that the manhole cover / grill / Guardrails has been placed back in position properly on \_\_\_\_\_ (date) at \_\_\_\_\_ hrs after the work was completed and safety arrangements removed and the area is cleared.

Name: \_\_\_\_\_ Designation: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(Receiver) (Receiver)

#### **B. Verified by Issuer**

Name: \_\_\_\_\_ Designation: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Process <b>Construction HSE Management</b>		
thyssenkrupp Industrial Solutions (India)	<b>PERMIT FOR PRESSURE TESTING</b>	QM code PIN LP-CHM-018 F13
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Project: \_\_\_\_\_ Project number: \_\_\_\_\_ Date & Time: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_ Location: \_\_\_\_\_

Type of Pressure Test: ☐ Hydrotest

☐ Pneumatic Test

<b>Issued to</b> : _____	<b>(Receiver's Name)</b>
<b>to perform work in area / Equipment</b> : _____	
<b>Work Description</b> : _____	
Starting Time : _____	Date : _____
Required Completion Time : _____	Date : _____

**Following precaution has been taken and inspected for carrying out the work:**

❖ Barricading the area	<input type="checkbox"/>	❖ Gasket adequacy	<input type="checkbox"/>
❖ Warning sign displayed – “ Pressure Test under progress”	<input type="checkbox"/>	❖ Flanges adequacy	<input type="checkbox"/>
❖ Pep Talk/Tool box talk	<input type="checkbox"/>	❖ Pneumatic Test – Below 21 bar (300 )psi Barricading 15 mtr radi	<input type="checkbox"/>
❖ Risk Assessment (through HIRA)	<input type="checkbox"/>	❖ Pneumatic Test – Above 21 bar (300 )psi Barricading 25 mtr radi	<input type="checkbox"/>
❖ Name of the standby person* _____	<input type="checkbox"/>	❖ Fasteners adequacy	<input type="checkbox"/>
❖ Availability of Safety gadgets and PPEs	<input type="checkbox"/>	❖ Test equipment well secured	<input type="checkbox"/>
❖ Two calibrated pressure gauge	<input type="checkbox"/>	❖ Availability of vent at the topmost point	<input type="checkbox"/>
❖ Hose of rated capacity Min 2 times more than the test pressure	<input type="checkbox"/>	❖ Availability of globe valve in the vent	<input type="checkbox"/>
		❖ Access to vent.	<input type="checkbox"/>
		❖ Availability of safety valve	<input type="checkbox"/>
(*Standby person shall ensures availability of barricades as well as evacuation throughout pressure testing )		❖ Draining arrangement adequate for hydro testing	<input type="checkbox"/>
		❖ Proper tools and tackles (spanners, wrenches)	<input type="checkbox"/>

**I confirm compliance of safe work methods/procedures required for the work. All safety precautions are taken. I will ensure HSE compliance while carrying out the job.**

**Contractor's Site Engineer**  
Performing the Work : (Name) \_\_\_\_\_ ( Signature) \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

**I have inspected the pressure test work area and all precautions are taken.**

Receiver: (Name) \_\_\_\_\_ ( Signature of Receiver) \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

**I confirm compliance of safe work methods/procedures as well as HSE requirements and grant permission for the same.**

**Special Instructions :** \_\_\_\_\_

Issuer : (Name) \_\_\_\_\_ ( Signature of Issuer) \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

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Work completed / Not completed. Tools, materials and equipment removed from the work area. Normal operation may / may not be started.  
Safety system has been uninhibited. In the case of isolation, full function has been restored.

Verified By the Contractor Site Engineer:

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_

Issuer:

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_

Receiver

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_



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**Attachments and Forms:****PIN LP-CHM-018 F01 - Cold Work Permit****PIN LP-CHM-018 F02 -Permit to Hot Work****PIN LP-CHM-018 F03 - Excavation Permit****PIN LP-CHM-018 F04 - Excavation Clearance****PIN LP-CHM-018 F05 - Permit for Road Closure****PIN LP-CHM-018 F05A - Format for information about Main Road Closure****PIN LP-CHM-018 F06 - Permit to Work at Height****PIN LP-CHM-018 F07 - Medical Certificate****PIN LP-CHM-018 F08 - Radiography Permit****PIN LP-CHM-018 F09 - Electrical Isolation Energisation Permit****PIN LP-CHM-018 F10 - Pre Erection Checklist for Scaffolds****PIN LP-CHM-018 F11 - Ladder****PIN LP-CHM-018 F12 - Permit to Open Manhole****PIN LP-CHM-018 F13 - Pressure Testing Permit**

Validity

Valid from: 12. 2018

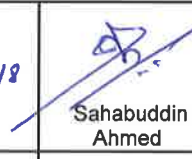
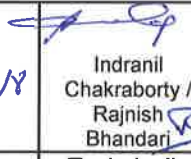

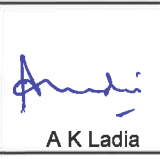
Valid until: 12. 2021

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**This procedure replaces HSE-CON-IN-018**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS India Local QM Standard	10/14/18		24/14/18		24/14/18		31/14/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
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## 1. Scope

This HSE procedure is applicable during the execution stage of project at all active construction sites. However the following conditions shall apply;

### tkIS India as Project Management Consultant (PMC)

If the construction project is a brown-field project, i.e., where the project is inside the existing, operating plant premises, for example – 1. Existing plant capacity expansion project; 2. Maintenance project etc., in general plant (client) work permit system shall be followed or as advised by the client.

If the construction project is a green-field project (i.e. a new plant construction in a new location), the client work permit system shall be followed or as advised by the client.

### tkIS India as EPC Contractor (LSTK)

If the construction project is of brown-field, in general client work permit system shall be followed. However if the client approves tkIS India work permit system shall be implemented.

If the construction project is of green-field project, tkIS India work permit system shall be implemented. However if client insists to implement their work permit system, it shall be implemented on mutual understanding between client and tkIS India site management.

This procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements.

This procedure and client / owner requirements are to be followed. As a rule the most stringent shall be implemented.

At any tkIS India active construction site, where the site HSE is the responsibility of tkIS India either tkIS India work permit system or client work permit system shall be implemented.

## 2. Purpose

This procedure describes how work and entry permits within the defined areas shall be planned, executed and checked.

The objective is set requirements to the use of written permits in within tkIS India active sites.

The PTW (permit to work) system is a formalized process to control work and access to identified areas designed to prevent incidents at sites. The written system is used to control work areas that are potentially hazardous. This process authorizes work only after safe procedures have been defined and they provide a clear record that all foreseeable hazards have been considered.

The use of written permits is to prevent injury to the personnel, damage to material and the environment. The system of written permits shall ensure that tkIS India site management has approved the activity within the area of its responsibility before the activity is executed.

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### 3. Definitions

#### 3.1 Confined Space

Any space where the access or egress is limited, where oxygen deficiency i.e. below 19.5% oxygen or enrichment i.e. above 23.5% oxygen by volume may occur, or where toxic substances or other hazards may accumulate in a restricted work area.

- i. Confined spaces include tanks, vessels, hoppers, bins, tank cars, steam boilers, conveyor tunnels, coal bunkers, sumps, excavations of depth more than 1.2m or 4 feet, ducts, scrubbers, manholes, sewers etc.
- ii. A confined space includes any chamber, tank, vat, pipe, or similar confined space. Any place large enough and so configured that an employee can bodily enter and perform assigned work is a confined space.
- iii. If the space has limited or restricted means for entry or exit or is not designed for continuous employee occupancy it is considered a confined space.
- iv. Permit required confined space program is the over-all program for controlling, and, where appropriate, for protecting employees from permit space hazards and for regulating employee entry into permit required spaces.
- v. Non - permit required confined space is any area that follows the items described in section 4.4 and if the described area has not been contaminated and is a new vessel or an open excavation of depth more than 1.2m or 4 feet.

#### 3.2 Energy

Electricity, Gas, Oil ,Water and other fluids, Air, Steam, Oxygen or Other stored Energy source, Flywheel, Mechanical, Gravitational, Kinetic, Chemical,

#### 3.3 Energy isolation

Dissipating or restraining (containing) any stored energy which can create hazard/hazardous condition

#### 3.4 Hazardous area

An area in which an explosive atmosphere is present or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of potential ignition sources

#### 3.5 Hot work

An activity that can produce a spark or flame or other source of ignition having sufficient energy to cause ignition, where the potential for flammable vapors, gases or dust exists. This includes all works which produces sparks, running of internal combustion engines, breaking of concrete, use of ordinary torches, use of battery operated devices, welding, thermal or oxygen cutting, heating, grinding etc.

#### 3.6 Cold work

Cold work is an activity that does not produce sufficient heat to ignite a flammable air-hydrocarbon mixture or a flammable substance.

#### 3.7 Radiation work

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An activity that is carried with a source of ionizing radiation.

### 3.8 Working at Height

Working at height is any activity that is carried out at 1.8 meters (6feet) and above on temporary structure or scaffold.

### 3.9 Excavation:-

An Excavation is any man-made cut, cavity, trench or depression in an earth's surface that is formed by earth removal. A Trench is a narrow excavation (in relation to its length) made below the surface of the ground in general the depth of trench is greater than its width, and the width (measured at the bottom) is not greater than 4.6 meters (15 feet).

### 3.10 Self Contained Breathing Apparatus (SCBA):-

It is a life saving Personal Protective Apparatus consisting of a facemask, combined with a hose and source of fresh air, generally in the form of a cylinder of compressed air, to be carried by the bearer.

### 3.11 Lockout: -

Use of a lock and system to prevent energy from being turned on during equipment maintenance or repair.

### 3.12 Tag out:-

Use of a special tag informing workers of the danger of starting the equipment.

### 3.13 LoTo:-

Lockout Tag out

### 3.14 Permit:-

A document authorising a person to undertake a specific work in designated area.

### 3.15 Restricted Area:-

An area to which access is available only to persons authorised by tkIS India.

### 3.16 Permit Issuer:-

A trained person who is authorised by tkIS India. Site Management to complete and issue a Permit. In general, concerned job execution Engineer /area Engineer of tkIS India shall be the Permit Issuer.

### 3.17 Permit Receiver:-

A trained person who is authorised, in general Contractors concerned job execution Engineer /Supervisor who receives a Permit from a Permit Issuer.

### 3.18 Blanket Permit:-

The hot work permit issued to areas after due consideration to safety (the fire hazard is minimum and hazards due to adjoining facilities taken into consideration.) with approval of tkIS India site Management for a maximum period of one month. Such Permit shall not need shift-wise renewal, however the work permit receiver/ job executor has to ensure that Permit Conditions are complied throughout the work period.

Note: tkIS India/Contractor HSE Personnel cannot become Work Permit Issuer or Receiver.

In case of Emergency all Permit s shall close automatically and before starting work fresh PTW need to be obtained.

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### 3.19 Job Safety Analysis:-

JSA is applicable for all activities. JSA to be prepared before commencement of any activity. Group discussion with all the stakeholders to be ensured and to be attached with work permit. (PIN LP-CHM-022 F01– Format: Job Safety Analysis)

## 4. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (tkIS India) /Commissioning Manager CoM	<p>(i) Responsible to ensure effective implementation of this procedure on site.</p> <p>(ii) Carry out random check of worksites under Permit particularly the jobs which are critical e.g. Hot Work, Confined Space Entry, Working at Height etc and take immediate corrective measures if required. These points shall be discussed in the Safety Committee Meeting.</p> <p>To assess necessity of job beyond normal working hours. To check the need of Blanket Permit for the work.</p>
tkIS India Construction Engineer/Commissioning Engineer CoE	<p>Responsible to implement this procedure and to ensure:</p> <p>(i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements.</p> <p>(ii) that all hazards associated with activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods.</p> <p>(iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.</p>
tkIS India Site HSE Personnel	<p>(i) Responsible to assist RCM in effective implementation of this procedure on site.</p> <p>(ii) To assist construction engineer identification, assessment, evaluation, control methods for likely hazards associated with the activity.</p> <p>(iii) To ensure the necessary administration of records required by this procedure is maintained.</p> <p>(iv) To assess the adequacy of Safety Precautions mentioned in the Permit and advice issuer for additional precautions if any.</p> <p>(v) Check that authorized signatories have signed the Permit at respective box of permit.</p> <p>(vi) Permit is properly filled up such as Period, Location, Nature of Job etc and all the columns of the checklist are addressed.</p> <p>(vii) Gas Test has been done and reading mentioned in case of "Confined Space Entry Permit" and the other works wherever advised by the issuer.</p> <p>(viii) Check whether the area is safe for the Blanket Permit job.</p>
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the

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	associated hazards, requirements of this procedure and adhere to the requirements of this procedure.
Permit Issuer	<p>Ensure all hazards associated with the proposed job have been identified, assessed and controlled.</p> <p>Be familiar with the intended task</p> <p>Ensure that the area and equipment are made safe .</p> <p>Outline how the work is to be undertaken(e.g. Procedures, Precaution, Equipment, Location, Start time, Duration)-Verbally and where necessary in writing.</p> <p>Maintain Records of work Permits.</p> <p>Ensure that good housekeeping is maintained in the work area.</p> <p>Authorised to STOP THE WORK if deviation is noted from the Permit Conditions.</p> <p>Shall check the Permit, submitted by Receiver to assess the safety requirements mentioned in the permit for their adequacy and may check physically some critical checklist compliance such as Gas Test, Isolation, Tagging, LoTo Implementation etc and recommend corrective measures before signing the Permit.</p> <p>Thoroughly check the worksite conditions ( such as hot work in a running unit/ near flammable and combustible substances, working at height, entry into confined space, radiography etc.) for all critical activities and compliance of Permit Conditions at site before signing.</p> <p>By experience may visualise additional hazards/ risks in job which needs to be addressed and will add this in the Permit for compliance.</p> <p>Before signing the Permit Issuer shall ensure that conditions mentioned in the Permit is fully complied at site.</p> <p>The Permit Issuer shall withdraw the Permit, if the conditions in Permit/Clearance are violated or the job is no more safe due to some other reasons.</p> <p>The information about the withdrawal of the Permit shall be communicated to all concerned.</p> <p>To prepare properly the equipment/facility/area before handing over to receiver.</p> <p>Ensure that the Permit is properly filled up and precautions are categorically mentioned.</p> <p>Gas Tests are to be carried out, if required.(Mandatory for Confined Space Entry Permit)</p> <p>Avoid giving general/vague remarks on Permit which is not specific.</p>
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	<p>For working at height, ensure that there is a provision of safe access to the worksite and there is a provision of ladder/platform/scaffold for safe execution of work.</p> <p>Check whether the scaffolds are provided with Green Scafftag.</p> <p>Close the Permit on completion of work and retain the copy at least three months.</p> <p>Keep your copy of Permit always with you.</p>
Permit Receiver	<p>Satisfy himself that understand the requirements of the Permit.</p> <p>To be trained and competent to perform the work.</p> <p>All aspects of the Permit shall be completed and documented.</p> <p>Adhere to the PTW requirements.</p> <p>Ensure that the job is performed in a safe manner.</p> <p>Be aware of the hazards that could exist and have the necessary controls in place.</p> <p>Make equipment and area safe on completion of the task.</p> <p>Make the work area safe and seek immediate advice from Permit Issuer if a doubt or circumstances or conditions change.</p> <p>Ensure that all tags and signs are prominently displayed so that Personnel are aware that the equipment etc is isolated/not be operated.</p> <p>Ensure that proper housekeeping is maintained.</p> <p>Authorised to STOP THE WORK if deviation is noted from the Permit Conditions and report to issuer immediately.</p> <p>On issue of Permit the Receiver shall go through the Permit and pass the instructions down the line as mentioned in the Permit for its compliance.</p> <p>In case of any doubt, the Receiver shall get clarified from Issuer.</p> <p>Do not sign without Authority.</p> <p>Ensure that precautions mentioned in the Permit are complied at site.</p> <p>Ensure that equipment being used is safe to perform the task in particular area.</p> <p>Ensure that all power driven equipment including the cables, insulation of cables and cable joints etc are as per Standard and are maintained in good condition.</p> <p>Make the Permit available at worksite all the time during the work.</p>

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	<p>Work at specified location only, as mentioned in the Permit.</p> <p>The checking and certifying including providing Scafftag on each scaffold shall be the responsibility of concerned job executing engineer/supervisor co-coordinated by the Receiver.</p> <p>All jobs shall be carried out as per relevant safety norms.</p> <p>Check and ensure availability of valid Medical Fitness Certificate for workmen, working at the height of 1.8 meters or above under "Work at Height Permit".</p> <p>Clear the site on completion of the work.</p> <p>Close the Permit on completion of day's work and hand it over to "Issuing Authority".</p> <p>Ensure that proper housekeeping shall be maintained all the time at site.</p>
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**Note:** Please refer Annexure1 for Work Permit Issuer & Work Permit Receiver safety guide lines, for Effective implementation of Work Permit System.

## 5. Procedure:

### 5.1 Works that require Permit:-

Normally all construction works shall be carried out with proper work permit. Following is the non-exhaustive list of jobs where PTW is required;

- Inspection
- Hot Work
- Cleaning Activities of process equipment
- Entry into Confined Space
- Excavation
- Vehicle entering into Process Area
- Work at Height
- Handling of Materials
- Using Mechanized means
- Erection and Dismantling of Scaffold Work
- Isolation and Energisation of Electric Equipment/Facilities
- Hydro/Pneumatic test
- Radiography
- Grit/Shot Blasting
- Steel Fabrication



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In addition to the above jobs any other job as advised by tkIS India Site HSE Representative/ tkIS India Site Manager shall require a Permit.

#### 5.2 Works exempted:-

Jobs carried out during emergencies (Fire/Explosion, Rescue, Uncontrolled release of hazardous chemicals/gases etc.) to control the emergencies.

Routine Work carried out at Stores and Lay down Yard/area & Steel Rebar Storage Area

Other than the above jobs, the requirement of Permit shall be advised by tkIS India Site HSE Representative/ tkIS India Site RCM.

#### 5.3 Types of Work Permits, Clearances Formats:-

Normally, the following work permits shall apply:

Hot Work Permit

Cold Work Permit

Confined Space Entry Permit

Permit to open manhole cover grills

Working at Height

Radiography Permit

Road Cutting / Blockade permit

Excavation Permit & Clearances

Pressure Testing

5.3.1 Cold Work Permit: - This Permit is required for carrying out any activities of construction e.g. cleaning, testing that does not produce sufficient heat to ignite a flammable air-hydrocarbon mixture or a flammable substance. The format for COLD WORK PERMIT is enclosed as PIN LP-CHM-018 F01. Examples of Cold Work Jobs: Scaffolding Erection, Excavation by hand tools

5.3.2 Hot Work Permit: - is required for carrying out any activity which produces sufficient heat to cause fire in a inflammable air-vapour mixture. The format for Hot Work is enclosed as PIN LP-CHM-018 F02.

Examples of Hot Work:

1. Gas Welding/Cutting
2. Electric Arc Welding
3. Grinding
4. Excavation done by machinery e.g. Breaker, Excavator etc.

#### 5.3.3 Confined Space Entry Permit

Refer PIN-LP-CHM-023-Confined Space Entry procedure

#### 5.3.4 Excavation Permit & Clearance:-

Excavation Permit is required for carrying out any excavation at tkIS India site. The format for Excavation Permit is enclosed as PIN LP-CHM-018 F03.

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Duly filled, signed "Excavation Clearance" is a pre-requisite for any Excavation Permit This shall be taken one time for one area for a particular depth. If condition changes (e.g. depth), once again clearance shall be taken. The format for the same is enclosed as PIN LP-CHM-018 F04.

Wherever temporary closure of road, cutting of road or blockage of main roads is required, the necessary approval shall be obtained in format for "Road Closure" enclosed as PIN LP-CHM-018 F05.

The information about the closure of main road shall be circulated in format enclosed as PIN LP-CHM-018 F05A.

#### 5.3.5 Working at Height Permit:-

For all working at height (of 1.8 meters or above), a Permit "Working at Height" is required. The format for same is enclosed as PIN LP-CHM-018 F06. The medical Certificate for the workmen require to Work at Height is mandatory. The format for the same is enclosed as PIN LP-CHM-018 F07.

#### 5.3.6 Radiography Permit:-

For all jobs which generate Ionizing Radiation, Radiation Permit is required. The format for the same is enclosed as PIN LP-CHM-018 F08.

#### 5.4 General Requirements of Work Permit:-

All construction jobs at the sites shall be carried out under applicable and valid "Permit to Work" only. Separate Permit shall be issued for each job. Multiple jobs in a single Permit is prohibited. Permit and Clearances shall be in Printed Form depending upon nature of work and serially numbered. Depending on the nature of work, type of Permit required shall be decided.

Working at height Permit shall be required for working at height of 1.8 meters and above on a temporary structure or on a fixed structure not ment for carrying out particular job safely. Full body safety harness (with double lanyards) with lifeline secured with a fixed structure is a must for working at height. Provision of Safety net shall also be made wherever required. Lifelines shall be of wire rope of diameter 12mm.

- ❖ All scaffolds shall be checked and tagged before use.
- ❖ Ready to work Scaffolds shall have Green Scafftag signed by Scaffolding Responsible Person and installed at the access point of the scaffold.

The workmen involved at Working at Height shall have Medical Fitness Certificate from a Doctor as per local legislation requirement.

Following points are to be advised/ ensured, while issuing Working at Height Permit.

- ❖ All tools shall be carried in tool kits to avoid their falling.
- ❖ Throwing or Dropping of material/equipment from height is prohibited.
- ❖ Avoid jumping from one structural member to another structural member, use proper access way.
- ❖ There shall be always "Three Point Contact" (e.g. Two hands, one leg or Two legs and one hand)
- ❖ Avoid movements on overhead beam without proper fall protection.

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- ❖ For details of hazards, precautions and other safety features refer HSE Instruction PIN LP-CHM-014 -Scaffolds and ladders” and “PIN LP-CHM-019 -Working At height”
- Before issuing an Excavation Permit, an Excavation Clearance is mandatory in prescribed format - (PIN LP-CHM-018 F04). Additionally for closure of road, permission shall be taken in Prescribed Form - PIN LP-CHM-018 F05 and information of the same shall be circulated to all concerned in prescribed format- PIN LP-CHM-018 F05A.
- For Excavation Permit jobs, the following shall be ensured: A warning and protective hard barricade of 1 meter height with Red and White Band and self glowing Caution Board (Deep Excavation, Keep Away etc) shall be provided.
- If the excavations are near human/vehicular traffic, in addition to hard barricade and self glowing sign board sufficient number of blinkers light to be provided and maintained.
- Excavated material shall be piled at least 2 feet away from the edge of the excavation.
- Preferably two entries/exits shall be provided for any excavation. In case of long trench for each 7.5 meters there shall be one access/exit.
- Safe angle of repose or Proper shoring/Strutting to cave-in shall be provided as per relevant code and safe operating practices.
- Excavation Clearance shall be obtained from concerned authorities in prescribed format before applying for Excavation Permit.
- For Radiography Permit jobs, the following shall be ensured:

A warning or protective barricade of 1m height around the work area, meeting the distance requirement as mentioned in the Permit and Radiation Signs and Symbols to be displayed prominently by work Permit receiver.

Permit Issuing Authority shall satisfy that Permit Conditions are met before issuing permit. It is also to be ensured that permit conditions are maintained in course of execution of the job.

- Before issuing a Permit, equipment is to be inspected to ensure the equipment/facility is prepared for safe execution of the assigned work.
- The area is cleaned and all safety precautions have been adopted. Wherever necessary, ensure that equipment is isolated, drained, depressurized, properly purged, water flushed, gas tested through portable gas meters and readings have been recorded in the Permit.
- No hot work shall be permitted unless the explosimeter shows zero.
- The Oxygen level shall be at least 19.5 vol % & the concentration of toxic gases below the threshold limit (TLV for H<sub>2</sub>S 10 ppm, CO 50 ppm).
- All concerned shall be trained on “Work Permit System” for proper implementation. Half a Day training shall be mandatory for signatory of Permit (Work Permit Issuer and Work Permit Receiver). Site HSE Rep shall maintain a record of such Work Permit System Trainings to ensure that no untrained person is signing the permit. Validity for signatory of Permit is three years. Site HSE Rep shall initiate action in advance to train the person whose validity is expiring. Further Refresher Course shall be attended in a period not exceeding three years. Site HSE Rep shall maintain a record of such training to ensure that no untrained person shall sign the permit.

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## 5.5 Work Permit Guidelines

### 5.5.1 General Requirements

#### 5.5.1.1 Blanket Permit

Blanket Hot Work Permit can be obtained on case to case basis from the concerned issuer/ tkIS India RCM.

5.5.1.2 Entire Project Site shall be divided into various zones. For each zone a particular Work Permit Issuer shall be authorized. For each zone, a trained tkIS India Site Engineer shall be authorized to issue a Permit. All Permits shall be clearly filled for validity of time and date, nature of work and location of work by receiver before seeking Permit from Issuer. For obtaining Work Permit the receiver shall fill up above information and submit duly signed copy to Issuer for approval.

5.5.1.3 Work Permit is a document, which certifies that all Practical Precautions have been taken for carrying out the job safely. Hence it is desirable that the Work Permit Form shall be filled up by the Issuer after checking and ensuring that the site/facility/equipment as mentioned in the Permit is safe to perform the assigned job. Issuer shall satisfy himself that all precautions have been taken to ensure that the work site is free from all hazards including hydrocarbon and toxic gases and there is no oxygen deficiency and shall remain so during the execution of the job. After filling and signing the Permit, the Issuer shall handover the signed Permit to Receiver. In case of hot work/entry into vessel/excavation, Issuer has to cross-check that the pre-conditions of Permit is complied at site, before signing the Permit. The Receiver shall go through the Permit, check the compliance and sign the Permit before carrying out the job. The Receiver shall pass the necessary instructions to working personnel as mentioned in the Permit before start of job.

5.5.1.4 Permit shall be available and displayed at the job site while the job is being executed. The Issuer shall retain his copy of Work Permit.

5.5.1.5 The Permit shall be closed by the concerned Receiver, signed and returned to the Issuing Authority after completion of the job. It is to be ensured by Receiver that the area has been cleared of all debris; scrap; additional materials etc and all temporary electrical connections have been removed.

5.5.1.6 The Issuer on receiving the closed Permit by the Receiver shall satisfy himself regarding completion of the job and that the area has been cleaned and made safe for operation. On confirmation of closure of the Permit, he shall also sign the Permit and keep the Records of closed out Permits for a Period of Three Months.

Closed Permits (Hard Copies) shall be sent to tkIS India Site HSE Rep for tracking and maintaining records for 3 months.

5.5.1.7 All Permits shall be displayed at work site at work locations near to specific job execution area. To protect the Permit from weather conditions, it shall be displayed in water proof plastic cover. Whenever required a separate stand may be kept at site to display the Permit.

5.5.1.8 The location of Road Closure shall be indicated in Green Colour on Project Site Layout Drawing, displayed at Work Permit Issuers' Office.

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### 5.5.2 Cold Work Permit:-

5.5.2.1 Cold Work Permit in prescribed format shall normally be valid for single shift only and same Permit can be renewed/extended upto a maximum of seven calendar days. Permit Issuer of the particular zone shall renew Permit in each shift after checking Permit Conditions/Precautions and complying the same.

5.5.2.2 Authorised Permit Issuer for the particular zone can issue Permit within that zone only.

5.5.2.3 The Permit shall be issued in Triplicate. Original (White in Colour) shall be with Issuer, watermarked as "Issuer Copy" and first copy (Blue in colour) for Receiver shall be marked as "Receiver Copy", second Copy (Green in Colour) for tkIS India Site HSE Department shall be watermarked as "HSE Copy"

5.5.2.4 The Permits shall be considered issued on Signature of Issuer and Receiver.

### 5.5.3 Hot Work Permit

5.5.3.1 Permit shall be issued in Triplicate.

5.5.3.2 The Original White in Colour shall be for Issuer and marked as "Issuer Copy". The duplicate "Pink in Colour" shall be watermarked as "Receiver Copy" and triplicate Green in colour shall be watermarked as "HSE Copy".

5.5.3.3 The Permit shall be issued job wise, specifying the exact location of the job. Where the exact area of the job cannot be specified, the sketch of the area can be enclosed.

5.5.3.4 Permit is to be obtained on daily basis for normal working hours and any extension of work beyond the normal working hours, is to be extended by the concerned issuer by signing the Permit

5.5.3.5 Normally hot work Permit shall be considered issued for the job after "Clearance Renewal" signed by Work Permit Issuer. This clearance on the same permit can be renewed /extended upto a maximum of 07 calendar days. Concerned Work Permit Issuer can issue clearance after checking permit conditions and ensuring compliance.

5.5.3.6 Blanket Hot Work Permit can be issued by the authorization of tkIS India RCM for a period of maximum one month. While issuing Permit the possible impact of nearby work activities shall be taken into consideration.

5.5.3.7 However, blanket permits for brown field projects shall be issued in consultation with client's representative.

5.5.3.8 For carrying out "Hot Work Permit" beyond normal working hours (general shift/Sundays/Holidays), Permission shall be obtained from tkIS India RCM. In case, concerned tkIS India RCM is not available is not available on duty, authorized nominee may give the Permission on Instruction from tkIS India RCM for emergency/urgent nature of job.

5.5.3.9 Whenever the hot job is discontinued at worksite for a day due to some reason, when the hot work Permit is valid, the Receiver has to inform to Issuer for further advice. The compliance of Permit conditions shall be ensured by Signatories (Receiver and Issuer) before restarting the work.

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5.5.3.10 All Hot Work Permits shall automatically cancelled on occurrence of Fire against that Permit unless it is rechecked and certified by Issuer. All such Permits shall be withdrawn and handed over HSE Department.

5.5.3.11 Equipment or surrounding areas shall be checked to ensure that they are free from any inflammable gas using a Portable Gas Tester.

5.5.3.12 All drain covers and surface man hole covers within 15 meters of hot work site shall be covered by flame retardant fabric clothes. Particular care shall be taken to ensure that these seals are maintained in good condition.

5.5.3.13 If welding or grinding is to be carried out at height, then precautions shall be taken to prevent the spread of sparks and molten metal by covering the work areas with fire resisting or flame retarding fabric or any other means.

5.5.3.14 Arrangement shall also be made to quench and extinguish sparks and molten slag by applying water through a hose, if possible.

5.5.3.15 A fire extinguisher shall be made available for near each hot work area.

#### 5.5.4 Excavation Permit :-

5.5.4.1 For Excavation Permit, Receiver shall obtain the excavation clearance in prescribed format from the respective disciplines of Client e.g. Electrical, Telecom, Instrumentation etc. as a prerequisite condition to Permit, two days before commencement of work. The Clearance Form shall be in Triplicate-Original for Issuer (White in Colour) shall be watermarked as "Issuer Copy", Duplicate for Receiver (Blue in Colour) shall be watermarked as "Receiver Copy" and Triplicate for HSE (Green in Colour) shall be watermarked as "HSE Copy"

5.5.4.2 Excavation Permit shall be issued in Triplicate Original for Issuer (White in Colour) shall be watermarked as "Issuer Copy", Duplicate for Receiver (Blue in Colour) shall be watermarked as "Receiver Copy" and Triplicate for HSE (Green in Colour) shall be watermarked as "HSE Copy".

5.5.4.3 For Road cutting, approval from RCM in Excavation Permit shall be obtained. Additionally, the Permission for road blockade shall be obtained by Client Rep./ tkIS India RCM ,one day before commencement of working in prescribed format. Issuer shall circulate the road blockade information to all concerned one day before commencement of work.

5.5.4.4 The maximum validity of Excavation Clearance shall be for 30 days. It shall be obtained at least two days before commencement of the work. If the work continues beyond one month, a fresh excavation clearance shall be obtained. The Excavation Clearance shall be followed by Excavation Permit.

5.5.4.5 In addition to an Excavation Permit, a Cold Work Permit is required if hand tools shall be used for excavation or a hot work permit is required if powered tools or mechanical equipment shall be used.

5.5.4.6 For excavations more than 1.2 meter deep confined space entries permit is required.

5.5.4.7 For any work inside the Excavation, appropriate Work Permit shall be obtained in addition to above.

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- 5.5.4.8 Receiver shall ensure compliance to precautions specified on the Work Permits and Excavation Clearance. Issuing Authority shall monitor these conditions.
- 5.5.4.9 Each signatories of Excavation Clearance, who has underground facilities near to Excavation site shall monitor the site daily where excavation is in progress, to ensure that the respective underground facilities are not damaged. Issuer shall check the site for damages before closing the Work Permit.
- 5.5.4.10 Excavations adjacent to building, structures, Pipe racks etc may require supports or strutting or shoring.
- 5.5.4.11 Ladder shall be positioned projecting a minimum of 1 meter above the edge of the excavation.
- 5.5.4.12 There shall be at least two means of exit for persons working inside large excavation within 7.5 meters of travel distance.
- 5.5.4.13 All walkways across any excavation shall be of scaffold construction with handrails. Jumping across excavations shall not be allowed.
- 5.5.4.14 Receiver shall arrange hard barricading of the excavation to avoid the hazard of persons and vehicles falling-in.
- 5.5.4.15 Reflective warning notices, traffic cones and flashing lights shall be provided at the edge of excavation and at a safe distance ahead.
- 5.5.4.16 All materials cum equipment and excavated soil shall be kept at least one meter away from the edge of excavation, to prevent "fall-in", injuries and collapse of excavations. Receiver shall inspect strutting or shoring materials before their use.
- 5.5.4.17 Receiver shall check the excavation safeguards, shoring, sloping and supporting system daily before starting the job and after every rain-storms or other hazard increasing occurrence.
- 5.5.4.18 Engine driven equipment shall not be used inside confined excavation. If required, confined space precautions shall be followed. Exhaust gases from the engines of excavators etc shall be kept clear of the excavation.
- 5.5.4.19 Trial excavations shall ensure safety of underground facilities before use of mechanical excavators.
- 5.5.4.20 Excavation work shall cease if any underground services are discovered or damaged during excavation. Information shall be reported to the Issuer without delay. The work shall be restarted only after approval has been obtained from Issuer.
- 5.5.4.21 Receiver shall report any damage to underground services or any other incident immediately to the Issuer.
- 5.5.5 LoTo (Lockout Tagout):-

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Before issuing any Permit related to electricity, having electrical connection the Issuer shall request the client concerned utility in-charge for isolating equipment (electrically) For isolation/enrgisation refer PIN LP-CHM-018 F09. For Lockout & Tagout details refer PIN LP-CHM-011.

#### 5.5.6 Permit for Working At Height :-

5.5.6.1 Permit for working at Height shall be issued in prescribed format shall be considered issued for job after signatures from Receiver and Issuer. The Permit can be renewed/ extended upto a maximum 7 Calendar Days. Issuer of the zone shall renew the Permit in each shift after checking Permit Conditions and ensuring the compliance of the same.

5.5.6.2 For carrying out job beyond normal working hours or Weekly Off/Holiday; Permission shall be obtained from tkIS India RCM.

**5.5.6.3** Working at height shall be avoided in adverse weather conditions, such as during rain, high wind, combination of high temperature and humidity.

5.5.6.4 "Pre-Erection Checklist for Scaffold" shall be filled up and requirement shall be fully complied before going for erection of any metallic tubular scaffold. The checklist shall be in Triplicate. Original shall be for Issuer, first copy to Receiver and second copy to HSE.

5.5.6.5 All scaffolds shall be of metallic tubular construction and checked using format HSE- PIN LP-CHM-014 F01 and certified before being tagged. No Working at Height Permit shall be used unless the scaffold is checked and certified in prescribed form and tagged in Green Colour, showing "Ready for Use". In case a scaffold is in continuous use for more than a week, it shall be re-checked and certified at an interval of every seven days. A Scaffold is also required to be checked and certified, whenever any alteration/ modification is done in scaffold or if the scaffolds are subjected to severe climatic condition. All Scaffold not ready for use shall be tagged-Not Ready for Use/Under Construction shall be tagged in RED COLOUR.

5.5.6.6 The Permit shall be issued in Triplicate Original for Issuer (White in Colour) shall be watermarked as "Issuer Copy", First Copy for Receiver (Pink in Colour) shall be watermarked as "Receiver Copy" and Second Copy for HSE (Green in Colour) shall be watermarked as "HSE Copy".

5.5.6.7 All ladders shall be inspected in prescribed format by joint committee consisting of Site Engineer, Site HSE Rep & Stores Rep once in a month. Visual Pre-use inspection of ladders shall be carried out by user before every use.

5.5.6.8 The persons working at height shall be medically fit. The format for Medical Certificate is HSE- PIN LP-CHM-018 F07. The Certificate shall be issued by an MBBS Doctor and it shall be valid for two years.

#### 5.5.7 Radiation Permit :-

5.5.7.1 Radiation Permit shall normally be issued valid for single shift only. Same Permit can be extended upto maximum of Seven Calendar Days if the radiation source and working conditions, hazards shall not change.

5.5.7.2 The Receiver /concerned shall fill the Permit for validity of Time and Date, Nature of Work and Location of Work before seeking Permit from Issuer. For obtaining Work Permit, Receiver /concerned



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shall fill up the above information and send duly signed forms to the Issuer. After checking the issuer shall handover the signed Permit to Receiver. The Receiver will go through the Permit, ensure the compliance.

5.5.7.3 The Permit is issued in Triplicate, the original copy (White Colour) for Issuer shall be watermarked as "Issuer Copy", first copy (Yellow Colour) for Receiver shall be watermarked as "Receiver Copy" and second copy (Green Colour) for HSE shall be watermarked as "HSE Copy".

5.5.7.4 Concerned zone Permit Issuer shall be authorized to issue the Permit.

#### 5.5.8 Form For Work Permits :-

Work permits are issued on the basis of completed work permit application form.

For working in confined space, please refer PIN-LP-CHM-023.

The forms shall be issued by the tkIS India Client site office, which shall keep a record of all issued permits.

The forms shall be completed, so that there is absolutely no doubt regarding the following:

- What has to be done?
  - Which actions/measures need to be taken before the permit will be issued and which actions/measures shall be carried out and followed up while work is ongoing?
  - Which signatures are required?
- The Work Executor shall ensure that the work is started at the right spot and that the work site is prepared as specified in the work permit. The form is numbered and is distributed as follows:
- The first copy shall be hung clearly visible at the work site.
  - Original form is kept in the tkIS India Issuer site office and also other copy by the tkIS India Site HSE Rep.
  - When the work is stopped and the personnel leave the work site the work permit shall be closed by Receiver and submitted to Issuer.
  - The used work permit will be kept for at least three months.

#### 5.5.9 Validity:-

A permit is not valid until all required signatures have been applied. The same person cannot sign the permit as Permit Issuing Authority and Work Executor. The work permit is normally valid for normal working hours.

#### 5.5.10 Issuance of Work Permits:-

Conditions linked to the various sections in the work permit are described below.

5.5.10.1 The date and time of work start-up shall be filled by Work Permit Receiver.

5.5.10.2 In which area/unit the work shall be carried out, and what kind of equipment/cords and/or instrument shall be used.

5.5.10.3 Work Permit Receiver provides a short description of the kind of work to be carried out. The description shall make clear to the Execution Engineer what shall be done and how the work is expected to be carried out in a way that misunderstandings and dangerous situations shall not arise. For entry, the number is applied to the entry permit.

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5.5.10.4 In certain cases, special signatures may be required. Normally this is determined by additional instructions and procedures.

5.5.10.5 If the original scope of the work is changed, new permit need to be taken.

5.5.10.6 A check shall be made to ensure that the work atmosphere is free of dangerous gas concentrations before work may start. In the case of hot work, the area is tested for inflammable gases and upon entry also for oxygen and/or hazardous gases. Requirements pertaining to the type of gas tests to be carried out as well as which gases are to be examined and the results stemming from these tests shall be indicated on the work permit.

The time, the recorded concentration and gas type(s) shall be documented. Trained personnel shall perform the measurements with approved measuring equipment subjected to documented maintenance and calibration.

The Work Permit contains the gas test results.

5.5.10.7 In the section, "Specific Instructions" the Work Permit Issuer point out special conditions/precautions linked to the execution of the work.

In the section, "**specific instructions**" the Work Permit Issuer point out special conditions/precautions linked to the execution of the work. For example the work might require special safety equipment, or the Work Executor shall be especially attentive to conditions linked to equipment in the vicinity that may require extra cover, etc.

5.5.10.8 Work Permit Receiver shall collect the permit and inform the persons who shall carry out the work about all conditions and actions linked to the work permit before the work is started.

5.5.10.9 The duration the work permit shall be indicated in particular column. The workplace shall be checked each time the work permit is renewed.

5.5.10.10 When the work is completed, Work Permit Receiver shall ensure that the work has been carried out professionally and the work site has been tidied.

5.5.10.11 If the work has not been completed, a new work permit shall be prepared before the work may be continued.

5.5.11 Firewatcher :-

It is recommended to provide a Firewatcher for hot works that produce to sparks/slugs. The requirement of Fire Watch shall be indicated by the Permit Issuer on the work permit .

Before the work starts, tkIS India HSE Rep. shall make sure that gas tests are performed, if required and advised by Issuer. Test is to be carried out as close/near to the work site and as short in time before the work as possible.

For hot work not requiring a Firewatcher, the workplace shall be checked for any possible fire hazards before work starts.

5.5.12 Procedure for Electrical Installation:-

For any construction, repair, testing, and maintenance or inspection job on an electrical system or for any work in close proximity to energized electrical circuits, or for-any job in general where an electrical isolation is needed, the requirements as detailed below shall apply.

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- Electrical isolation and energization shall be carried out only by authorised person.
- Contractor's Authorised Electrical Person (AEP) shall initiate the work permit to carry out the work. For Lockout & Tagout Instruction refer PIN LP-CHM-011.
- AEP, after receiving work permit shall de-energise, do the positive electrical isolation, complete all the work, remove all temporary installations, keep the circuit ready for energization, report to Permit Issuing Authority, and return the permit for closure and records.
- Throughout the work, AEP shall ensure that switches and circuit breakers controlling the supply to the equipment or line shall be locked out and kept tagged with caution boards stating "Men Working On Line, Do Not Switch On" to caution against anyone inadvertently closing them. The area of work shall be cordoned off to avoid any unauthorized entry.
- While carrying out electrical isolation / Energization work, the persons connected with the work shall use only approved protective equipment (Rubber gloves, shoes, mats, safety appliances etc).
- Permit Issuing Authority shall verify the completion of all work and ensure that the circuits are ready for safe re-energisation. Permit Issuing Authority shall arrange for the safe charging of the equipment.

## 6. Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN LP-CHM-099.

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**Attachments and forms:** Nil**Validity**

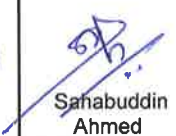
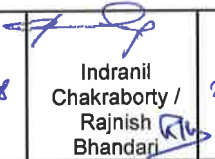

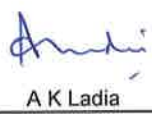
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**This procedure replaces HSE-CON-IN-019**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tkIS India Local QM Standard	10/12/18		21/12/18		24/12/18		31/12/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				No project-specific adaptation				
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### 1. Scope

This HSE procedure is applicable for working at height during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS-India irrespective of activity being carried out by tkIS -India personnel, Contractor, Sub-Contractor, vendor personnel. This procedure takes effect on date of approval.

### 2. Aim

This HSE procedure is aimed at providing guidelines and defining requirements for safe system of work while working at height. The Project HSE Management plan requires, risk assessments to be carried out for any work where there is a risk of falling. This HSE procedure defines the guidelines for personnel working at height to assess and mitigate the risk of falling or objects being dropped.

The procedure sets the basic minimum requirements in addition to compliance with current industry practices, applicable regulatory standards/requirements and tkIS Global Procedure on Working at Height (GP-HS-08 Working at Height)

However, the most stringent requirement shall be applicable.

### 3. Responsibilities

The responsibilities of site personnel related to HSE functions are as given below:

Site Manager (SM)/ Commissioning Site Manager (COM) tkIS India & Contractor	Responsible to ensure effective implementation of this procedure on site.
tkIS India Construction Site Engineer (CSE)	Responsible to implement this procedure and to ensure:  (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements.  (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods.  (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist Site Manager in effective implementation of this procedure on site.  (i) To assist construction engineers in identification, assessment, evaluation, control methods for likely hazards associated with the activity.  (iii) To ensure that necessary administration of records required by this procedure.
Contractor Engineers/ Supervisors/ Personnel      HSE	(i) Carry out HIRA (Hazard Identification and Risk Assessment) for activity, as applicable and submit to tkISIndia for comments / Approval prior to commencement of the respective activities.  (ii) Ensure that personnel under their supervision understand and adhere to this procedure.

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	(iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, req. of this procedure and adhere to the req. of this procedure.

#### 4. Definitions

##### 4.1 Competent People/Person

Person(s) trained, experienced and duly authorised to carry out a particular function.

##### 4.2 Harness Lanyard

A strap or rope usually of synthetic fibre specially designed to attach a safety harness to an anchor point or lifeline.

##### 4.3 Reasonably Practicable

By considering the risk in relation to the measures necessary to eliminate the risk is known as Reasonably Practicable measure.

##### 4.4 Working at Height (WAH) / Elevated Places

“Working at height” includes all work where there is possibility of falling from more than 1.8 meters. That is, accessing or exiting from any elevated position above a surface where a person could fall a distance or in a way likely to cause personal injury.

Working at height situation example: 1. a person could potentially gain access to within 1.8 meters of an exposed edge where there is potential fall of 1.8 meters or more.

2. work at less than 1.8 meters height, but the risk assessment determines it as high risk work activity. Permanent workplaces at elevated position, provided with suitable permanent work platforms and stairs are not considered under this definition of Working at height.

##### 4.5 Mobile Elevated Work Platform (MEWP)

A telescoping device, hinged device, scissor device, articulating device or any combination of these devices, used to move personnel, equipment or materials to and from work locations above the support surface.

##### 4.6 FLT

Fork Lift Truck

#### 5. Procedure

##### 5.1 Elimination or Minimisation Program for Work at Heights

The site shall implement a program for minimisation of work at height. This shall be done by either:

- elimination of the need to perform work at height; or
- by eliminating the risk of fall (i.e. implementation of fixed barrier's, scaffolds etc.)

Where reasonably practical as much work as possible shall be done at ground level to minimise working at height e.g. sections of steel work can be bolted together, pipes welded, radiography carried out and the items painted before being lifted into position.

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## 5.2 Actions Prior to Starting the Work at Height

Prior to start the work at height, following questions should be answered by concerned construction Engineer/supervisor, if the answer is “yes” the hazard is eliminated and if it is “no” next steps are to be followed:

- Can working at height be prevented?
- Can the job be executed from ground level using extension tools?
- Can the job/item being assessed for work at height be permanently or temporarily relocated to ground level?

Before the commencement of work at height, the concerned construction Engineer / Supervisor of the employee planning to work at height should:

- Ensure the purchased equipment for working at height is rated for industrial use and is certified as per applicable and appropriate Standards.
- Choose the appropriate equipment and method for working at height.
- Ensure that the selected equipment is assembled, installed and inspected in line with the legal requirements.
- Ensure that the employee or contractor is medically fit to work at height as per applicable legal requirements.
- Ensure that the worker shall not work alone at height.
- Prior to any person working at height HIRA should be carried out to identify the risks and the safety measures necessary to eliminate or reduce the risk. In those cases where it is not reasonably practicable to provide a safe working platform and a person has to rely on the use of a safety harness, a suitable rescue plan should be considered along with the safety measures.
- Before the commencement of work at height a trained and competent person should verify that the contents of this guideline have been implemented. This person then must give approval for the start of work. Respective Contractors should maintain a documented inventory for all persons or companies performing work at heights.

## 5.3 Verification of Guideline Implementation

For all work at height of over 1 day in duration a systematic verification of the implementation of this guideline should be carried out by a competent person. The frequency of this check should be adapted to duration and the risk of the operation and should be documented using a checklist.

After the completion of all high work it must be formally verified that the work place has been left in a satisfactory condition and that all persons have safely returned from the workplace. Concerned Construction Engineer / Supervisor should carry out this job.

## 5.4 General Precautions

### 5.4.1 Fall Prevention

Where it is absolutely necessary for persons to work at height, the first consideration should be to provide, so far as is reasonably practicable a safe working platform. The sides of all stairways,

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floors/platforms, walkways, buildings, etc. from where a person can fall and suffer serious injury or from where articles could fall and seriously injure someone should be protected with double guard rails and toe boards of at least 150mm in height. With regard to permanent structures such as stairways and platforms, as much of the permanent handrails as is reasonably practicable should be installed while the structure is at ground level. Where this is not possible then handrails/guard rails should keep pace with construction.

#### 5.4.2 Floor Openings

All openings, through which a person can fall and suffer serious injury, should be covered using material which is sufficiently strong to support any forces that it may be subjected to. It also should be prevented from being inadvertently displaced. The word “Hole” or “Opening” must be printed on the cover topside. If a cover is not used the opening should be protected by rigid guard rails of adequate strength and toe boards.

#### 5.4.3 Safety Nets

Effective safety measures such as a safety net slung beneath the area of work should be adopted for persons installing floor grating. Floor panels should be locked/bolted in position as each one is fixed. Persons not connected with the works should be prevented from inadvertently walking into the area until all panels are fixed and work complete. Double guard rails should be used for closing off such areas and notices conspicuously displayed prohibiting unauthorised access.

#### 5.4.4 Hand Tools

Hand tools used in elevated work areas should have a strap/rope of approximately 1m in length used to attach a hand tool to a person's body/tool kit bag, or in the case of heavy tools to some fixed point such as a guard rail.

#### 5.4.5 Lifelines and Harnesses

Life lines used for the attachment of safety harnesses should be:

- made of steel rope 12mm diameter (min),
- installed at waist height or above,
- tensioned by use of a turnbuckle or similar, and;
- be securely anchored at both ends at points able to withstand the dynamic load generated by a fall.

All lanyards should be made of flame resistant materials. Inertia reels should be used to enable more safe movement around certain areas.

Safe access and egress should be provided to all places of work including access to lifelines.

- Full body type harnesses with double lanyards and shock absorber should be used. The use of two lanyards should ensure 100% hook up all times to anchorage point even during worker movement by enabling one lanyard to be left attached while the second lanyard can be moved to next anchorage point.

Under no circumstances, waist type belts should be used as fall protection.

- Harness should be connected to the lanyard or lifeline at the top dorsal (back) position.



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Ideally anchor points should not be situated below the attachment point of the harness, however if this is not possible, alternatives can be used.

- All attachment devices used in conjunction with fall protection equipment should be of double action type.
- Lanyard must be fitted with double action devices and as an assembly should comply with relevant national standards.

Lanyards should be of a length that is suitable to the task in relation to the potential fall distance.

- Self-retracting lanyards are not designed for continuous support but become effective in the event of a fall. They should not to be used as working supports by locking the system.

Retractable lanyards shall only be used in fall potential areas that have a fall potential between vertical and 45 degrees.

Situation which need the use of Full Body Harness:

Any personnel working in a situation where they are at risk of falling should wear an approved fall arrest system (e.g. full body harness with double lanyard) attached to a secure anchor point on the structure.

Normally, such situations can arise during construction and dismantling of scaffolding when, work is being conducted outside the protection of handrails and mid-rails.

This shall also apply to areas where handrails, scaffolding or grid mesh has not been installed, is not secured, or has been removed for access purposes.

#### 5.4.6 Adverse Weather Conditions

Persons should not be allowed to work on adverse wet or icy steel or work in exposed positions in the rain, snow or strong winds. Plant and equipment such as cranes, mobile elevating work platforms, cradles etc. should not be used in such adverse conditions.

No work at heights (Including work on roofs) at outside the building or in the open area, when the wind velocity is 37 Kmph (23 Miles per hour) or higher and in case of lightning.

#### 5.4.7 Work Above / Below Other Work Areas

- All tools and equipment used on elevated work areas should be secured to prevent falling to lower levels.
- All walkways and stages should have toe/ kick-boards fitted immediately following the installation of handrails.
- Where personnel are working above common access ways, barricades and signage should be erected to prevent persons from entering below the area where the work is on.

Personnel working below any other work activity should notify those above of their presence.

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- Tools and equipment should only be raised to or lowered from upper level work areas by crane, hoist or any other suitable and safe means.

Smaller tools and equipment may be raised or lowered by rope or bucket, provided they are properly secured.

- Power tools must be hoisted by the body of the tool and not by the power lead.

Tools and equipment should not be thrown from one person to another.

- No person should raise or lower tools until all personnel below have been advised and are clear of the area.

#### 5.4.8 Fall Protection

Fall protection shall be used wherever there is a risk of fall. Safety harness must be in a good condition.

All personnel required to use a full body harness shall complete a harness training session prior to use. Training shall cover safe usage and storage of harness.

Factors which may cause a person to fall may include, but are not limited to:

- Sudden acceleration or deceleration
- Moving on unlevelled surface
- The surface not capable of supporting the load
- Unprotected/unidentified openings or holes
- Level changes
- Loss of hand grip
- Slippery surfaces
- Unsuitable footwear
- Equipment, tool, rubbish causing obstructions in the workplace
- Ladders used incorrectly
- Improper clothing
- Surface movement
- Insufficient lighting
- Poor weather conditions
- Struck by moving or falling objects

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- No or improper use of fall arrest systems and devices
- Electric shock
- Effect of fumes, chemicals, drugs

Efforts should be made to avoid any such situations which may cause fall.

#### 5.4.9 Risk Assessment & Mitigation

##### General considerations in HIRA

Construction Engineers should ensure that personnel assigned tasks at height are trained and fit for purpose and comfortable with working at height.

HIRA should consider not only the equipment and the positioning of workers, but also the relationship between anchor points and work positions.

The following should be considered:

- Possibility of pendulum effect in case of fall, when working at full length of lanyard.
- Retrieval of personnel in case of fall.
- Lanyards getting exposed to sharp edges.
- In case of a fall, personnel hitting or falling on a structure or an object, before the fall protection system comes into action.

HIRA should be conducted prior to commencing work at heights to eliminate or control hazards that may be present.

The following should be considered when conducting a HIRA, as a minimum:

- Correct selection, use, fitting, care, maintenance and storage of fall arrest equipment and devices.
- Procedures in the event of an emergency such as rescue, incident or injury
- Electrical safety
- Reference to standard ready-made HIRA for the purpose. However, same should be discussed and reviewed prior to adopting.
- Hazard/ incident reporting systems.

Possible means to eliminate hazard (e.g. pre-fabricating on ground, fitting Static Lines to structures prior to lifting them into position).

#### 5.4.10 Equipment

To the extent possible, a temporary platform, scaffold or elevated work platforms should be used for work at heights.

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Where this is not practicable, an industrial fall-arrest system with proper devices and anchorage should be used.

## 5.5 Ladders, Scaffolds and Mobile or Elevated Work Platforms

### 5.5.1 Safe working on Ladders

Ladders can be used for light jobs of low risk and short duration but not more than one person must be on the ladder and the ladder must be secured to prevent it from slipping outwards and sideways. The person on the ladder shall be wearing a safety harness to help prevent falling.

Person working at height on ladder should:

- be trained in 'safe use of ladders' prior to use the ladder.
- select the type of ladder appropriate to work (i.e. ladder made of non-conducting material for working around live electrical wires).
- not to use ladders longer than 7 metres in length.
- check ladder before each use for – damaged ladder parts (i.e. broken stile or rung or other faults), non-slip feet, non-slip rungs (steps) & valid inspection tag.
- not climb a step ladder that is leaning against a wall, for this purpose straight ladder should be used.
- select a strong upper resting point for the extension ladder.
- not place ladders on boxes, unstable bases or on scaffolds to gain additional height.
- use a ladder to access another level, ensure that the ladder extends at least 1 metre beyond the access platform and is tied off unless other measures are taken to ensure a firm handhold.
- ensure that the different ladder sections are prevented from moving relative to one another, when using an extension ladder.
- ensure that there is sufficient overlap between the different sections of ladder as specified in the ladder manufacturer's manual (usually 5 or 6 rungs need to overlap), when using an extension ladder.
- ensure that the extension ladder is inclined so that the horizontal distance from the top support to the foot of the ladder is not less than  $1/4$  and not more than  $1/3$  of the length of the ladder.
- securely fastens the stiles of the extension ladder at or near their upper end / or lower end. When securing is not possible (e.g. as long as ladder is not securely fastened), one more worker has to hold the ladder in place.
- fully open the stepladder spreaders and shelf.
- cleans off his boot soles before climbing.
- not overload the ladder. Ladders are meant for one person only, so as to be climbed / used one person at a time.
- not stand on the 3 top rungs of an extension ladder.
- not work on the 2 top steps (or even 3 top steps, according to manufacturer's manual) of a step ladder.
- face the ladder while ascending / descending it.
- not carry tools or equipment in hands while climbing the ladder. Use a tool bag/kit or lifts with approved lifting materials.
- keep the body between the stiles. Does not lean out beyond the stiles, i.e. does not overreach. Keep the step ladder close to the work and move the ladder when needed.
- not exercise force sideways as this could push the ladder away.
- not "shift" or "walk" a ladder when standing on it.
- keep ladder away from power lines.
- not use ladders in passageways, doorways, driveways or other locations where a person or vehicle can hit it. If unavoidable, sets up suitable barriers.
- not use a stepladder as a brace or as a support for work platform.

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### 5.5.2 General Scaffolding Requirements

As a minimum:

- All scaffolding erection should be performed by trained personnel.
- All scaffolding should be erected in compliance with the requirements of tkIS-India HSE Procedure Scaffolds and Ladders (PIN LP-CHM-014)
- Scafftag system shall be implemented in compliance with the requirements of HSE instructions for Ladders and Scaffolding (PIN LP-CHM-014).
- Scaffolding found to have any defective component should not be used or placed where it may get used.
- Scaffolding materials should not be used for lifting purpose.
- Scaffold should not be loaded higher than the permitted load.
- No one should work from the ladder of the scaffold.
- No one should alter a green tagged scaffold, except authorized scaffolders/super visor with appropriate safety precautions.

Defective scaffolding equipment should be tagged 'Out Of Service' and discarded or removed from site immediately.

### 5.5.3 Working on Roofs

Persons working on sloping roofs must use proper roof ladders designed to gain anchorage from the opposing slope or must be connected to a lifeline positioned so that the person(s) cannot fall off the roof.

Persons working on fragile roofs must use crawling boards of sufficient length to span roof trusses. Buildings with fragile roofs must have a notice conspicuously displayed at all access points with the wording or similar "Danger Fragile Roof"

### 5.5.4 Hoists, Mobile Elevating Work Platforms, Personnel baskets & Cradles

These equipment need to be tested and thoroughly examined by a competent person (statutory) before first use, inspected daily by the operator/user and tested and thoroughly examined by a competent person at least once every 6 months. Test Certificate should be maintained on Site.

Operators/users of this equipment should be trained in its safe operation and to carry out daily safety checks. In some countries operators are required to have certificates of competency.

Platforms, baskets and cradles should have solid sides to a height of approximately 1.1metre or be fitted with double guard-rails and toe boards/kick plates. Persons on platforms, in baskets or in cradles should wear a safety harness. On Mobile Elevating Work Platforms and in Cradles, the harness is to be attached to an anchor point in the basket/platform/cradle, in baskets suspended by crane, the harness shall be attached to an independent lifeline to the mast or boom.

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Cranes used for personnel baskets should not be operated in free fall and a device must be attached to the ropes of cranes to prevent the basket from spinning

#### 5.5.4.1 Specific requirements of Mobile / Elevated work platforms (MEWP)

Mobile / elevated work platforms should be used to gain safe access to work areas. These platforms are safe, if properly used by competent personnel. Operators of these platforms should have an appropriate and valid certificate of competence.

While using Mobile Elevated Work Platforms (MEWP), following should be ensured:

- Log Book is completed daily.
- All lubrication points are checked daily.
- All articulated joints are checked for wear, abrasion and cleanliness daily.
- All control lines and cable secures are free from traps, leaks or kinks.
- Stabilising ring secure and all clamp bolts fitted.
- Cell controls perform correctly.
- All interlock valves and electric switches are operational.
- If outriggers are fitted, boom cannot operate until they are extended.
- When outriggers or road jacks are down, the vehicle cannot be driven.
- A properly operative back up system to cover failure of the main pump on hydraulic, to allow safe retrieval of boom and cage.
- Cones, bunting or other warning devices are located to keep traffic flow clear of the machine.
- Adequate overhead clearance.
- Load specifications are not exceeded under any circumstances.
- The unit is not used as a crane.
- The MEWP operator / users shall carry out the required pre-use checks.
- The MEWP operator and users shall wear full body harness with short restraint lanyard, attached to the designated point on the platform. Care shall be taken not to attach harness to a structure outside the platform.
- The MEWP operator and users should enter / leave the platform only in its lowest position.
- The MEWP should only be driven when the platform is in its lowest position.
- The MEWP should not be used as a crane, lifting device, lift (stepping out at height) or jack.
- The MEWP should not be tied on to any structure.

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- The MEWP operator / users should avoid pushing or pulling on a structure alongside the platform.
- The MWEF Safe Working Load (SWL) must not be exceeded by personnel and/or tools.
- Standing on hand rails or mid rails of MEWP is prohibited.
- To gain extra height from MEWP - steps, ladders or guardrail should not be used.
- The Operator / User should not leave the equipment unattended while it is in use.
- A safe distance should be maintained from power lines.
- The MEWP should not be used in open areas, above the maximum wind speed specified by the manufacturer and / or when wind velocity is 37 Km/h (23 Miles/ hour) or as advised by tkIS - India Site Safety Manager.
- The MEWP should travel on inclines, by only within specified manufacturer's limits.

## 5.6 Training

Training shall include

- How to rescue someone suspended from a safety harness or having fallen into a safety net.
- Details of the procedure for working at elevated work places
- Safe use of powered access equipment (as appropriate)
- Safe use of ladders.
- Daily equipment checks including safety harness inspections.
- Scaffolding erection (as appropriate)

## 6. References

Working at Height: TG GP-HS-008

## 7. Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN LP-CHM-099.

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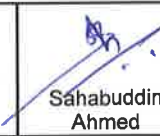
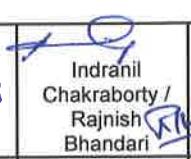
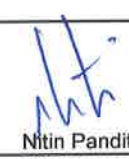
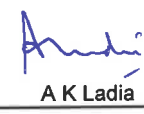
**This procedure replaces HSE-CON-IN-020****Attachments and forms:** Nil**Validity**

Valid from: 12. 2018

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Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

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### 1. Scope

This HSE instruction is applicable for welding and cutting during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

This HSE instruction is aimed at providing guidelines and defining requirements for safe system of work for welding and cutting procedure. The instruction is also aimed to ensure a safe execution of welding and cutting activities at construction sites as well as to ensure the protection of health and environment.

The instruction sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements.

However, the most stringent requirement shall be implemented.

### 3. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India SSI & SSV	Responsible to implement this procedure and to ensure: (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements. (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods. (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site. (ii) To assist Construction Engineer identification, assessment, evaluation, control methods for likely hazards associated with the activity. (iii) To ensure that necessary administration of records required by this procedure.
Contractor Supervisors/ Personnel Engineers/ HSE	(i) Carry out HIRA (Hazards Identification and Risk Assessment) for activity, as applicable and submit to tkIS India for comments / approval prior to commencement of the respective activities. (ii) Ensure that personnel under their supervision understand and adhere to this procedure. (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the

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	requirements of this procedure.
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#### 4. Procedure

##### 4.1 General Safety and Personal Protective Equipment

Workers in the welding areas at site shall wear clothing appropriate to the job.

Everyone including supervisors, office personnel, visitors and workers, while in the welding work area shall:

- Wear hard hats, goggles or approved safety glasses and safety shoes (steel-toed).
- Be constantly alert for safety and health hazards.

Welders shall wear:

- Work clothes (or ideally overalls) with covered pockets and have buttons at neck and cuffs so as to avoid catching any hot metal spatter.
- Gloves are mandatory to protect against sparks, flames and hot or sharp metal.

It is important to avoid gloves that are not suitable for welding. Ideally leather gloves with gauntlet-type cuffs and a flame-retardant lining shall be used.

- Oxyfuel gas welders and cutters shall wear approved goggles with the correct shade lens.
- Arc welders shall wear an arc welding protection with a lens of the proper shade for the amperage and process being used.

##### 4.2 Housekeeping

A key factor for safety is proper housekeeping.

- Rubbish, scraps and debris shall be removed from the works areas as soon as practical and in accordance with the site regulations.
- Any material and equipment that are not essential for the job shall be removed.
- Aisles and escape routes shall be kept clear of hoses and electric cables, which can cause tripping accidents.
- The workbenches and floors shall be kept clean of scrap metal, garbage, oil, grease.
- Combustibles such as flammable liquids, wood, paper, rags must be kept clear of all areas where hot metal or sparks may fly. The same shall apply for hoses and cables that could be also damaged.
- Every worker has a responsibility to help keeping the welding areas clean and clear of hazards and

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to report safety, health or environmental hazard to the supervisor.

#### 4.3 General Requirements for hazards associated with welding/cutting operations.

##### 4.3.1 Electrical Hazards

Electrical equipment shall be installed and repaired only by well-trained and competent technicians.

All concerned workers shall be informed about hazards associated with electrical devices and about the basic rules for the safe use of these devices.

- A regular safety inspection of the arc welding station shall be made by the welder. With the welding machine power off, the cables shall be checked over their entire length for any cut in insulation or exposed wires. Cable connectors shall be checked for tightness. The electrode holder or welding gun shall be checked for cracked insulations, loose contacts and worn or cut hoses.
- To avoid electric shocks, a welder shall never work with: (a) wet or damp gloves; (b) welding when standing on a wet or damp floor. If a work is required to be done under such conditions, a floor of non-conducting material shall be built up above the wet areas..
- Electrical repairs shall be made only by qualified electricians.
- Repairs of feed wires shall be made only with the power off.
- Only the base metal, electrodes and approved welding cables shall be used to carry welding equipment.

##### 4.3.2 Fire Hazards

- It is important to take into account that cutting and welding activities at construction sites are a major source of fires because of molten metals and sparks.

The sparks may fly and remain hot for several seconds which is enough time to ignite combustible material.

- In welding and cutting operations, suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use.

Such equipment may consist of buckets of sand or portable extinguishers.

It is also recommended to have fire blankets.

- To reduce fire hazards, all equipment shall be shut down before leaving the work area.

##### 4.3.3 Electrode Stubs Hazards

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- Careless disposal of hot stubs may result in injury to other workmen; specially those working at lower levels, or create falling or fire hazards.

A fire resistant bucket or container shall be provided for the disposal of electrode stubs.

#### 4.3.4 Confined Space Hazards

- Dust, fumes, and metal particles can be a hazard to health; whenever welding, cutting, or heating is performed in a confined space.
- Gases that are heavier than air or lighter than air can be extremely dangerous to welders in closed tanks or confined spaces (e.g. Argon and carbon dioxide are heavier-than-air gases and Helium is lighter-than-air gas). These gases are colorless and odorless and will displace the oxygen in a closed space. Argon, for example, can asphyxiate a person in few seconds. Accordingly, work in confined space shall be performed only under a specific control procedure and work permit. For details refer HSE-CON-IN-023

#### 4.3.5 Fumes of Hazardous Metals

- Fumes of hazardous metals like lead, zinc, cadmium are hazardous.
- When welding/ cutting Lead, Zinc, cadmium coated lead bearings, chrome or other toxic materials, provisions shall be made for removal of fumes.
- Use of proper personal respiratory protection shall be enforced.

#### 4.3.6 Explosion Hazard

Cutting or welding of closed containers which had contained flammable liquids require extreme caution. Such jobs require a specific procedure and work permit. Anyone involving in such tasks must ensure:

- Never try to weld or cut a pipe or container that has held flammable or hazardous materials, unless you are trained in the proper procedures for doing so.
- Availability of specific procedure for the task and valid work permit.
- The procedures described in the American Welding Society (AWS) Publication F4.1: 1999, "Recommended Safe Practices for Preparation for Welding and Cutting of Containers and Piping" is recommended to be referred.

#### 4.3.7 Oil & Grease Hazards

- Oxygen cylinders and fittings shall be kept away from oil or grease.
- Cylinders, cylinder caps and valves, couplings, regulators, hoses and apparatus shall be kept free from oil & greasy substances and shall not be handled with oily hands gloves.
- Oxygen shall not be directed at oily surfaces, greasy clothes or within a fuel or other storage tank or vessel.

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#### 4.3.8 Arc Ray and Spark Hazards

- Approved welding goggles of the recommended shade number shall be used to protect the eyes from hazards like exposure to infrared and ultraviolet rays as well as hot sparks.
- Ideally leather, preferably flame-retardant-treated cotton clothing shall be worn to protect the body.
- An arc welding face shield with the correct filter shade number lens shall be worn while welding. This shall protect the eyes, face and neck from burns caused by the ultraviolet rays emitted by the electric arc. It shall also protect against flying sparks.

#### 4.3.9 Hot and sharp metal hazards

- When metal is left to cool, special care shall be taken to prevent any worker contracting the hot metal by proper signage or barriers.
- Pliers or tongs shall be used to pick up hot metal parts.
- In case of workers handling sheet metal or metal that may have sharp edges, it is recommendable to wear cut-proof gloves.

#### 4.3.10 Hearing hazards

- Earmuffs or plugs shall be worn for hearing protection during plasma arc welding, cutting or arc gouging.
- Ear protection is also necessary to protect against the high noise levels of other equipment in the shop or on the job site.

#### 4.3.11 Toxic fume hazards

- The fumes that result from welding, brazing, braze welding or cutting metals that are coated with or contain zinc, chromium, lead, cadmium and beryllium are toxic. Cadmium fumes can be fatal. Fumes from fluxes containing fluorides or sodium cyanide compounds also can be toxic.
- Excellent ventilation is required when working with these toxic metals or fluxes. It may be necessary to supplement normal ventilation with clean air. An air-supplied breathing apparatus shall be used, if required, when working in a confined space. Air purifying respirators shall not filter out toxic fumes; they are designed to filter out dust, dirt and metal particles only.

#### 4.3.12 Breathing hazards

- Arc welding shall be done with good ventilation and with proper protective clothing.
- Ventilation shall always be arranged in such a way that the fumes are picked up before they reach the welder's eye, nose or mouth. The hazards from toxic fumes are the same for the arc welding processes as they are for all other forms of welding.

### 4.4 Gas Welding: Oxy-fuel gas Equipment

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Personnel working with welding equipment shall be trained, competent and provided with personal protection equipment. Welding goggles, helmets, screens, forced ventilation equipment as required shall be provided to all workers.

Welders shall be aware of the hazards involved in the use of fuel gas (acetylene), oxygen and shielding -gas cylinders as well as safe storage of the same. They shall be well trained in:

- a) The function and operation of each part of an oxy-fuel gas welding or cutting operation.
- b) Correct methods of starting, testing for leaks and shutting down an oxy-fuel gas welding or cutting station.

#### 4.4.1 Gases

- Oxygen is odorless. It can promote rapid combustion; therefore, grease and oil shall never be used near oxygen as this could cause fire.
- Oxygen cylinders or apparatus shall not be handled with oily hands or gloves. A jet of oxygen shall never be permitted to strike an oily surface, greasy clothes or enter fuel, oil or other storage tanks.
- Acetylene has a distinct odor often like that of garlic or sour apples. It is combustible when mixed with air over a wide range of (2.5% - 81%). Acetylene burned with oxygen can produce a higher flame temperature than any other commercial gas.

Acetylene becomes unstable at pressure above 103 kPa (15 psi), which means it may explode. Under no conditions shall acetylene be generated, piled (except in approved cylinder manifolds) or utilized at a pressure in excess of 15 psi gauge pressure. Inside the cylinder, acetylene is dissolved in acetone to prevent internal explosion; therefore, it is essential that acetylene cylinders be stored, handled and used in vertical position to prevent the liquid acetone from escaping and damaging the valves and other equipment

- Regulated Acetylene pressures shall never be allowed to exceed 103 kPa (15 psi) or it may explode.

##### 4.4.1.1 Use of Fuel gas

- Before a regulator shall be connected to a cylinder valve, the valve shall be opened slightly and closed immediately. This action is generally termed "cracking" and is intended to clear the valve of dust or dirt that might otherwise enter the regulator.
- The person cracking the valve shall stand to one side of the outlet, not in front of it.
- The cylinder valve shall always be opened slowly to prevent damage to the regulator. For quick closing, valves on fuel gas cylinders shall not be opened more than 1 ½ turns.
- When a special wrench is required for opening, it shall be left in position on the stem of the valve, while the cylinder is in use so that the fuel gas flow can be shut off quickly in case of an emergency.
- In the case of a manifold or coupled cylinder, at least one such wrench shall always be available for immediate use.

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- Nothing shall be placed on top of a fuel gas cylinder, when in use, which may damage the safety device or interfere with the quick closing of the valve.
- Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shutoff valves, without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.
- Before a regulator is removed from a cylinder valve, the cylinder valve shall always be closed and the gas released from the regulator.
- If, on opening valve on a fuel gas cylinder, some leak is found around the valve stem, the valve shall be closed immediately and the gland nut tightened. If this action does not stop the leak, the use of cylinder shall be discontinued. It shall be properly tagged and removed from the work area.
- In the event of fuel gas leak from the cylinder valve, when the gas cannot be shut off, the cylinder shall be properly tagged and removed from the work area.

#### 4.4.2.1 Hose

- Fuel gas hose and oxygen hose shall be easily distinguishable from each other as per applicable National Standard.
- Oxygen and fuel gas hoses shall not be interchangeable.
- All hose in use for carrying acetylene, oxygen, fuel gas which may ignite or enter into combustion or in any way be harmful to personnel, shall be inspected at the beginning of each working shift. Defective hose shall be removed from service.
- Hose which has been subjected to flashback or which shows evidence of severe wear/damage shall not be used.
- Hose couplings shall be of the type that cannot be unlocked or disconnected by means of a straight pull without rotary motion.
- Hoses, cables and other equipment shall be kept clear of passageways, ladder and stairs.

#### 4.4.2 Torches

- Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills or other devices designed for such purpose.
- Torches in use shall be inspected at the beginning of each working shift for leaking shutoff valves, hose couplings and tip connections. Defective torches shall not be used.
- Torches shall be lighted by an approved friction lighter or other approved device and not by matches or from hot work.

#### 4.4.3 Regulators and gauges

Oxygen and fuel gas pressure regulators, including their related gauges shall be in proper working order while in use.

- When welding or cutting is completed and the flame is extinguished, the system shall be bled (emptied) of all gases from the cylinder outlet to torch tip.

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This is done by closing both cylinder valves, opening the torch valves and turning in the regulator adjusting screws until all the gauges read zero. Then, close the torch valves and turn out the regulator adjusting screw.

- When a regulator is not in use, the adjusting screw shall always be turned out until it feels loose. This is the 'Off' position for a regulator.
- Whenever the torch is not in the welder's hand, it must be off.
- The torch shall never be pointed at cylinders, regulators, hoses or anything else that may be damaged and cause a fire or explosion.

#### 4.4.4 Storage of Cylinders

Apart from the following requirements, compliance with HSE instruction PIN LP-CHM-001, Compressed Gas Cylinders – shall be ensured.

- Cylinders shall be stored in a safe, dry, well-ventilated place, prepared and reserved for that purpose.
- Flammable substances such as oil and volatile liquids or corrosive substances shall not be stored in the same area.
- Oxygen cylinders and flammable gas cylinders shall be stored separately, at least 6.1 meters (20 feet) apart or separated by a fire proof, 1.6 meters (5 feet) high partition.
- All cylinders shall be chained or otherwise secured in an upright position.
- To prevent rusting, cylinders stored in the open shall be protected from ground contact, extreme of weather or contact with water.
- Valve caps shall be kept in place when cylinders are not in use.
- Flammable substances shall not be stored near cylinder storage areas.
- Cylinders shall not be stored at temperatures exceeding 54 degrees centigrade (130 degrees Fahrenheit).
- Cylinders shall not be stored near sources of heat such as radiators, furnaces or near highly flammable substances like gasoline.
- Cylinders shall be stored out of the direct rays of the sun, in protective enclosures or sun shelters.
- Cylinders storage shall be planned so that cylinders shall be used in the order in which they are received from the supplier.
- Empty and full cylinders shall be stored separately with empty cylinders plainly marked as "MT", to avoid confusion. Empty cylinders shall be segregated according to the type of gas they have held.
- All cylinder storage rooms shall be ventilated sufficiently so that explosive concentrations of gas cannot accumulate.
- Smoking or any other source of ignition shall be prohibited near storage areas, and appropriately marked "No Smoking" sign board.



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- All wiring shall be in conduit and electric switches shall be located outside the room. All electrical installations shall meet the applicable National Electrical Code (NFPA 70) for hazardous areas.
- Cylinders shall be stored in places away from moving or heavy construction equipment. Assigned storage places shall be located where cylinders shall not be knocked over or damaged by passing/falling objects or subject to tampering by unauthorized personnel.
- Cylinders shall be placed in such a way that they cannot become part of an electrical circuit.
- Electrodes shall not be struck against a cylinder to strike an arc.
- Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces.
- Cylinders, whether full or empty, shall not be used as rollers or supports.
- No one except the owner of the cylinder or authorized personnel by him shall refill a cylinder.
- No one shall use cylinder's contents for purposes other than those intended by the supplier

#### 4.4.5 Handling of Cylinders

Serious accidents may result from the misuse, abuse or mishandling of cylinders.

- Cylinders shall never be lifted by their valves, since the valves are not designed to take such stress.
- When cylinder is not in use, the valve shall be protected with the valve cap.
- All valves shall be fully closed before a cylinder is moved.
- Unless a trolley or special carrier is used, regulators and hoses shall be detached from the cylinders, for moving.
- If cylinders are to be lifted by a crane, specially designed cylinder holders/cages with lifting eyes shall be used.
- Chain and wire rope slings can allow cylinders to slip. Where a trolley is to be used for slinging, its base shall be strong enough to take the weight of the cylinders.
- Do not lift a cylinder with an electromagnet.
- Cylinders in transit on vehicles shall have valve caps in place and be firmly secured to prevent movement. Cylinders shall be secured to avoid any violent contact.
- Loading and unloading shall take place carefully.
- Cylinders shall not be dropped, dragged, used as rollers or as a support.
- No damaged or defective cylinders shall be used.
- When in doubt regarding the proper handling of a compressed gas cylinder or its contents, the supplier of the gas shall be consulted.
- Depleted cylinders shall be returned to the supplier with the valves closed and the valve protection caps in place.

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- Cylinders, even those marked "MT", shall be treated as a possible hazard and handled with great care as they still contain some gas.
- Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck or permitted to strike each other violently.

#### 4.4.6 Inspecting Equipment

All equipment shall be examined immediately before use by welder and regularly maintained. All welding operation shall be conducted in well ventilated areas.

- Only soapy water shall be used to check for leaks. Presence of a leak is often indicated by a hissing sound or unusual changes in the torch flame.
- Cylinders and valves shall be kept clean. Valve sockets shall be kept free of grit, dirt, grease or oil.
- Hoses shall be examined before use, by welder for any signs of splitting which might give rise to leakage.
- All hose connections shall be made by clips or crimps. The hoses used for acetylene and for oxygen shall not be interchangeable.
- Connections and check valves shall be regularly examined. Equipment shall be fitted with the correct pressure regulators and a regular check shall be made to ensure that the regulator is working properly. The torch nozzle shall be kept closed.
- An acetylene cylinder valve wrench shall be available at all times for the cylinder in use.
- Means of torch ignition shall be readily available. A friction lighter shall be used for this purpose.
- Acetylene can form explosive compounds in contact with certain metals or alloys, particularly unalloyed copper or silver. Joint fittings or lines made of copper shall not be used and acetylene shall not be allowed to come into contact with copper pipe work or tubing. Only approved materials shall be used for acetylene systems.
- It is dangerous to let the torch flame come into contact with gas cylinders or for the lighted torch itself to be left unattended. Torches shall never be laid down to lit.
- It is equally dangerous to rest blow pipes, even extinguished ones, on old drums.
- "Empty" drums which have contained low flash point liquids are known to have become lethal bombs when a hot welding torch was laid down on them.
- Cylinders in use shall be kept upright on a custom-built stand fitted with a bracket to accommodate the hoses and equipment or otherwise secured. The meal cap shall be kept in place to protect the valve when the cylinder is not connected for use.

#### 4.4.7 Faults

It is not uncommon for minor "explosions" to occur during welding or cutting. Most are more frightening than harmful, but some can lead to very dangerous conditions.

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There are three general groupings of these faults;

a. Snap out can occur during use when:

- Both regulators are set at an incorrect pressure
- Torch nozzle obstructed
- Nozzle held too close to the work

Corrective action:

- Completely shut down both torch valves
- Check regulator setting
- Check cylinder pressures
- Check nozzles
- Re-light
- Ensure adequate gas flow

b. Backfire can occur on lighting up when:

- Regulators not set to correct pressure
- Lighter applied before flow of gas mixture properly established

Corrective Action:

- Close both torch valves, oxygen first.
- Check cylinder pressures
- Check and adjust regulator settings
- Cool torch and check nozzle orifice for obstruction
- Re-light

C. A Flashback is very dangerous. Flashback is caused by gases being mixed in the hose(s). Usually this mixing of gases occurs when the hoses have been disconnected from regulators or torches or when a new hose is being used for the first time. Sometimes, it is due to loose connections. Usually one of the hoses shall have burst and possibly ignited.

Preventive Action:

- Use flashback flame arrestors for regulator and torch
- Ensure all connections are tight
- Ensure cylinder valves are open and torch valves closed
- Set regulators to the required pressures
- Purge each hose separately and consecutively by opening the torch valve and allowing gas to flow for sufficient time to ensure only pure gas remains in the hoses
- Close the valve for each gas as the purge is completed. This purge shall be carried out only in the open or in extremely well-ventilated areas

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Corrective Action:

- Close both torch valves
- Close both cylinder valves
- Extinguish hose if alight
- Repair equipment and hoses

Fuel gas and Oxygen Manifold

In case manifolds are used, following safety precautions shall be followed:

- Fuel gas and oxygen manifolds shall bear the name of the substance they contain by letters at least 2.5 cm (1 inch) high which shall be either painted on the manifold or on a sign permanently attached to it.
- Fuel gas and oxygen manifolds shall be placed in safe, well ventilated and accessible locations. They shall not be located within enclosed spaces.
- Manifold hose connections, including both ends of the supply hose that lead to the manifold, shall be such that the hose cannot be interchanged between fuel gas and oxygen manifolds and supply header connections. Adapters shall not be used to permit the interchange of hose. Hose connections shall be kept free of grease and oil.
- When not in use, manifold and header hose connections shall be capped.
- Nothing shall be placed on top of a manifold, when in use, which shall damage the manifold or interfere with the quick closing of the valves.
- To prevent possible fires and explosions, check valves and flash back arrestors shall be installed in all oxy-fuel gas manifolds.

#### 4.5 Electric Arc Welding

Arc welding is a process for joining metals by heating with an electric arc. For arc welding, two welding leads, the electrode lead and the work lead, are required.

##### 4.5.1 Welding Equipment

- Only standard electric arc welding equipments such as generators, motor – generators units, transformers, rectifiers, etc. shall be used. These equipments shall conform to the national standards/requirements of the related and applicable norms of each site.
- Power circuits shall be installed and maintained in accordance with regulations.
- Before connecting to a machine, the voltage which is wired must be checked.
- All electrical welding machines shall be effectively grounded
- Electrodes and ground cables shall not be supported from equipment. The ground lead for the welding circuit shall be mechanically strong and electrically adequate for the service required.

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- Any current carrying parts passing through the portion of the holder which the arc welder or cutter grips in his hand, and the outer surfaces of the jaws of the holder, should be fully insulated against the maximum voltage encountered to ground.
- An electrode holder of adequately rated current capacity, insulated against shock and shorting or flashing shall be used.
- Adequate exhaust and ventilation shall be provided where internal combustion engines are used to operate gas welding machines in enclosed spaces.

#### 4.5.2 Manual electrode holders.

- Only manual electrode holders which are specifically designed for arc welding and cutting, and are of a capacity capable of safely handling the maximum rated current required by the electrodes shall be used.
- Electrode holder shall be of adequately rated current capacity, insulated against shock, shorting or flashing when laid on grounded material.

#### 4.5.3 Welding cables and connectors.

All arc welding and cutting cables shall be:

- Completely insulated & flexible type.
- Capable of handling the maximum current requirements of the work in progress, taking into account the duty cycle under which the arc welder or cutter is working.
- Welding cable shall be free from repair or splices for a minimum distance of 3.0 m (10 feet) from the electrode holder. Other places, cables with standard insulated connectors or with splices whose insulating quality is equal to that of the cable insulation can be permitted.
- When it becomes necessary to connect or splice the cables, sufficient insulated connectors of a capacity at least equivalent to that of the cables shall be used.
- When connections are effected by means of cable lugs, they shall be securely fastened together to give good electrical contact and the exposed metal parts of the lugs shall be completely insulated.
- Cables in need of repair shall not be used.

#### 4.5.4 Ground returns and machine grounding.

- A ground return cable shall have a safe current carrying capacity equal to or exceeding the specified maximum output capacity of the arc welding or cutting unit to which it services.
- When a single ground return cable services more than one unit, its safe current-carrying capacity shall be equal to or exceed the total specified maximum output capacities of all the units to which it services.

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- Pipelines containing gases or flammable liquids, conduits containing electrical circuits shall not be used as a ground return.
- When a structure or pipeline is employed as a ground return circuit, it shall be determined that the required electrical contact exists at all joints. In case, generation of an arc, sparks or heat at any point is noticed, such a structure shall not be used as ground circuit.
- When a structure or pipeline is continuously employed as a ground return circuit, all joints shall be bonded and periodically inspected to ensure that no condition of electrolysis or fire hazard exists by virtue of its use as a ground return circuit.
- The frames of all arc welding and cutting machines shall be grounded either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current.
- Grounding circuits, other than by means of the structure, shall be checked to ensure that the circuit between the ground and the grounded power conductor has resistance low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.
- All ground connections shall be inspected to ensure that they are mechanically strong and electrically adequate for the required current.

#### 4.5.5 Operating instructions/requirements:

- When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected that they cannot make electrical contact with personnel or conducting objects.
- Hot electrode holders shall not be dipped in water. This may expose the arc welder or cutter to an electric shock.
- Power supply to the arc welding/cutting machines shall be switched off when:
  - The arc welder or cutter has occasion to leave his work or to stop work for any reason.
  - The arc welding or cutting machine is to be moved
- Any faulty or defective equipment shall be reported to the supervisor.
- Whenever space restrictions, all arc welding and cutting operations shall be shielded by noncombustible or flameproof screens to protect personnel involved in operations and any other personnel working in the vicinity from the direct rays of the arc.

DC shall be used for welding operations in any situation where the effect of electric shock is likely to be extreme, such as in damp and confined space (tank, boilers, etc.).

#### 4.5.6 Welding Connections

In each welding circuit there are three main connections:

- the welding lead;
- the welding return;

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- the welding ground.

4.5.7 The welding lead is the conductor carrying the welding current from the point of supply to the electrode holder.

4.5.7.1 The welding return is the conductor carrying the current back from the work to the point of supply. Its conductivity shall be at least equal to that of the welding lead. The welding return shall be used to ground the metal case of the welding machine. This high current capacity is essential, because all the current fed to the arc has to be conducted back to the supply point. The current involved could be as high as 300 amperes on a hand welding operation.

4.5.7.2 A continuous welding ground is essential and indispensable for conductors since electric currents as low as 50 milliamperes can be fatal. The ground shall be of low impedance so that there can be no rise in the potential of the work and so that sufficient fault current passes quickly enough to cut off the supply if necessary. It is recommended that the welding ground be bonded to the ground of the main supply system by a separate substantial conductor.

The frames of all fixed arc welding and cutting machines shall be grounded either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current.

Welding grounds and returns shall be securely attached to the work by cable lugs, by clamps in the case of stranded conductors.

4.5.7.3 Welding cable insulation needs to be abrasion resistant to withstand normal treatment over rough ground and the wear inflicted by foot and vehicular traffic.

Where feasible, cables shall be additionally protected by stringing overhead or by using cable covers. They shall be regularly examined for cuts or abrasions to the insulation; damaged cable shall not be used.

If joints become necessary, standard plug and socket coupling shall be used. Holders shall be unplugged when not in use.

4.5.7.4 Electrode holders shall be able to accommodate all sizes of electrodes and shall have an ejector for hot, spent stubs.

A shield shall be fitted between electrode holder and handle to prevent live elements from being touched. The handle itself shall be made of non-flammable insulating material and be free from joints or holes.

#### 4.5.8 Protective Measures

The welder is to take safety precautions and preventive measures during the operation of welding machines to ensure that no safety-related incident occurs. The following is a list of precautions and operating considerations to take into account when operating a 400 amp arc welding machine, for example. All users/welders are strongly encouraged to read the equipment's operating manual to ensure reliable and safe operation.

- Keep all doors, covers and panels in place when operating the machine; the arc welding machine is designed to operate with all its doors, covers and panels in place. They ensure the

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optimum flow of cooling air, and removal of these covers and panels shall reduce the cooling of the engine and generator, resulting in overheating and premature failure of the unit.

- Ensure that the engine protection push button ‘pops out’ when the engine is switched off, if applicable. Under normal circumstances, this button will ‘pop out’ once the engine is switched off. However, if the unit becomes clogged with dirt, dust or sand, it may not return to its ‘off’ position without assistance. If the button remains depressed, it will quickly drain the unit’s battery. The resulting failure of start shall delay the work while a new battery is fitted, a ‘just start’ arranged or a recharge cycle is completed.
- Maintain welding and ground cables and connections in good condition. A major source of safety hazards, poor and inconsistent welding performance, and loss of point-of-use welder capacity is a set of welder leads in poor condition, or of the wrong size for the length of cable being run. Other sources of safety hazards related to cables and connections are:
  - a. Cracked insulation is an obvious source of hazard producing shorts to ground eventually leading to increase of conductor resistance. With no-load voltages approaching 100 + volts, significant hazard of electrocution to personnel exists, especially in wet areas or when working on metal structures.
  - b. Combining sets of low capacity cables to reach a distant welding site can greatly reduce the effective welding power available to the welding machine. Larger capacity cables shall be used to reach distant sites, because of the buildup of resistance from the extra length of the leads. Inadequate or weak cable connections can also introduce sparking hazards, potential shorts to ground and extra resistance which reduces effective welding machine capacity. Cable sizes and lengths shall be recommended by the manufacturer.
- When welding is in progress, the full length of cable shall be stretched out on the ground. Leaving the cable coiled on the machine alters the current flow and disrupts the welding process.
- Do not adjust ‘current control’ while welding is in progress. This can damage the control.
- Sparks and molten or hot metal coming from the work area can easily set fire to combustible materials near or below the working area. Wherever possible, all combustible material shall be removed from the work area. If it cannot be removed, it shall be covered with fireproof material. Gas cylinders shall be protected from falling sparks.
- Welders/operators of arc welding equipment shall always switch off the current to the electrode holder and remove the electrode whenever it is to be set down and is not actually in use.
- When welding or cutting material that is supported by a crane, a shield or an effective screen shall be provided to protect the suspension ropes or chains. Grounding cables shall only be connected to the work, not to the crane or rigging.
- Forced ventilation shall be arranged whenever work is to be carried out in a confined space. Suitable metal bins shall be provided for spent electrode stubs as they are usually hot when discarded and can easily cause a fire. Dry chemical powder (DCP) fire extinguisher shall be kept available while work is in progress. All completed work shall be marked “HOT”.

#### 4.6 Welding and Cutting: Tanks, Vessels and Drums



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- Careful tests shall be made to establish that the tank, vessel or drum is free from explosive flammable vapors or substances.
- The responsible supervisor shall make a check before permitting any work to begin.
- It is essential that past contents of tank, vessel or drum be identified. If there is any doubt or if the tank is known to have had any kind of flammable or explosive content, it shall be cleaned and purged thoroughly prior to welding or cutting .
- Extreme care shall be taken in considering methods of tank welding and cutting as these jobs are hazardous operations unless correct safety measures are taken.
- Welding and cutting on drums is strictly controlled and, in most cases, prohibited
- Cold cutting is an option to be considered with an appropriate HIRA.
- The use of oxygen for blowing out containers and small tanks is forbidden.

#### 4.7 Confined Spaces

- It is vital that forced ventilation be maintained in confined spaces if required, at all times.
- Air line respirators may be needed for men working inside such places.
- No gas cylinders shall ever be allowed into such an area.
- The hoses and equipment used inside shall be in excellent condition.
- Where work in confined spaces has to take place over several days, the hoses and equipment shall be taken outside overnight in case of any leakage that could occur, resulting in a build up of gas.
- Refer instruction PIN-LP-CHM-023, Confined Space Entry, for further details.

#### 4.8 Personnel Protection

- Safety Helmets, safety shoes, welding hoods, heat resistant gloves and goggles are necessary to protect eyes and face against heat and the effect of intense light emitted by welding operations.
- Goggles are required to protect the eyes of the welder from pieces of flying slag chips during electric welding. They shall be fitted with opaque side pieces. These goggles shall also be worn under the regular welding hoods.
- Electric welding operations shall be effectively screened to prevent nearby personnel from being affected by harmful radiation. Screens shall be made from fire resistant materials or shall be suitably treated with a fire resistant compound. Screens shall be designed and placed so as not to restrict the flow of air for ventilation purposes.
- Gloves are necessary protection to the hands against heat, sparks, molten metal and radiation. Leather, suitably reinforced at points of maximum wear, is the material most generally worn.

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Gloves shall be long enough to protect wrist and forearms. When gloves are not enough, protective sleeves of similar materials shall be worn.

- Safety shoes and leggings are essential to provide effective protection against heat, flying sparks and falling metal.

#### 4.9 Health Hazards

Apart from the obvious hazards of physical burns, health hazards in welding operations fall into two classes: hazards from radiant energy from dusts and fumes.

##### 4.9.1 Radiant Energy

The process of welding produces radiant energy in the form of visible light, ultraviolet rays and infrared rays. The risk of this energy harming the operator/welder or other personnel can be minimized by the proper use of protective clothing and shielding.

- Exposure of the skin to infrared and ultraviolet rays can result in irritation and burning. The risk of exposure is lessened by wearing protective clothing, shielding and distance.
- Arc-eye or flash burn is a well known condition in welding operations and is due to the eyes being exposed to ultraviolet rays. This condition is a superficial burn on the outer layer of the eye.
- The effects normally wear off within two days and generally no permanent damage is caused. The condition is, however, extremely painful and can easily be avoided by the use of eye protective lens or shields.
- Welding protective lens shall be tempered glass. Lens shall be distinctively marked to identify approved lens shade.

Lens shade guide:

- Arc Welding ----- 10 to 14
- Gas Welding ----- 4 to 8
- Torch brazing ----- 3 to 6

##### 4.9.2 Respiratory Effects

The risk of being gassed in normal welding operations is slight; however, when working in confined areas, forced ventilation shall be in operation to remove any build up of hazardous gases.

- Oxy-acetylene welding operations can cause the oxygen and nitrogen of the air to unite to form nitrogen oxides. In well ventilated areas this does not cause any problem; however, in confined areas or where the welder is working very close to the job, the amount of nitrogen oxides breathed can rapidly reach toxic levels. The main problem with this gas is that the welder does not appear to be affected at the time; the real effects take place some 6 to 24 hours after exposure.

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- All welding operations produce certain quantities of ozone, a highly toxic gas. In oxy-acetylene and electric arc welding, the amount produced is small and by providing adequate ventilation this hazard can be controlled.
- There are many other dangers which can arise when welding or cutting under specific conditions or on particular metals. Hazardous operations include: welding on manganese steel, galvanized material, material which has been degreased or on material which has been painted with lead, copper-bearing or chromate-containing paint. These problems shall be recognized before the job starts and safe practices for dealing with them shall be established.
- Although welding cannot be regarded in general as an extremely hazardous occupation, exposure to concentrated fumes may be irritating and in some cases dangerous. It is essential that each operation be analyzed before work starts and that the control measures are correctly applied.

## 5. Records

Necessary records as required by this instruction shall be maintained.

For further details, please refer Instruction PIN LP-CHM-099.

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**Attachments and forms:** Nil**Validity**

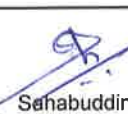


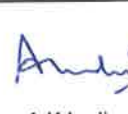
Valid from: 12. 2018

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**This procedure replaces HSE-CON-IN-021**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the "IMS document management" (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

tKIS-India Local QM Standard	10/12/18		21/12/18		21/12/18		31/12/18	
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				No project-specific adaptation				
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### 1. Scope

This HSE Procedure is applicable for trenching and excavation during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

### 2. Aim

This HSE Procedure is aimed at providing guidelines and defining requirements for safe system of work for trenching and excavation. The Procedure is also aimed to manage the risks associated with the construction activities of excavation and provide some guidance in basic soil mechanics and construction methodology associated with such works.

The instruction sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements.

However, the most stringent requirement shall be implemented.

### 3. Responsibilities

The responsibilities of site personnel related to HSE functions are given below:

Site Manager (SM) (tkIS India & Contractor)	Responsible to ensure effective implementation of this procedure on site.
tkIS India Construction Engineer	Responsible to implement this procedure and to ensure:  (i) that relevant personnel are trained in this procedure, and other relevant statutory training requirements.  (ii) that all hazards associated with the activity have been mitigated to as low as reasonably practicable through the implementation of identification, assessment, evaluation, control methods.  (iii) that the effectiveness of risk controls are monitored and reviewed to manage the risks to a level that is as low as reasonably practicable, and enable the process of continual improvement.
tkIS India Site HSE Personnel	(i) Responsible to assist SM in effective implementation of this procedure on site. (ii) To assist construction engineer identification, assessment, evaluation, control methods for likely hazards associated with the activity. (iii) To ensure necessary the administration of records required by this procedure.
Contractor Engineers/ Supervisors/ HSE Personnel	(i) Carry out Hazard Identification and Risk Assessment (HIRA) for activity, as applicable and submit to tkIS India for comments / Approval prior to commencement of the respective activities.  (ii) Ensure that personnel under their supervision understand and adhere to this procedure.  (iii) Ensure that necessary records required by this procedure are maintained and submitted to tkIS India.
Relevant personnel	Personnel carrying out work relevant to this procedure must be aware of the associated hazards, requirements of this procedure and adhere to the requirements of this procedure.

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#### 4. Procedure

##### 4.1 Definitions

- a. Adjacent Structures Stability refers to the stability of the foundation(s) of adjacent structures whose location may surcharges; create changes in soil conditions or other disruptions that have the potential to extend into the failure zone of the excavation or trench.
- b. Competent Person is an individual who is capable of identifying existing and predictable hazards of working conditions that are hazardous, unsanitary or dangerous to employees and who has authorization to take prompt corrective measures to eliminate or control these hazards and conditions.
- c. Confined Space is a space that, by design and / or configuration, has limited openings for entry and exit, unfavorable natural ventilation, may contain or produce hazardous substances and is not intended for continuous employee occupancy. For details refer PIN LP-CHM-23, Confined Space Entry instruction.
- d. Excavation – An excavation is any man-made cut, cavity, trench or depression in an earth surface that is formed by earth removal.  
A Trench is a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth of trench is greater than its width and the width (measured at the bottom) is not greater than 15 ft. (4.6 meter). If a form or other structure installed or constructed in an excavation reduces the distance between the form and the side of the excavation to 15 ft. (4.6 meter) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.
- e. Hazardous Atmosphere is an atmosphere that by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen-deficient, toxic or otherwise harmful may cause death, illness or injury to persons exposed to it.
- f. Ingress and Egress means, entry and exist, respectively. In trenching and excavation operations, they refer to the provision of safe means for employees to enter or exit an excavation or trench.
- g. Protective System refers to a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation and from the collapse of adjacent structures. Protective systems include support systems, sloping and benching, shield systems and other systems that provide the necessary protection.
- h. Support System refers to structures such as underpinning, bracing and shoring that provide support to an adjacent structure or underground installation or to the sides of an excavation or trench.
- i. Subsurface Encumbrances include underground utilities, foundations, streams, water tables, transformer vaults and geological anomalies.
- j. Surcharge means an excessive vertical load or weight caused by spoil, overburden, vehicles, equipment or activities that may affect trench stability.
- k. Underground Installations include, but are not limited to, utilities (sewer, telephone, fuel, electric, water and other product lines), tunnels, shafts, vaults, foundations and other

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underground fixtures or equipment that may be encountered during excavation or trenching work.

- l. Unconfined Compressive Strength is the load per unit area at which soil will fail in compression. This measure can be determined by laboratory testing or it can be estimated in the field using a pocket penetrometer or by thumb penetration tests or by other methods.
- m. Shoring is hydraulic, timber or mechanical systems that support the sides of an excavation, designed to prevent cave-ins.
- n. Benching is a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or series of horizontal steps, with a vertical rise between steps.
- o. Sloping is a method of excavating in which the sides of an excavation are laid back to a safe angle to prevent cave-ins. The safe angle required varies with different types of soil, exposure to the elements and superimposed loads. There is no single angle of Maximum Allowable Slope (earlier it was known as angle of repose).
- p. Cohesive Soil means clay, or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with appropriate side slopes, and is plastic when moist. Cohesive soil is hard to break up when dry and exhibits significant cohesion when submerged.
- q. Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance or a material that exhibits open cracks, such as tension cracks, in an exposed surface.
- r. Granular means gravel, sand or silt (coarse grained soil) with little or no content. Granular soil has no cohesive strength, cannot be molded when moist and crumbles easily when dry. Some moist granular soils exhibit apparent cohesion.
- s. Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury or otherwise injure and immobilize a person.
- t. Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of shoring system.
- u. Uprights means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called sheeting.
- v. Wales means horizontal members of shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

#### 4.2 Types of Soil ( As per IS Codes)

OSHA categorizes soil deposits into three types A through C & rock as follows:

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### Type A

Cohesive soils with an unconfined compressive strength of 1.5 tone per square foot (tsf) (144 kPa) or greater are classified as Type A. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if one or more of the following conditions are true:

- i. The soil is fissured.
- ii. The soil is subjected to vibration from heavy traffic, pile driving or similar effects.
- iii. The soil has been previously disturbed.
- iv. The soil is part of sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater or has seeping water.
- v. The material is subjected to other factors that would require it to be classified as a less stable material.

### Type B

Soils classified as Type B are:

- i. Cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa).
- ii. Granular cohesion less soils including angular gravel (similar to crushed rock), silt, silt loam, sandy loam and sandy loam clay.
- iii. Previously disturbed soils except those which would otherwise be classed as Type C soil.
- iv. Soil that meets the unconfined compressive strength or cementation.
- v. Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is Fissured or subject to vibration.
- vi. Dry rock that is not stable.
- vii. Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less than four horizontal to one vertical (4H:1V) but only if the material would otherwise be classified as Type B.

### Type C

Soils classified as Type C are:

- i. Cohesive soils with an unconfined compressive strength of 0.5 tsf (48 kPa) or less.
- ii. Granular soils, including gravel and loamy sand.
- iii. Submerged soil or soil from which water is freely seeping.
- iv. Submerged rock that is not stable.
- v. Material in a slope layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V).

Stable Rock is natural solid matter that can be excavated with vertical sides and remain intact while exposed. It is usually identified by a rock name such as granite or sandstone. Determining whether a deposit is of this type may be difficult unless it is known whether cracks exist and whether or not the crack run into or away from the excavation.

Layered Geological Strata. Where soils are configured in layers, i.e., where a layered geologic structure exists, the soil must be classified on the basis of the soil classification of the weakest soil layer. Each layer may be classified individually if a more stable layer lies below a less stable layer, i.e., where a Type C soil rests on top of stable rock.



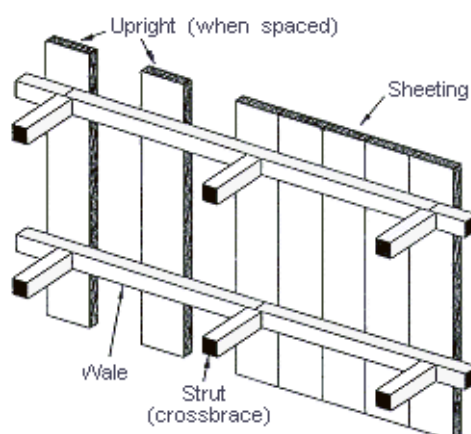
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### 4.3 Types of Shoring

Shoring means a structure such as a metal hydraulic, mechanical or timber shoring that supports the sides of an excavation and which is designed to prevent cave-ins.

Shoring is the provision of a support system for trench faces used to prevent movement of soil, underground utilities, roadways and foundations. Shoring or shielding is used when the location or depth of the cut makes sloping back to the maximum allowable slope impractical. Shoring systems consist of posts, wales, struts and sheeting. There are two basic types of shoring, timber and aluminum hydraulic.

#### 4.3.1 Timber shoring



*Fig. 1 Timber Shoring*

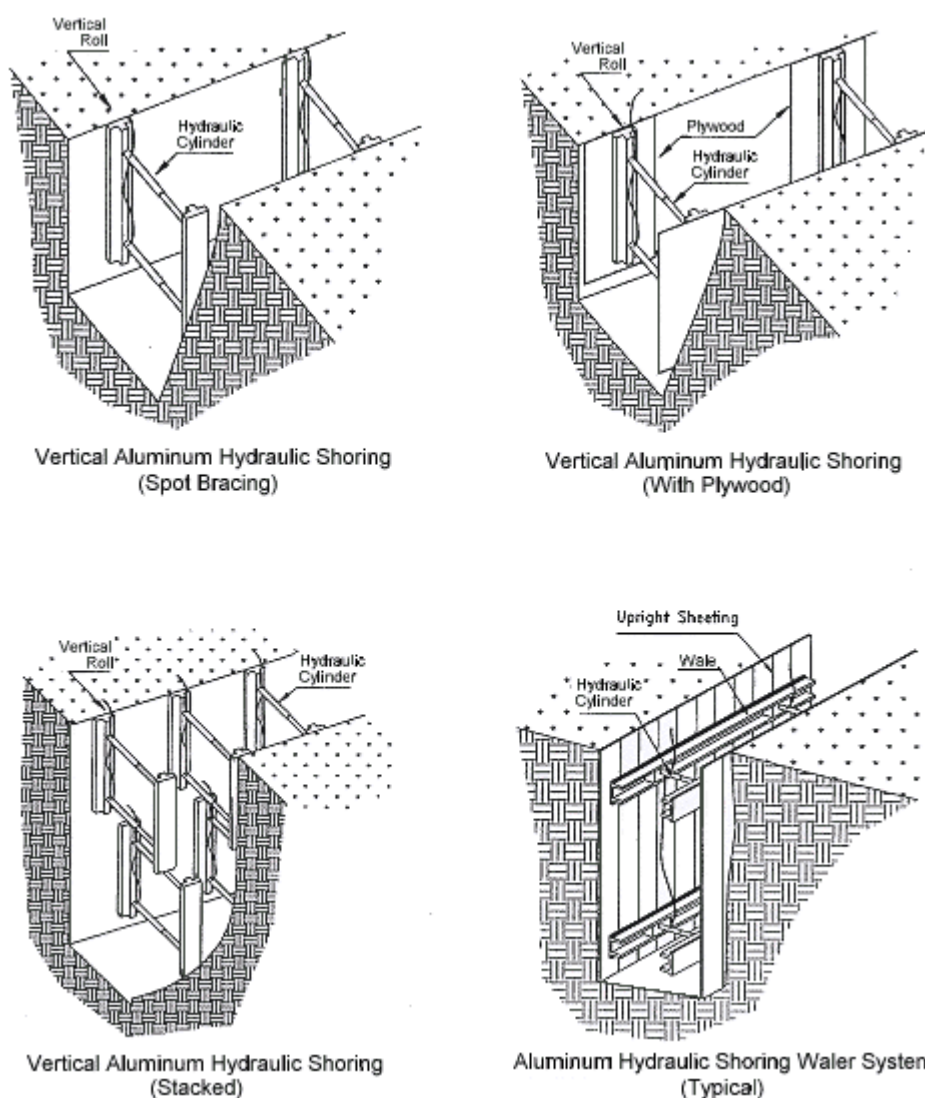
#### 4.3.2 Hydraulic Shoring

Hydraulic shoring is a prefabricated strut and/or wale system manufactured of aluminum or steel. Hydraulic shoring provides a critical safety advantage over timber shoring because workers do not have to enter the trench to install or remove hydraulic shoring. Other advantages of most hydraulic systems are that they:

- Are light enough to be installed by one worker;
- Are gauge-regulated to ensure even distribution of pressure along the trench line;
- Can have their trench faces preloaded to use the soil's natural cohesion to prevent movement;
- and
- Can be adapted easily to various trench depths and widths.

All shoring shall be installed from the top down and removed from the bottom up. Hydraulic shoring shall be checked at least once per shift for leaking hoses and/or cylinders, broken connections, cracked nipples, bent bases and any other damaged or defective parts.

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*Fig. 2 Shoring Variations: Typical aluminum hydraulic shoring installations*

#### 4.3.3 Pneumatic Shoring

Pneumatic shoring works in a manner similar to hydraulic shoring. The primary difference is that pneumatic shoring uses air pressure in place of hydraulic pressure. A disadvantage to the use of pneumatic shoring is that an air compressor shall be on site.

#### 4.3.4 Screw Jacks

Screw jack systems differ from hydraulic and pneumatic systems in that the struts of a screw jack system shall be adjusted manually. This creates a hazard because the worker is required to be in the trench in order to adjust the strut. In addition, uniform preloading cannot be achieved with screw jacks and their weight creates handling difficulties.

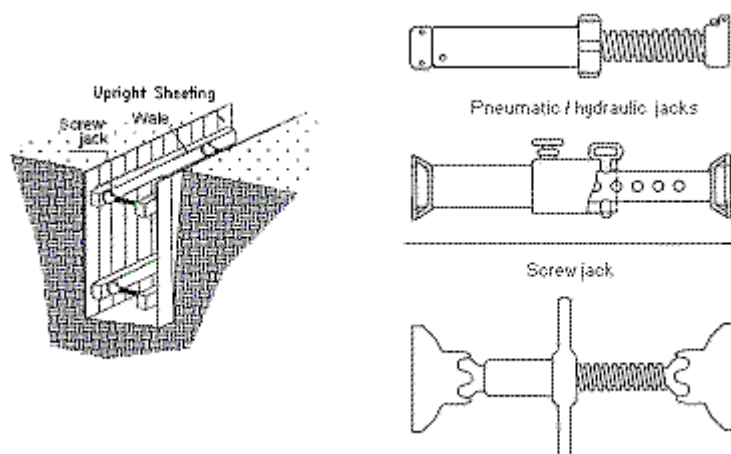
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#### 4.3.5 Single-Cylinder Hydraulic Shores

Shores of this type are generally used in a water system, as an assist to timber shoring systems and in shallow trenches where face stability is required.

#### 4.3.6 Underpinning

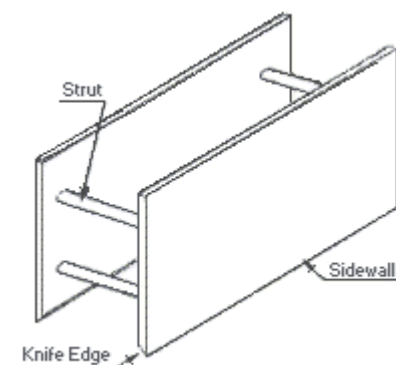
This process involves stabilizing adjacent structures, foundations and other intrusions that may have an impact on the excavation. As the term indicates, underpinning is a procedure in which the foundation is physically reinforced. Underpinning shall be conducted only under the direction and with approval of tkIS India.



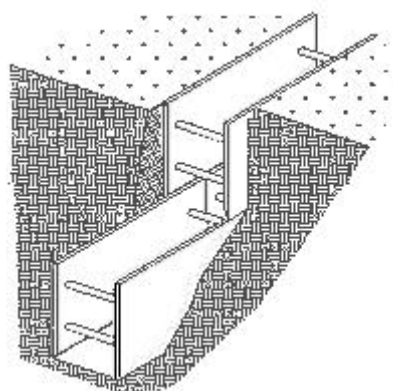
*Fig. 3 Shoring Variations*

#### 4.4 Types of Shielding

Trench boxes are different from shoring because, instead of shoring up or otherwise supporting the trench face, they are intended primarily to protect workers from cave-ins and similar incidents. The excavated area between the outside of the trench box and the face of the trench shall be as small as possible. The space between the trench boxes and the excavation side are backfilled to prevent lateral movement of the box. Shields shall not be subjected to loads exceeding those which the system was designed to withstand.



*Fig. 4 Trench Shield*



*Fig. 5 Trench Shield, stacked*

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## 4.5 Sloping and Benching

### 4.5.1 Sloping

Maximum allowable slopes for excavations less than 20 ft. (6.09 meters) based on soil type and angle to the horizontal are as follows:

*Table 1 : Maximum Allowable Slopes*

Notes:	Soil or Rock Type	Maximum Allowable Slopes (H:V) for excavations less than 20 ft. deep	Maximum Allowable Slopes in DEGREES for excavations less than 20 ft. deep
	Stable Rock	Vertical	90
	Type A	$\frac{3}{4} : 1$	53
	Type B	1 : 1	45
	Type C	$1 \frac{1}{2} : 1$	34
	Type A (Short Term and for a maximum depth of 12 ft.)	$\frac{1}{2} : 1$	63

- Numbers shown in third column under the heading maximum allowable slope angles are expressed in degrees from the horizontal & angles have been rounded off.
- A short term maximum allowable slope of 1/2H : 1V (63 Degrees) is allowed in excavations in Type A soil that are 12 ft. (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 ft. (3.67 m) in depth shall be 3/4H : 1V (53 degrees).
- Sloping or benching for excavations greater than 20 ft. Deep shall be reviewed by tkIS India.

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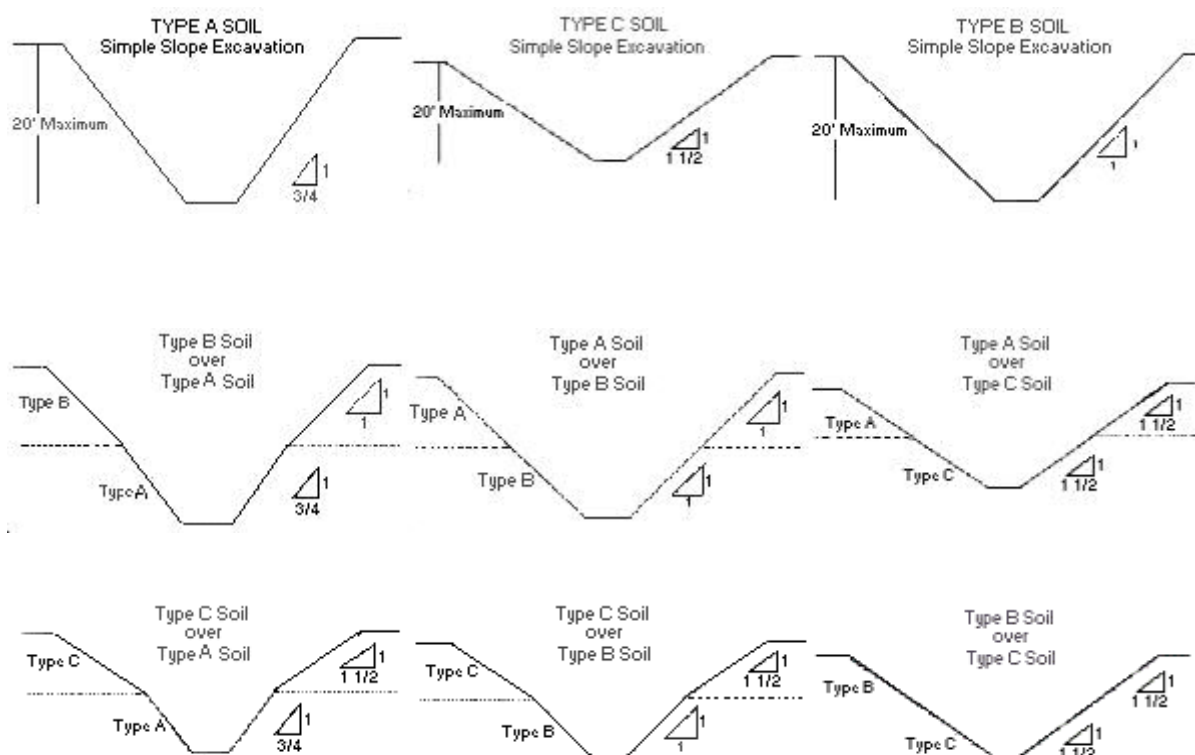


Fig. 6: Slope Configurations: Excavations in Layered Soils

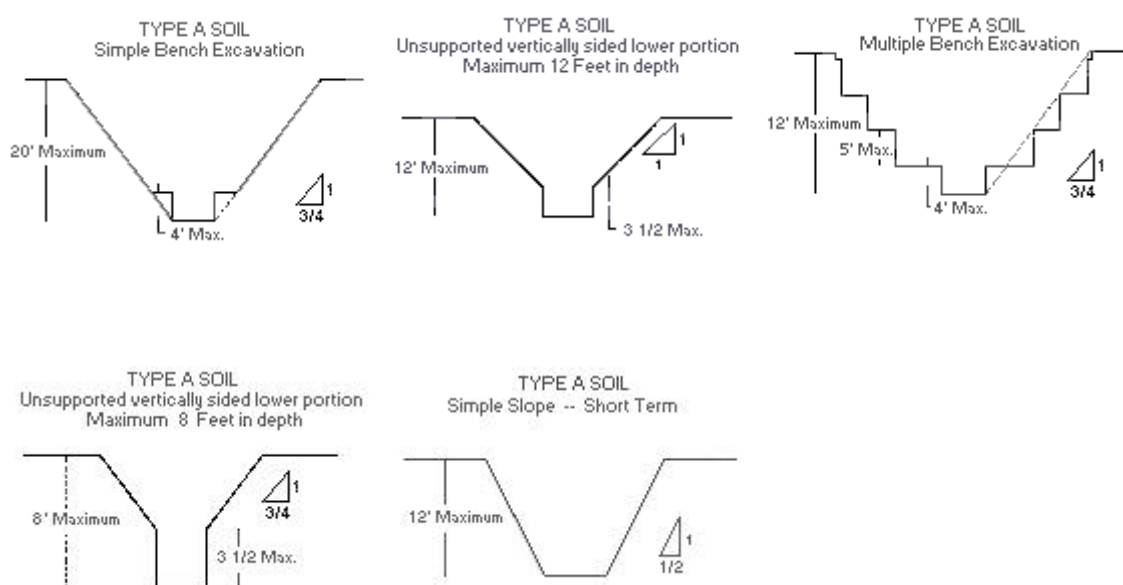


Fig. 7: Excavations made in Type A Soil

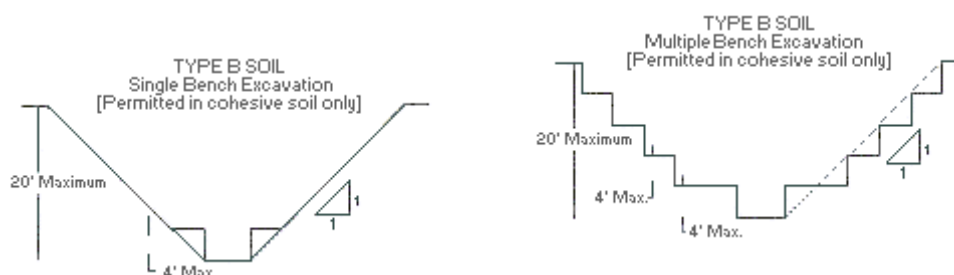
#### 4.5.2 Benching

Benching means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

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There are two basic types of benching, simple and multiple. The type of soil determines the horizontal to vertical ratio of the benched side.

As a general rule, the bottom vertical height of the trench shall not exceed 4 ft. (1.2m) for the first bench. Subsequent benches may be up to a maximum of 5 ft. (1.5 m) vertical in Type A soil and 4 ft. (1.2m) in Type B soil to a total depth of 20 ft. (6.0 m). All subsequent benches shall be below the maximum allowable slop for that soil type. For Type B soil the trench excavation is permitted in cohesive soil only.

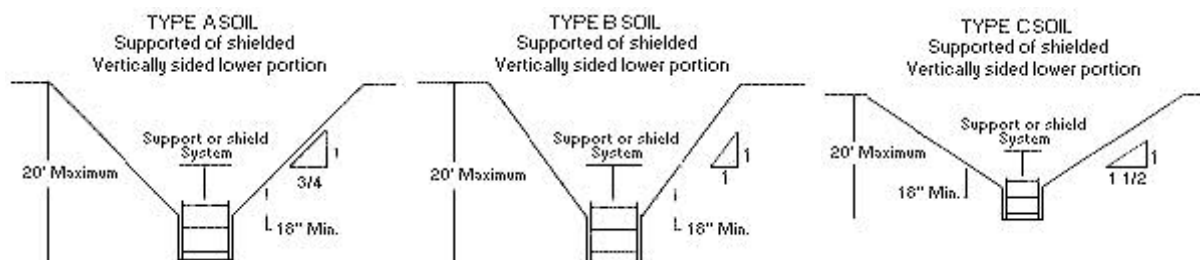


*Fig. 8: Excavations made in Type B Soil*

#### 4.6 Combined Use

Trench boxes are generally used in open areas, but they also may be used in combination with sloping and benching. The box shall extend at least 18 inches (0.45m) above the surrounding area if there is sloping toward excavation. This can be accomplished by providing a benched area adjacent to the box.

Earth excavation to a depth of 2 ft. (0.61m) below the shield is permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench and there are no indications while the trench is open of possible of soil from behind or below the bottom of the support system. Conditions of this type require observation on the effects of bulging, heaving and boiling as well as surcharging, vibration, adjacent structures, etc., on excavating below the bottom of a shield. Careful visual inspection of the conditions mentioned above is the primary and most prudent approach to hazard identification and control.



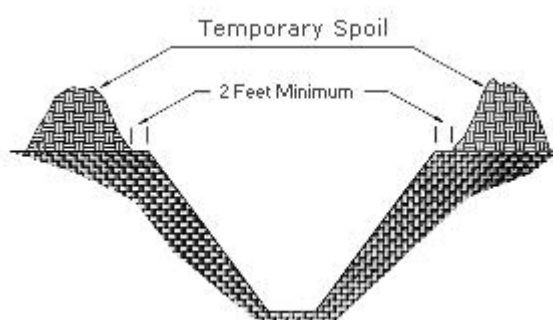
*Fig. 9: Slope and Shield Configurations*

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## 4.7 Spoil

### 4.7.1 Temporary Spoil

Temporary spoil shall be placed no closer than 2 ft. (0.61m) from the surface edge of the excavation, measured from the nearest base of the spoil to the cut. This distance shall not be measured from the crown of the spoil deposit. This distance requirement ensures that loose rock or soil from the temporary spoil shall not fall on employees in the trench.



*Fig. 10: Temporary Spoil*

Spoil shall be placed so that it channels rainwater and other run-off water away from the excavation. Spoil shall be placed so that it cannot accidentally run, slide or fall back into the excavation.

### 4.7.2 Permanent Spoil

Permanent spoil shall be placed at some distance from the excavation. The improper placement of permanent spoil, i.e. insufficient distance from the working excavation, can cause an excavation to be out of compliance with the horizontal-to-vertical ratio requirement for a particular excavation. This can usually be determined through visual observation. Permanent spoil can change undisturbed soil to disturbed soil and dramatically alter slope requirements; hence it is always advisable to place permanent spoil at tkIS India/Client approved designated place and disposed-off as per established plan.

## 4.8 Excavation Safety Requirements

### 4.8.1 Before Excavation work Starts

In order to begin excavation work with minimum risk to employees, plant and equipment and to enable the work to proceed without interruption, the following factors shall be considered well before the job starts:

- Size and purpose of the excavation.
- Nature of the ground including the proximity of made-up ground.
- Stability of adjacent structures.
- Position of underground obstructions such as pipes, electric cables and other utilities.

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- Weather and soil moisture conditions, especially high water table.
- Sources of soil vibrations (highway traffic, railroads, machinery etc.)
- Adjacent roads and footpaths.
- Method of excavation (hand or by machinery)
- Excavation plan submitted to tkIS/Client.

Consideration of these factors shall indicate the safety measures which can be implemented to proceed with the job and whether the sides of the excavation can be sloped and benched to a safe angle or whether protection systems shall be required. It is important to provide adequate and suitable protective systems for use whenever excavation work is to be carried out to a depth of 1.5 meters (5 ft.) or more. Excavation work to a depth of less than 1.5 meters (5 ft.) may also require protective systems, if advised by tkIS.

#### 4.8.2 Work Permit

Work permit shall be obtained from the concerned authorities before excavation work is started in any tkIS India project site where the presence of underground /utility obstructions is known or suspected.

A confined space entry permit is a second work permit and is required for trenches deeper than 1.2 meters (4 ft.).

All protective shoring systems and configurations, such as timber shoring, hydraulic and pneumatic systems, sloping, benching, shielding and sheet piling shall be designed by contractors and approved by tkIS India. Excavation plan shall be submitted to tkIS India before work start up.

#### 4.8.3 Underground Obstructions

Whenever the presence of underground pipes, cables, vessels or structures are known or suspected, mechanical excavation shall not be used until all such obstructions have been exposed by hand digging. Mechanical excavators shall not be used within 3 meters (10 feet) of any such obstruction. Pneumatic breakers shall only be used where necessary to break concrete or other hard surfaces.

#### 4.8.4 General Precautions

##### 4.8.4.1 Shoring Protective Systems

- As soon as an excavation reaches a depth of 1.2 meters (4 ft.), suitable shoring shall be installed or the sides sloped back to a safe angle. Shoring may be of timber or any other suitable material, such as steel sheet piling.
- The determination of the angle of slopes, benches or the choice and design of other protective systems shall be based on evaluation of pertinent factors such as: type of soil (Type A, B or C), depth of cut; possible variations in water content of the material while the excavation is open; anticipated changes in materials from exposure to air, sun or water; loading imposed by structures, equipment, overlying material or stored material; and vibrations from equipment, blasting, traffic or other sources.
- Excavations shall not be sloped at an angle greater than 1 ½ H: 1V one and one-half horizontal to one vertical (34 degrees from the horizontal). Plans for sloping and benching systems shall be submitted to tkIS India for review.



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- Shoring systems shall be designed by a qualified person and meet accepted engineering requirements. Materials used shall be in good serviceable condition and timbers shall be sound, free from large or loose knots and of proper dimensions.

#### 4.8.4.2 Personnel Protection

- Portable trench boxes or sliding trench shields may be used for the protection of personnel in lieu of a shoring system or sloping. Where such trench boxes shall be used, the design shall be approved by tkIS India.
- Trench boxes shall be designed, constructed and maintained to provide protection equal to or greater than the sheeting or shoring required.
- Shields shall be installed in a manner to restrict lateral or other movement of the shield and be capable of withstanding any sudden application of lateral loads.
- Shields shall be extended above the excavation to protect employees working inside the shields and when entering or exiting the areas protected by shields.
- Employees shall not be allowed inside the shielded areas whenever shields are being installed, removed or moved.

#### 4.8.4.3 Inspection

- All parts of an excavation, including the shoring, shall be inspected every day by a competent person to ensure that there is no danger of collapse and all observations shall be noted in the site safety log book.

#### 4.8.4.4 Clearance

- In order to provide a safe footing at the edge and to prevent spoil falling into an excavation, a clear space of at least 0.6 meter (2 feet) wide shall be maintained on all sides.

#### 4.8.4.5 Mechanical Excavator

- Men shall not be permitted to work underneath loads or in places where they could be struck by any part of a mechanical excavator.

#### 4.8.4.6 Walkways

- Where employees, equipment or members of the public are required or permitted to cross over an excavation, a close planked bridge or walkway with standard guard rails shall be provided and kept clear of excavated materials or other tripping hazards.
- No sidewalk shall be undermined unless properly shored.

#### 4.8.5 Access and Egress

- Safe means of getting into and out of an excavation shall be provided at intervals not exceeding 7.5 meters (25 feet). Ladders shall conform to the requirements set out in instruction HSE-CON-IN-014, Scaffolds and Ladders.
- Ladders shall be placed at an angle of 75 degrees and extend at least 0.9 meter (3 feet) above the stepping –off point.
- Ladders shall be securely fixed.

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#### 4.8.6 Hazardous Atmosphere and Materials

##### 4.8.6.1 Ventilation

- Where there is reason to suspect oxygen deficiency or the presence of a hazardous atmosphere in an excavation, gas tests shall be carried out by a trained person. Where necessary, mechanical ventilation shall be used or other appropriate precautions shall be taken before personnel entering the excavation.
- Toxic, oxygen and flammable gas tests are to be conducted before entering hazardous excavations in restricted areas.

##### 4.8.6.2 Hazardous Atmosphere

- Prior to entry into excavations greater than 4 ft. deep or confined spaces, a confined space entry permit shall be obtained from the concerned authority. Gas tests shall verify that the oxygen level is 19.5 – 23.5 % , combustible gases 0%LEL and hydrogen sulphide is 0 ppm.
- Corrective measures may include use of air movers, identification and isolation of sources from fuel lines, sewers, open tanks or other measures to return the breathing atmosphere to normal readings.
- Subsequent testing is required to monitor the area during the work so that appropriate precautions can be taken as necessary.
- Precautions shall be taken to prevent employee exposure to an atmosphere containing a concentration of any flammable gas above its lower explosive limit (LEL).
- Flammable gases permit conditions shall be;
  - Above 0% LEL – No hot work permitted
  - 0.05% LEL to 0.5% LEL – Breathing apparatus must be used
  - Above 0.5% LEL – No entry permitted
- When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe

##### 4.8.6.3 Emergency Rescue Equipment

- Emergency rescue equipment, such as Self-contained breathing apparatus (SCBA), a full body safety harness, life line and a stretcher shall be readily available where hazardous atmospheric conditions exist or may develop during work in an excavation.
- This equipment shall be attended by a standby man outside the trench when in use.
- Employees entering bell-bottom pier holes or other similar deep and confined footing excavations shall wear a full body safety harness with a life line attached to it.
- The life line shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline in the excavation.

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- Mechanical devices shall be available to lift incapacitated employees from excavations.

#### 4.8.6.4 Exhaust Gases

- Where an internal combustion engine is used in an excavation, special precautions shall be taken to ensure that exhaust gases are discharged so as not to be a hazard to men working in the excavation.

#### 4.8.7 Edge protection, markers and fixed lighting

- Whenever it is necessary to place or operate power shovels, derricks, trucks, materials, soil banks or other heavy objects on a level above and near an excavation, the side of the excavation shall be sheet-piled, shored and braced as necessary to resist the extra pressure due to such superimposed loads.
- When mobile equipment is utilized or allowed adjacent to excavations, substantial stop logs or barricades shall be installed.
- If men or vehicles are in the vicinity after dark, fixed warning lights shall be used to mark the limits of the work.

#### 4.8.8 Roads, Streets and Sidewalks

- Excavation work in roads, streets and sidewalks shall not be undertaken without prior approval of the relevant authorities and work permit.
- Excavation work on public highways will have to be cleared in advance with Government / Police and any special measures that they might specify shall be implemented.

#### 4.8.9 Backfilling

- Backfilling and removal of trench supports shall be accomplished first by backfilling up to a level allowing for the removal of the lower braces.
- Another layer of backfill shall be positioned in the trench to the next layer of braces to be removed.
- Removal of trench supports shall progress together with the backfill from the bottom of the trench.
- In unstable soil, ropes shall be used to pull out the jacks or braces from above, after employees have cleared the trench.
- All excavations shall be backfilled and consolidated, and the surface shall be left in good condition as soon as is practicable.

#### 4.8.10 Barriers

- All excavations deeper than 1.2 meters shall have rigid barriers (hard barricades). Barriers shall be of a strength that is capable of withstanding the weight of a person falling against the barrier.
- Excavations less than 1.2 meters in depth may be highlighted with warning tape at a distance of at least 1.5 meters from all edges of the excavation as an alternative to hard barricade with tkIS approval; however critical areas nearby road or near the access of general public shall be hard

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- barricaded irrespective of the depth of the excavation.

#### 4.8.11 Training

- All persons required to work in an excavation deeper than 1.2 meters are to be trained.

#### 4.8.12 Fencing, Signage, and Lighting

- Where appropriate, barricades and fencing of a suitable nature, with appropriate signage and lighting (as necessary), shall be erected before, during and after excavation, until restoration is completed.
- Proper barricading, protection and signages shall be ensured if it becomes necessary to leave excavations open during night, during weekends or whenever site is unattended.
- Wherever practicable, excavations shall be backfilled at the end of the shift.

#### 4.8.13 Traffic Management

- Traffic management plans shall be prepared and approved by tkIS India. Approved Plan shall be implemented to address any hazards or risks associated with vehicular and pedestrian movement around/near excavation area.
- All Contractor personnel shall ensure that their risk controls are implemented in accordance with the approved traffic management plan.

#### 4.8.14 Emergency Response

- Emergency response requirements shall be identified and documented before commencement of excavation activities at site.
- Emergency response plans shall appropriately provide measures to ensure safety of all personnel, should any foreseeable emergency situation arise during excavation activities.
- Suitable training shall be provided to ensure continuing preparedness. Mock drills shall be conducted on every six months and documented.
- Where underground pipelines, gas lines or other services are involved in the excavation area, emergency contact numbers and communication methods for all concerned authorities shall be ensured beforehand.

#### 4.8.15 Inspections

Inspections shall be made by a trained/competent person and shall be documented. The following guideline specifies the frequency and conditions requiring inspections:

- Daily and before the start of each shift;
- As dictated by the work being done in the trench;
- After every rainstorm;
- After other events that could increase hazards, e.g. Snowstorm, windstorm, earthquake, etc.;
- When fissures, tension cracks, undercutting, water seepage, bulging at the bottom or other similar conditions occur;
- When there is a change in the size, location or placement of the spoil pile; and
- When there is any indication of change or movement in adjacent structures.

### 5. Records

Necessary records as required by this Procedure shall be maintained.

For further details, please refer Procedure PIN LP-CHM -099.

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<b>Job area is considered:</b> Project No:	<b>Establishment/Project:</b>	<b>JSA No.:</b>
---	-------------------------------	-----------------

<b>Person participating in Job Safety Analysis.</b>	Contractor:	tkIS India:	Client:	
	1.	1.	1.	
	2.	2.	2.	
	3.	3.	3.	
	4.	4.	4.	
	5.	5.	5.	

**JOB DESCRIPTION:**

Requirement of Working Permit (Check the relevant box)	Requirement of adding Personal Protection Equipment. (Additional list)	Requirement of adding special equipment or tool	
Restricted space <input type="checkbox"/>	1.	1.	5.
Heating job <input type="checkbox"/>	2.	2.	6.
Digging <input type="checkbox"/>	3.	3.	7.
Isolation / Energization <input type="checkbox"/>	4.	4.	8.
Other job <input type="checkbox"/>	5.		

JSA considering procedure	Yes	No	Comment
Is JSA establishment participated by job implementing group?			

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Is JSA considered by Job implementing group before carrying out the job?			
Is JSA sheet used/ consulted in work implementation?			
Is the job carried out step by step?			
Do you propose to improve JSA sheet (give in detail)			
Is detail of any trouble showing			

ACTIVITIES	HAZARD/ DANGER	CONTROL MEASURE	ACTION
<i>Separate the job into the main tasks and record them in sequence.</i>	<i>Describe all hazards identified for each task based on observations and experience.</i>	<i>Describe fully all equipment, facility, and/or procedure controls applicable for each hazard.</i>	

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<b>Prepared by</b> (Contractor / tkIS)	<b>Reviewed by</b> (tkIS HSE - Manager)	<b>Approved by</b> (Site Manager / Commissioning Manager)
Name:	Name:	Name:
Designation:	Designation:	Designation:
Signature:	Signature:	Signature:
Date:	Date:	Date:

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## Attachments and forms:

PIN LP-CHM-022 F01- Format-Job Safety Analysis

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Validity  
Valid from: 12. 2018  
Valid until: 12. 2021

**This procedure replaces HSE-CON-IN-022**

Updating procedure: Should this instruction require revision, proposed changes/improvements shall follow the “IMS document management” (PIN LP-QMC-003).

Document distribution: This instruction shall only be made available via Intranet.

PIN-LP-QMC-03 F01 E 2018-03

tKIS India Local QM Standard		Sahabuddin Ahmed		Indranil Chakraborty / Rajnish Bhandari		Nitin Pandit		A K Ladia
	Date	Prepared	Date	Technically checked	Date	Formally checked	Date	Approved
				No project-specific adaptation				
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## 1. Scope

This HSE Procedure is applicable for HSE management during the execution stage of project at construction sites. These requirements are applicable to all project sites managed by tkIS India irrespective of activity being carried out by tkIS India personnel, Contractor, Sub-Contractor, vendor personnel.

## 2. Aim

This HSE Procedure is aimed at providing guidelines and defining the requirements for HSE management at site during execution phase of the project.

The Procedure sets the basic minimum standard in addition to compliance with current industry practices and applicable regulatory standards/requirements. This Procedure and Client / Owner requirements are to be followed, however the most stringent requirement shall be implemented.

## 3. Responsibilities

### Site Manager (SM)

SM shall form the site HSE committee for effective implementation for requirements of these instructions.

## 4. HSE Committee

The Site HSE Committee organization generally shall be:

- Chairman – tkIS India Site Manager (SM)
- Secretary – tkIS India HSE Manager (In-Charge)
- Members – Owner's Representative/s
- Contractor's Site Managers (SMs)
- Contractor's HSE Managers
- tkIS India Site HSE personnel

However, based on the project needs and site specific requirements, tkIS India SM may modify this organization.

### 4.1 HSE Committee Responsibilities

The HSE Committee has the responsibility to ensure construction activities are effectively managed throughout the duration of the construction phase in order to achieve the Project HSE Targets and Goals. The specific responsibilities of the HSE Safety Committee shall include:

- Analyze HSE statistics and reports and make recommendation to mitigate recurrences.
- Conduct site inspections. In case of any deviation/non-conformance, analyze and make recommendation to mitigate and avoid recurrence of deviation/non-conformance.
- Monitor performance standards achievement against HSE Targets and Goals.

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- tkIS India/Contractor shall organize regular HSE promotional events and activities to motivate and instill HSE consciousness into the workforce.
- tkIS India/Contractor shall organize regular HSE training programs to educate and keep workforce abreast of current hazards and HSE awareness
- Review major and critical activities and coordinate necessary measures among parties involved to eradicate hazard presence.

## 5. Requirements

### 5.1 Qualified and Competent Site HSE Professionals

To manage the site HSE Management system effectively, it is essential to have qualified (as per applicable statutory requirement) and competent HSE Professionals at site.

In India BOCW Act 1996 & Rules Or Factory Act 1948 & Rules shall apply, in countries other than India law of the land shall apply.

Refer the table below for the detailed requirement for HSE Professionals for projects in India, for projects in countries other than India law of the land shall apply.

**Site HSE Professionals qualification and experience requirement is detailed below:**

HSE PROFESSIONAL	QUALIFICATION	MINIMUM YEARS OF EXPERIENCE IN CONSTRUCTION SAFETY
Site HSE Officer / Site HSE Engineer	Recognised Degree in Engineering with recognized Diploma in Industrial Safety	5
	Recognized Diploma in Engineering with recognized Diploma in Industrial Safety	7
Site HSE Supervisor	Recognised Degree in Science/Diploma in Engineering with recognized Diploma in Industrial Safety	3
HSE Manager	Recognized Degree in Engineering with recognized Diploma in Industrial Safety	10

**Note:** 1. If more than one HSE Officer is working at site, one HSE Officer among them shall be nominated as Site HSE Representative / Manager.

2. Site HSE Officer / Engineer / Supervisor CV is to be approved by tkIS India.

### 5.2 Site HSE Personnel deployment

Contractor, as a minimum requirement shall deploy the following HSE Personnel at Site:

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Sr. No.	Number of persons at Site	HSE Professional
1	Up to 50 persons deployed by contractor at Site	Deploy one HSE Supervisor
2	For 51 to 100 persons deployed by contractor at Site	Deploy one qualified & experienced HSE engineer / HSE officer in addition to the HSE Supervisor as described in (1) above
3	For more than 500 persons deployed by contractor at site	Deploy one HSE Manager as described above
4	Ratio	1:50 ( One HSE Professional : 50 workers)

No work shall be started at site until above HSE personnel are mobilized and physically present at site. The contractor shall submit a safety program clearly indicating the line of responsibility and reporting. Contractor shall furnish CV of the site HSE personnel he intends to mobilize, for tkIS India approval.

## 6. HSE Communication

tkIS India shall prepare a detailed HSE Communication Procedure prior to the commencement of actual construction activities (normally, this will be as a part of project HSE plan).

### 6.1 HSE Committee meetings

tkIS India shall organize periodic, preferably once in a week HSE Committee Meetings to effectively manage all activities throughout the duration of the construction phase.

The agenda of HSE Committee meetings shall include:

- ❖ Review of HSE statistics and effectiveness of actions to mitigate recurrences.
- ❖ Review results of HSE inspections and also effectiveness of actions taken to prevent recurrence of deviation / non-conformance.
- ❖ Discussion on any HSE issues concerning site.
- ❖ Monitoring of HSE objectives and HSE performance for the office.
- ❖ Suggesting improvements towards HSE performance within the frame work of HSE Rules and procedures.
- ❖ Initiative for HSE promotion.

Minutes of the HSE committee meetings shall be maintained by tkIS India HSE Manager (In-charge) and shall be circulated to all concerned for necessary actions.

### 6.2 HSE Meeting and Inspection Schedule

HSE Committee meetings and inspection schedule shall be drawn as per project requirements at the commencement of site.

HSE Committee Meetings and inspections shall be regularly held as per the schedule.

HSE Committee meetings shall be conducted at least once a month.

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### 6.3 HSE Training

HSE Committees shall, from time to time, analyze and make recommendation for HSE trainings to educate the workforce.

HSE trainings shall include:

- HSE Orientation/Induction Training.
- Refresher Training
- Specific HSE Trainings shall include:
  - Working in Confined Space and Use of Respirators.
  - Scaffolding Erection, Dismantling and Alteration.
  - Emergency Response and Fire Fighting.
  - Environmental Protection.
  - Working at height
  - Job specific requirement

### 6.4 HSE Promotion & Incentives

**tkIS / Contractors** shall organize HSE promotional activities and reward programs throughout the construction phase.

The objectives and purpose of this promotional and incentives program is to create awareness amongst the workforce to instill and encourage safe work practices in order to achieve the overall Project HSE objectives and targets.

HSE promotional activities and reward programs can include:

- Safe Driving Award Scheme.
- No loss Time Award Scheme at 1, 5, 10, 20 million man-hours worked and so on.
- Most HSE Conscious Staff, Subcontractor, Subcontractor's Supervisor, Foreman and Worker.

Promotional or incentive programs shall be derived from one of or more of the following criteria:

#### 6.4.1 General

- Statistics of compliance and non-compliance with current and applicable HSE legislations regulations and requirements.

#### 6.4.2 Health

- Number of health and hygiene inspections conducted
- Number of medical briefings given and examinations performed

#### 6.4.3 Safety

- Number of hazards observed and recorded
- Number of actions generated and number of actions closed

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- Number of actions outstanding for more than one month
- Number and level of attendance in HSE meetings
- Number of Risk Assessment (HIRA) conducted
- Number of kilometers driven without incident/accident
- Frequency and Severity of injuries recorded
- Number of near misses recorded

#### 6.4.4 Environment

- Number of spills recorded
- Number of environmental inspections conducted
- Quantity of waste stream recorded and percentage reduction
- Number of environmental non-compliances recorded

#### 6.4.5 Security

- Number of security incidents/infringements recorded
- Number of security patrols and inspections conducted

### 6.5 Pre-Construction Meeting

Pre-construction meeting shall be held between tkIS India's Site Management, Client and Contractor's Management. The agenda of the meeting shall include HSE issues such as:

- Current and applicable HSE Legislation and Regulations of the Local Government Authority.
- HSE Requirements of tkIS India/Client.
- Pre- construction Risk Assessment.
- Best Engineering Practices
- tkIS India/Client HSE Requirements as established in Construction HSE Manual, other related programs and procedures developed under Project HSE plan.
- Review of construction plants and equipment intended to be used on the project prior to mobilization, to ensure compliance and condition.
- Review of key project personnel, their qualification and experience.

Contractors shall be required to acknowledge and undertake the responsibilities to comply with all the above requirements to effectively implement requirements of Construction HSE Plan, other related programs and procedures developed under this plan.

Contractors are also required to ensure that all their personnel understand the requirements set forth by developing and organizing communication programs as those mentioned above.

### 6.6 Toolbox Meetings

Contractor's supervisors shall be responsible to conduct daily Toolbox meetings.

tkIS India site HSE personnel as well as tkIS India Construction personnel are responsible to ensure that the daily toolbox meetings are conducted. Contractor's supervisors shall be responsible for training their workforce and also be responsible for their safety.

Such training shall include daily toolbox meetings as well as giving pre-work tasks instructions. These meetings shall be attended by all concerned personnel. It shall be ensured that HSE Matters related to the performance of their work concern are addressed.

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Toolbox meeting shall be held on a daily basis prior to the commencement of work/shift. tkIS India Site HSE Rep. shall determine the actual meeting time and duration. Each meeting shall be documented, listing the attendees, topics covered and signed by the person conducting the meeting.

Subcontractors HSE Officers or HSE Supervisors shall keep and file all meeting reports for audit purpose.

Subcontractor HSE Officer shall complete the toolbox meeting report daily. The report shall list the subject discussed, suggestions offered, remarks from the Foreman and his signature. All attendees shall be listed along with their badge number or names or whichever is easier.

## 6.7 Ad-Hoc Meeting

The purpose of ad-hoc meeting is to ensure the discussion and brainstorming of major, non-routine and hazardous construction activities and operations prior to its actual execution.

Major, non-routine and hazardous construction activities and operations such as the installation of a heavy equipment or structure that involves potential risk and consequences shall require the preparation and submission of a detail construction method statement with a hazard and risk assessment report. A meeting will then be organized after all respective personnel involved have thoroughly studied the Construction Method Statement and Risk Assessment Report submitted by Subcontractor/s involved.

The objectives of such ad-hoc meetings are:

- Discuss and analyze construction method and sequence of work to prevent the occurrence of incident/accident. Such discussions shall include the proposed machinery, plant, equipment and personnel involved their capacity, certification, qualification and etc.
- Identify hazards underlying in activities, the risk of their occurrence, the potential impacts and significant aspects of an activity.
- The mitigations measures proposed to reduce and minimize the potential impacts.

tkIS India Construction Manager shall chair all ad-hoc HSE meetings. Members of these meetings shall include tkIS Site HSE Rep., Site HSE Officers/Supervisors, tkIS India Construction Superintendent, tkIS India Site Supervisors, Owner, Subcontractor/s Management and their HSE personnel.

All matters discussed in these meetings shall be recorded, kept and filed by tkIS India Site HSE Rep.

A copy of the meeting minutes shall be distributed to the Subcontractor/s for the incorporation of the matters discussed into the method statement and used subsequently for the supervision of the actual work.

## 7. Worksite Safety

tkIS India/Contractor shall:

- Maintain control of the work site, all personnel on the work site and all equipment on the work site
- Keep worksites as clean and tidy as is reasonably practicable
- Upon completion of the work, promptly clear away and remove from the work site, all surplus materials and equipment and reinstate as required to the satisfaction of the Owner.
- Provide continuous adequate protection at the work site, of the Owner property and the construction site.
- Take responsibility for the safety of all persons on the work site.

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- Ensure compliance with tkIS India/Client HSE management system by employees, subcontractors, agents and others entering the premises. All HSE rules of Owner and applicable provisions of safety laws, rules or regulations also to be complied.
- Ensure all equipment in use is identified and certified to tkIS India HSE Management System or International Standards as necessary and is operated in accordance with safe systems of work.
- Provide rest and welfare facilities at work locations
- Provide HSE officers and/or paramedics at site.
- Provide owner with access to any area as required to conduct investigations, inspections, safety meetings or any other activity.

## 7.1 Smoking, Drugs & Alcohol Policy

The control of abuse and measures to arrest consumption within the construction area:

### 7.1.1 Smoking

The rules in effect from Client and tkIS India shall determine the Project Policy towards smoking. Smoking shall be prohibited in all areas within the construction area and temporary facility areas unless a specific area is marked as a smoking area. As such, smoking shall only be permitted in designated and marked areas.

Employees who fail to adhere to this requirement shall be liable to immediate termination of their contract.

A smoking area plan showing designated areas shall be posted on all bulletin boards. All designated smoking areas shall be maintained in a clean and sanitary condition at all times. Steel cigarette ash and butts containers shall be provided at all designated smoking areas, with a DCP Powder 9Kg Fire Extinguisher.

### 7.1.2 Drugs and Alcohol

The consumption of any intoxicating substances during working hours or within such time, where a person could still be considered intoxicated and he shall be prohibited from entering the Construction Site.

Any such substance including alcoholic beverages, illegal drugs, inhalants and prescription drugs are not to be consumed during working hours or within such time a person will be mentally or physically impaired.

The use of prescription drugs during working hours is prohibited unless verification from the prescription physician states that the medication shall not impair the person's ability to perform his specific duties. This verification shall be in writing from the physician and on the office letterhead.

tkIS India shall educate the workforce during HSE Orientation Training and other safety awareness campaigns to introduce the dangers and consequences of substance abuse during employment to ensure compliance with the substance abuse policy.

As a standard policy on all security access points and worksite locations, Security teams shall be authorized to stop and search any person on site for the abuse of such substances.

Any person found to have committed the substance abuse policy shall be liable to immediate termination of their contract.

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## 7.2 HSE Inspections

The purpose of HSE inspection is to identify variation in construction activities and operations, machineries, plant and equipment and processes against the HSE Plan and its supplementary procedures and programs. All identified variations (unsafe practices, non-conformances and hazardous machinery/plant/equipment) shall be corrected and make safe the condition.

The scope shall span over the whole construction work site, temporary facility areas.

Following HSE inspections program shall be adopted to ensure completeness are:

- Planned General Inspection
- Routine Inspection
- Random Inspection
- Other Inspection

## 7.3 Planned General Inspection

Planned general inspections are performed at predetermined interval and it usually involves the management from both tkIS India and the Client.

Inspections that shall be classified under this inspection program are:

- Monthly tkIS India, Owner and Subcontractors Site Safety Committee Inspection.
- Weekly HSE Inspection by tkIS India Construction Manager & Supervisors (tkIS India and Sub-contractors). (Client Employee Representative shall be invited to attend)
- Daily HSE Inspection by tkIS India Site HSE Team.

tkIS India Site HSE Rep or his delegates shall participate in the above HSE inspections.

## 7.4 Routine Inspection

Routine inspections are often referring to the inspection of plant, equipment and temporary structure performed by plant and equipment operators and temporary structure erectors.

Such inspections shall be made in prescribed forms.

Inspections that shall be classified under this inspection program are:

- Daily Inspection of plant and equipment by user / operator.
- Weekly Inspection of scaffold by scaffolding supervisor.
- Monthly Inspection of electrical hand tools by competent electrical worker.
- Quarterly Inspection of temporary electrical systems by competent electrical supervisor.
- Yearly or half-yearly inspection of lifting machinery, lifting appliances, equipment and gears by qualified person.

Note that the list mentioned above is not exhaustive. tkIS India Site HSE Rep. shall ensure all plants, equipment, powered tools and any other temporary structures that shall pose a hazard to operators and workers working in close proximity are routinely inspected by assigned person.



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## 7.5 Specific versus Random Inspection

Random inspections are performed on processes or activities without a predetermined date. Inspections are usually performed by comparing and ensuring a process or activity is executed in accordance to a general set of rules, method statement submitted or developed procedures.

The following are examples that shall be commonly performed as required on the construction site:

- Inspection performed before a heavy lifting operation.
- Inspection performed before and after the initiation of a process such as flushing of pipes and pressure testing of a system.
- Inspection performed before and after the entry of person into a confined space.
- Inspection performed before and after a Welding and Gas Cutting operation.
- Inspection of Formwork before concreting by Formwork Erector.

Note that the list mentioned above is not exhaustive. tkIS India Site HSE Rep. shall ensure all high risk processes and activities performed are inspected by a competent person.

## 7.6 Job Safety Analysis

Job safety analysis (JSA) is a procedure to integrate accepted safety, health & environment principles and practices stepwise into a particular task or job operation. In a JSA, at each step of the job, potential hazards are being identified and necessary mitigation / precautionary measures are recommended to do the job safely.

JSA is applicable for all activities. JSA is to be prepared before commencement of any activity. Group discussion with all the stakeholders must be ensured and to be duly signed by all. For any critical activity, group discussion of site manager(s) need to be ensured and final approval to be done by tkIS Site Manager / Commissioning Manager.

For EPC (LSTK) project, JSA need to be reviewed by client's representative and should be approved by tkIS SM / CoM.

(PIN LP-CHM-022 F01– Format: Job Safety Analysis)

## 7.7 Other Inspection

Other inspections include the following:

- Mandatory Inspection of Plant and Equipment by Approved Person in accordance with the Local Government Legislation.
- Client Site HSE Management Team
- Site HSE Inspection and Audit by tkIS India HO.

All inspection records and reports shall be properly kept and filed for audit purpose. Inspection reports from Planned General Inspection and Routine Inspection shall be used for discussion during HSE Committee Meetings.

## 8. HSE Performance Indicators and Benchmarks

The following parameters shall be used to measure and report on HSE performance.

Process <b>CHM</b>		
thyssenkrupp Industrial Solutions (India)	<b>Local Procedure Site HSE Management</b>	QM code <b>PIN LP-CHM-022</b>
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### 8.1 Procedures and Work Practices

- Control of Working Hours
- Working Procedures
- Method Statements
- Task Risk Assessments
- Health, Safety, Environmental and Security Procedures
- Communication Procedures

### 8.2 Training

- Behavioural Safety
- Management/supervisory HSE induction training
- Refresher Courses
- Tool Box Talks
- Specialist assistance
- Using the language mostly understood by workforce
- Other training in accordance with the training matrix developed by tkIS India

### 8.3 Driving and Vehicles

- Transport Management Procedure
- Vehicle Identification, Quality and Equipment
- Vehicle Inspection and Maintenance arrangements
- Driver Training and Evaluation
- Logistics Safety
- Personnel reporting and Movement

### 8.4 Plant and Equipment

- Identification, quality and certification – pre mobilization and during use
- Inspection and Maintenance
- Operator Training and Evaluation

### 8.5 Audits and Reviews

- Work Site System Audit / Reviews
- tkIS India management audits
- Site Inspections
- Documentation
- Equipment on Site, in use

### 8.6 Occupational Health

- Cleanliness
- Hygiene
- Food and Water
- Occupational Health and Welfare
- Medical Equipment and Facilities
- Dust Emissions
- Work Site Noise
- Community Noise
- Ergonomics
- Illumination
- Control of Substances Hazardous to Health
- Emergency Medical System

Process <b>CHM</b>		
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- External Temperatures / Heat Stress

### 8.7 Incidents (Near Misses and Accidents)

- Unsafe Acts / Near Miss Conditions
- Investigation Teams appointed
- Investigations undertaken and actions identified
- Reporting System / Procedure
- Fatalities
- LTI (Lost Time Incidents)
- Hazard Reporting
- Recordable Injuries

### 8.8 Environmental

- Vehicle emissions
- Dust emissions
- Local Air Quality
- Releases from the worksite to water courses
- Water Quality
- Quality of water in water courses impacted by construction activity
- Area of reinstatement completed according to reinstatement specification

## 9. Records

Necessary records for this procedure are available in PIN LP-CHM-099.

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE EVALUATION FORM</u></b>	QM code PIN LP-CHM-023 F01
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CONFINED SPACES ARE DEFINED AS:

1. Large enough and configured such that an employee can bodily enter and performed the assigned work.
2. Has limited or restricted means for entry or exit.
3. Is not designed for continuous employee occupancy.

PERMIT-REQUIRED CONFINED SPACES ARE DEFINED AS HAVING ONE OR MORE OF THE FOLLOWING:

1. Contains or has a potential to contain a hazardous atmosphere.
2. Contains a material that has the potential for engulfing an entrant.
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or by a floor, which slopes downward and tapers to smaller cross-section.
4. Contains any other recognized serious safety or health hazard.

CONFINED SPACE ASSESSMENT FORM

Name of Evaluator \_\_\_\_\_

Work Area Assessed \_\_\_\_\_

Date of Assessment \_\_\_\_\_

Confined Space Determination

1. Area was not designed for continual worker occupancy  
YES ☐ NO ☐
2. Area can be bodily entered and assigned work performed  
YES ☐ NO ☐
3. Area has limited and/or restricted means of access and egress  
YES ☐ NO ☐

If you answered yes to all of the above you have met the criteria of a confined space, and must proceed to the next section.

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thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE EVALUATION FORM</u></b>	QM code PIN LP-CHM-023 F01
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#### Permit-Required Confined Space Determination

- The area contains or has the potential to contain a hazardous atmosphere  
YES ☐ NO ☐
- The area contains a material that has the potential to engulf an entrant (water, grain, sand, etc).  
YES ☐ NO ☐
- The area has an internal configuration, inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section.  
YES ☐ NO ☐
- The area contains any other recognized serious safety and health hazards (electrical, thermal, Mechanical, physical, chemical, etc).  
YES ☐ NO ☐

If you answered yes to any one or more of the above you have met the criteria of a permit-required confined space. Permit-required spaces must be identified with the appropriate signs, and implement measures to prevent unauthorized entry (locks, bolts, etc). If employee entry is required a confined space entry program and training program must be developed and implemented.

#### Reclassification of Permit Required Confined Space

A space classified by the employer as a permit-required confined space may be reclassified under the following conditions:

- If the permit space poses no actual or potential atmospheric hazards and if all the hazards within the space are eliminated without entry into the space, and the non-atmospheric hazards remain eliminated.
- The employer shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space or to that employee's authorized representative.
- If hazards arise within a permit space that has been reclassified to a non-permit space, each person must immediately exit the space. The employer shall then reevaluate the space and determine whether it must be reclassified as a permit space.

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Classification of Work Space

Permit-required confined space

Non permit-required confined space (does not contain hazards capable of causing serious harm or death)

### STEP BY STEP CONFINED SPACE ENTRY PROCEDURE

#### 1. JOB PLANNING MEETING

- (i) Identify and classify the confined space. Conduct Hazard Identification & Risk Assessment.
- (ii) Prior to entry into a confined space, personnel involved with the job will discuss the procedures that will be followed, so that the confined space work will be completed safely. The required equipment will be assembled; instructions will be conveyed to those involved in the entry; procedures will be discussed; and hazards, which may be encountered, will be explained. The attendant should ensure that any ignition source taken into the confined space is limited to ones required to perform the necessary work. Each location may have different hazards.
- (iii) All necessary equipment to be used for entry shall be made available at site by Entry Supervisor, including communication devices (radios, if required) to be used to quickly summon Rescue Personnel by attendant.

#### 2. ENTRY PROCEDURE

- (i) Follow TKIS Lockout/Tag out procedures to isolate any potential hazardous sources, which will adversely affect those working in confined space.
- (ii) Open sufficient manhole covers, doors, vents, or other openings in the confined space.
- (iii) Where necessary, use ventilators to change the air in the confined space.
- (iv) Entry Supervisor will test the air for oxygen content, flammable and toxic gases. Initial air monitoring data will be recorded on the confined space permit. Frequency of air monitoring shall be decided by concerned TKIS Job Engineer (Permit Issuer) in consultation with TKIS Site HSE Personnel.
  - a) Oxygen must be between 19.5% and 23.5%
  - b) Flammable/Explosive gases must be below 5% Lower Explosive Limit (LEL)
  - c) Toxic gases/vapors must be below BOCW Act & Rules, Factories Act & Rules/OSHA's Permissible Exposure Limits (PEL)

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE EVALUATION FORM</u></b>	QM code PIN LP-CHM-023 F01
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## 1 Air Testing

A. The atmosphere within the space will be tested to determine whether dangerous air contamination and/or oxygen deficiencies exist. Direct reading instruments, detector tubes, alarm only gas monitors and explosion meters are examples of monitoring equipment that may be used to test confined space atmospheres. Entry Supervisor who have successfully completed air-monitoring training shall perform the air testing. Air testing equipment shall be calibrated (bump tested using span gas) and certified according to the manufacturer's recommendations. Calibration records shall be kept.

B. The minimum parameters to be monitored are oxygen deficiency, LEL and, if applicable, contaminants that may be present which are over BOCW Act & Rules, Factories Act & Rules/ OSHA's PEL. When testing for atmospheric hazards, first test for oxygen content, then for flammable gases or vapors and lastly for toxic gases or vapors. The initial air readings shall be recorded on the Permit and kept at the work site for the duration of the job. The employees shall be able to review the testing results.

## C. Air Testing Procedure

Prior to atmospheric testing, check air readings outside of the Confined Space to ensure proper operation of the instrument and that air readings are within normal ranges.

Record Air test readings on the Permit.

- From each entrance, drop the sampling probe of the Meter to the bottom of the space.
- Additionally, use other available openings, which would facilitate air testing for that confined space.
- Slowly raise the sampling probe, stopping at intervals of two feet to ensure that the atmosphere is not stratified. The rate of sampling shall be slowed to accommodate detector response due to the length of the sampling line and probe.
- Record air testing data on the confined space permit.

## C1 Air testing for Confined Spaces having a side or bottom man way (ducts, tanks, etc.):

- From each entrance, move the sampling probe of the Meter to the opposite side of the space. Use rods, poles or other means to extend the probe to the opposite side of the space.  
Slowly test all areas inside the Confined Space.  
The rate of sampling shall be slowed to accommodate detector response due to the length of the sampling line and probe.

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thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE EVALUATION FORM</u></b>	QM code PIN LP-CHM-023 F01
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- Record air testing data on the confined space permit.

C2 Air testing for Confined Spaces having a top entrance (manholes, tanks etc):

- Upon initial entry, all areas that could not be tested from the man way shall be tested. Slowly test the areas with the sampling probe out in front of you, checking all areas that were missed.
- If there are no non-atmospheric hazards present and if the pre-entry tests show there are no dangerous air contamination and/or oxygen deficiency within the space, entry into and work within the space may proceed.
- The atmosphere within the space shall be periodically tested as necessary to ensure no accumulation of a hazardous atmosphere. If conditions exist that could change the atmosphere of the Confined Space, it will be necessary to monitor the atmosphere continuously during occupancy. Air monitoring shall be performed at the actual work location in the confined space. The results of this monitoring shall be documented on the confined space permit, at a frequency established by the Entry Supervisor.

D. The workers will immediately leave the permit space and notify Entry Supervisor/Concerned Job Execution Engineer when any of the gas monitor's alarm set points are reached as defined. After a suitable ventilating period, repeat the testing. Entry may not begin until testing has demonstrated that the hazardous atmosphere has been eliminated and Execution Engineer (Permit Issuer) approves entry.

E. The Entry Supervisor will assign a trained Attendant to control entry into the confined space.

F. The Attendant will ensure that all Entrants are authorized; keep an accurate count of all who enter, continually communicate with those within the confined space, watch out for the well-being and safety of all entrants and stay until relieved. Attendants will verify that all Entrants sign the Register prior to entry/exit as per Appendix D.

G. If all is clear in step 2(a), the Entry Supervisor will allow entry. Continuous forced ventilation should be used when required. Continuous air monitoring shall be conducted and recorded periodically on the back of the permit when required.



Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE EVALUATION FORM</u></b>	QM code PIN LP-CHM-023 F01
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- H. If work is stopped for any reason, the air tests shall be re-taken if deemed necessary by the Entry Supervisor, prior to re-entry.
- I. When the job has been completed, the Attendant will account for all Entrants before they leave the job site.
- J. The Entry Supervisor will check to ensure that all personnel are out, all equipment is clear, and when he is satisfied with the site conditions, he/she can close out the confined space entry permit, prior to allowing the Confined Space to be sealed.

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE ENTRY PERMIT</u></b>	QM code PIN LP-CHM-023 F02
	<b>Permit Required Confined Space / Non Permit Required</b>  <b>Confine Space</b> <b>(Complete Prior to Entry)</b>	Page 1 of 3

**I. ENTRY DESCRIPTION**

Confined Space Location /Number: -----

Purpose of Entry: -----

Date Permit Issued-----Time of Entry: (in) ----- (out) ----- Permit Expires-----

**II. ENTRY TEAM MEMBERS**

Name (list below)	Time In	Time Out
Attendant	xxxxxxxx	xxxxxxxx
Entrant		
Entrant		
Entrant		
Entrant		
Entrant		

**III. ATMOSPHERIC TESTING**

Has unit been calibrated within last month Yes/No

Battery checked? Yes/No

Location in space	% O2	% LEL	CO ppm	Other	Initials of Tester
Prior to Entry*					
At Opening					
Middle					

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE ENTRY PERMIT</u></b> <b>Permit Required Confined Space / Non Permit Required</b> <b>Confine Space</b> <b>(Complete Prior to Entry)</b>	QM code PIN LP-CHM-023 F02
		Page 2 of 3

Bottom					
Acceptable Limits*	19.5- 23.5%	Below 5%	Below 25 ppm		

\*Continuous monitoring may be required. Site-specific conditions may require entrant to wear a monitor.

#### IV. SAFETY CHECKLIST (check each item when completed)

- \_\_\_\_\_ 1. Establish communication from worksite with tkIS Site Office
- \_\_\_\_\_ 2. Barricades in position
- \_\_\_\_\_ 3. Establish continuous ventilation/monitoring if required.
- \_\_\_\_\_ 4. Communication checked between entrants and attendant (List how \_\_\_\_\_)
- \_\_\_\_\_ 5. Escape harness, tripod and winch available
- \_\_\_\_\_ 6. Lockout/tag out completed (if needed)
- \_\_\_\_\_ 7. Appropriate PPE worn \_\_\_\_\_ Harness \_\_\_\_\_ Hardhat \_\_\_\_\_ Gloves \_\_\_\_\_ Hearing  
Protection \_\_\_\_\_ Foot \_\_\_\_\_ Personal Monitor \_\_\_\_\_ Eye Protection \_\_\_\_\_ Other (list) \_\_\_\_\_
- \_\_\_\_\_ 8. Lighting
- \_\_\_\_\_ 9. Heat conditions assessed
- \_\_\_\_\_ 10. Others (list) \_\_\_\_\_

#### V. AUTHORIZATION FOR ENTRY

Permit Receiver (print name) \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Permit Issuer (print name) \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

OR: The above confined space has been reclassified to *Non Permit Required*:

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE ENTRY PERMIT</u></b>	QM code PIN LP-CHM-023 F02
	<b>Permit Required Confined Space / Non Permit Required</b> <b>Confine Space</b> <b>(Complete Prior to Entry)</b>	Page 3 of 3

Permit Receiver (print name) \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Permit Issuer (print name) \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

#### VI. AUTHORIZATION FOR PERMIT CLOSURE

Permit Receiver (print name) \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Permit Issuer (print name) \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

¥ Delete whichever not applicable.

¥¥ The “Non Permit Required Confined Space”; Permit requirements shall be as advised by tkIS Site RCM/ Site HSE Representative.

**Note-** Permit Receiver & job execution Supervisor/Engineer (Contractor) shall be trained  
Gas Test shall be conducted by Entry Supervisor.

Process Construction HSE Management		
thyssenkrupp Industrial Solutions (India)	<b><u>CONFINED SPACE ENTRY /EXIT REGISTER</u></b>	QM code PIN LP-CHM-023 F03
		Page 1 of 1

NAME Persons allocated to work (Confined Space)		IN		OUT	
Block Letters	Date	Signature	Time	Signature	Time

Name of the Attendant: -----

Signature of Attendant: -----

Date: -----Time: -----

### **SUB: Prohibition /Ban of Use of Hydra crane in Phased Manner at Refineries.**

In refineries the tractor based articulated, ,tyre mounted, hydraulic mobile hydra crane (8-14 Tonne )are being used in Maintenance Deptt., Central Store /Workshop & in PJ activities for last several decades to the large extent for loading/unloading, of Piping, Equip., Heavy consignment(Mech./ Elect.),Cable drum, Catalyst ,Erection of Structural's etc.

There are number of instances of hydras being toppled because of excessive load, unsafe practice/condition by operator. The use of hydras at site have following Safety issues:

- Loaded Hydra in articulated position topples.
- Hydraulic lever operated steering dangerous.
- No electric safe load indicator control.
- Only Mechanized Safety System provided.
- No side stabilizers or outriggers for stability.
- Low Load visibility to operator.
- Strong operator tendency to overload.

Some of the refinery have started using double cabin city of hydra, but that does not give stability & visibility during operation & is safe only during idle movement.In view of above, it is suggested to explore the possibility of replacing these hydras in a phased manner with more stable state of the art crane available in market of almost similar capacity .It has also been brought to our notice that some of the leading Safety Conscious agencies / PJ owners e.g. Tata Projects, L&T ECC,DMRC ,Reliance for Expansion PJ etc have already banned/stopped the use of such hydras at their PJ site. Moreover few agencies have already used crane suggested as below at Paradeep during PJ activities. Operational safety is the prime reason for this prohibition ,because the crane topples while in operation at sites .More the view of the helpers and working group is restricted as the hydra boom is in line of the sight of operator which causes a great threat to safety & human life during movement from one place to another during operation.

These hydras have been replaced by use of stable 14/15 Tonne capacity, eight tyre ,hydraulic mobile, articulated, steering wheel controlled steer cranes available in the market .The popular crane models are F15 by Escorts & FX 150 by ACE. The Tech. (Details of both Model is enclosed as Annex. I & II for reference) . These cranes are equipped with electronic safe load indicator and have front out riggers for better stability during heavy lift operations. These cranes have boom pivot at the back of the operator cabin (front mounted cabin) which enables complete visibility of the working group or any person walking on the road during movements.

In view of above and keeping in mind safe operation environment at our various Refineries i/c PJ Sites ,following is proposed in a phased manner:

1. Prohibition /Ban of use of Hydra cranes at PJ Site i/c Material Handling Contract ( to be awarded) ,and same should be specified in contracts if reqd.
2. Prohibition of use of Hydra in central store in the future contracts.
3. Prohibition of use of Hired/ Contractor owned Hydras in Maint. Activity i/c Shutdown .



ESCORTS  
Construction Equipment



# ESCORTS F-15

Hydraulic Mobile Pick-n-Carry Crane



## ESCORTS LTD.

Plot No. 219, Sector 58, Ballabhgarh-121 004, Haryana, India  
Tel.: +91 129 2306567, Toll free: 1800-180-1890, Fax: +91 129 2306463  
e-mail: [ece.marketing@escorts.co.in](mailto:ece.marketing@escorts.co.in) [www.escortsece.com](http://www.escortsece.com)

• The information contained in this leaflet is intended to be of a general nature only. • We reserve the right to change specifications without notice. • All Dimensions and weights are variable within +/-5%

- Travel Long Distance on own Power
- Boom Height with Flyjib: 21m
- Heavy Duty Hoist Winch
- Front Mounted Cabin with Steering Wheel
- Slotted Boom with Self Compensating Snatch block
- New Technology Control Valve for Precision Handling
- 4 Wheel/ 2 Wheel Drive selector
- Dragging Winch with Outriggers (Optional)
- Safe Load Indicator with Hydraulic cutoff (Optional)



SPECIFICATION F-15

Rated Capacity

14 tonne at	1.50 m radius
900 Kg at	15.80 m radius
Max hook height	17.60 m

Vehicle Performance

Speed	max 40 kmph
Gradeability	40% unladen

Drive

4 wheel drive

Engine

Diesel engine of VOLVO Eicher make, Model E483 TCIC, Turbo charged water cooled, developing 101 HP @ 2400 rpm or equivalent engine

Transmission

Synchromesh gearbox with auxillary gearbox  
Speeds-10 forward and 2 reverse

Clutch

Single, dry type friction clutch plate

Brakes

Service: Fully air operated ‘S’ cam dual circuit brakes on front & real axles  
Parking: Air operated, spring actuated fail safe brakes

Axles

Front - rigidly mounted  
Rear - mounted with two semielliptical springs

Tyres

8 nos. - 11x20 - 16 PR

Hydraulic System

Main pump of 46 cc/rev,  
Control Valve-3 spool double acting with a built in relief & auxillary valves

Electrical System

24 V, DC

Steering

Full power orbitrol with twin hydraulic double acting rams 40° articulation on either side

Boom

4 part boom, 3 part hydraulically powered & fully synchronised.  
4th part power extended and manually pinned for safety

Hoist

Hydraulically operated with 4 falls  
Built in safety brakes

Wheel Base

3.95 m

Dimensions

Overall length	9725 mm
Overall width	2450 mm
Overall height	3215 mm

Wheel Track

Front 1825 mm

Rear 1825 mm

Operating Weight

Front Axle 6315 kg

Rear Axle 9000 kg

Total 15315 kg

Turning Radius

7.2 m

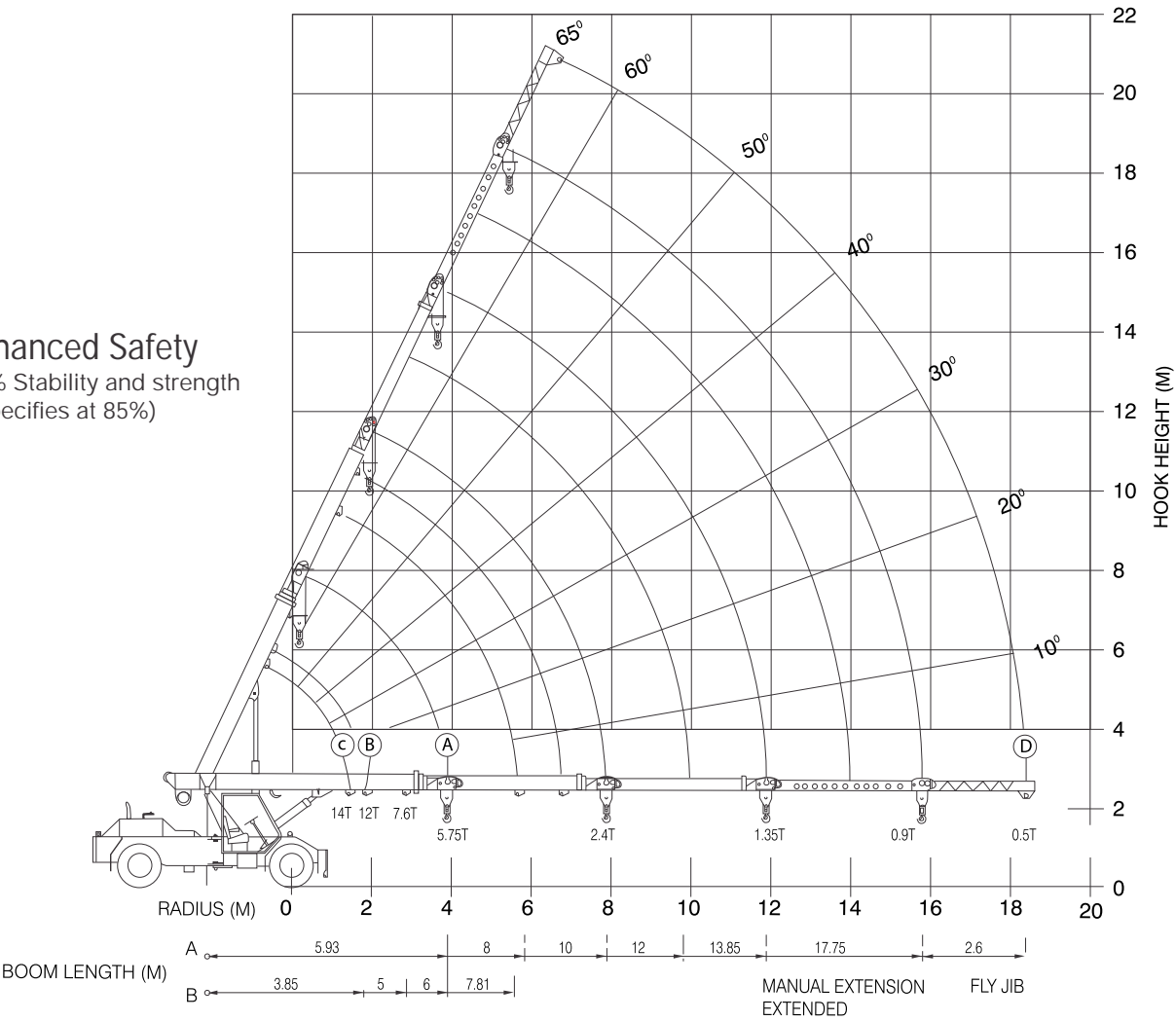
Standard Accessories

All weather cabin with unrestricted visibly

Optional Accessories

- 2.6 m fly jib
  - Spare wheel
  - Air conditioned cabin
  - Safe load Indicator with hydraulic Cutoff
  - RHINO Hook
- Man carrying basket (275 kg)
  - Additional cabin
  - 4x2 Wheel drive
  - Outriggers
  - Dragging Winch

13.33% Enhanced Safety  
SWL Based on 75% Stability and strength  
(IS 4573 specifies at 85%)



RADIUS (M)	(A)					
	BOOM LENGTH IN METRES- MANUAL EXTENSION RETRACTED					MANUAL EXTENSION EXTENDED
	5.93	8	10	12	13.85	17.75
2	7500	7500	7500			
3	7500	7500	6900	5200		
4	5750	5700	5070	4500	3970	
5		4400	4760	4000	3460	1680
6		3600	3525	3475	3100	1575
7			2900	2900	2750	1475
8			2400	2478	2400	1400
9				2130	2080	1300
10					1775	1250
11					1550	1180
12					1350	1135
13						1110
16						900
18						

RADIUS (M)	(B)			
	PIVOT TO INNER LUG 1ST JIB EXTN. MANUAL EXTN. MANUAL EXTN. RETRACTED			
	3.85	5	6	7.81
2	12000	11000	11000	10550
3		7000	7000	6700
4			4800	4750
5				3570
6				
7				

(C)	
14T LUG	
BOOM FULLY RETRACTED	
RADIUS (M)	S.W.L (KG)
1.5	14000

RADIUS (M)	(E)			
	BOOM PIVOT TO OUTER LUG 1ST JIB EXTN. MANUAL EXTN. RETRACTED			
	4.97	6.5	7.5	8.93
2	11000	10500	10000	7500
3	7600	7400	7300	6000
4		5000	4900	4800
5			3800	3700
6				3000
7				2300

RADIUS (M)	(D)	
	FLY JIB (BOOM FULLY EXTENDED)	
6.4	750	
8.0	750	
10.9	700	
13.5	650	
15.6	600	
17.1	550	
18.0	500	
18.4	500	

- Radius is the horizontal Distance Measured from the center of front wheel to the load point
- S.W.L are based on firm level ground with tyres 11x20 - 16 ply rating to 115 PSI. Weight of hooks, blocks, slings & chain etc. included
- Lift & Carry - the S.W.L Shall be carried with the minimum boom length & as close to the ground as possible at speed not in excess of 2 kmph.
- Boom head mounted RHINO hook capacity - 6000 kg

All Dimension are in mm and are variable with in + 5%

## Guidelines on Personal Protective Equipment (PPE)

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2	a) Excavation. b) Fire pump Operation. c) Testing of Pressure Gauge	<ul style="list-style-type: none"> <li>• Helmet (B)</li> <li>• Safety Shoe (A)</li> </ul>	12-13
3	Excavation involving dewatering works	<ul style="list-style-type: none"> <li>• Helmet (B)</li> <li>• Gumboot</li> <li>• Gloves ( Two alternatives)</li> <li>• Goggles</li> </ul>	14-18
4	Blast Cleaning	<ul style="list-style-type: none"> <li>• Helmet (B)</li> <li>• Safety Shoe(A)</li> <li>• Goggles</li> <li>• Ear Muff</li> <li>• Gloves ( Two Alternatives)</li> <li>• Apron ( Three Alternatives)</li> <li>• Half face mask</li> </ul>	19-26
5	Painting ( Confined space / external)	<ul style="list-style-type: none"> <li>• Helmet (A)</li> <li>• Safety Shoe</li> <li>• Gloves ( Two alternative)</li> <li>• Half face mask</li> <li>• Apron (Two Alternatives)</li> </ul>	27-30

## Guidelines on Personal Protective Equipment (PPE)

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7	a) Road work. b) Reinforcement c) Concreting	<ul style="list-style-type: none"> <li>• Helmet (B)</li> <li>• Gum Boot</li> <li>• Goggles</li> <li>• Gloves ( Two Alternatives)</li> </ul>	33-34
8	a) Grass Cutting b) Blinding & de-blinding work	<ul style="list-style-type: none"> <li>• Helmet (B)</li> <li>• Gum Boot</li> </ul>	35
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## Guidelines on Personal Protective Equipment (PPE)





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12	Tank Cleaning	<ul style="list-style-type: none"> <li>• Helmet (B)</li> <li>• Gum Boot</li> <li>• Apron ( Two Alternatives)</li> <li>• Gloves ( Two Alternatives)</li> </ul>	<b>45-47</b>
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14	DG Operation	<ul style="list-style-type: none"> <li>• Helmet (B)</li> <li>• Safety shoe (B)</li> <li>• Ear muff</li> <li>• Electrical glove</li> </ul>	<b>50</b>

- 1) **Additional PPE to be provided for various activities as per requirement of Job Safety Analysis (JSA), OISD and Statutory stipulations.**
- 2) Training inputs as required to be given for proper usage, maintenance of PPE.
- 3) Various EN Standards / BIS codes mentioned are available on line on IOCL CO, HSE website.




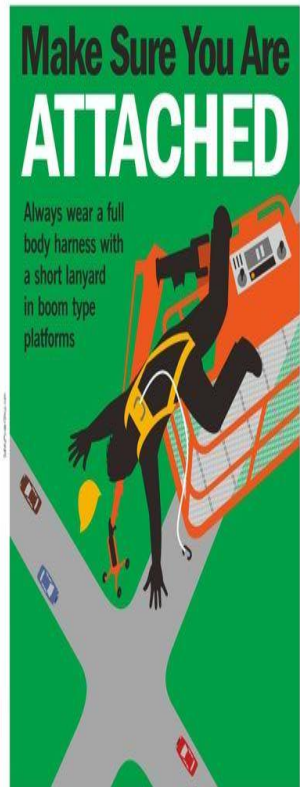
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*Issued in May 2017*

## Guidelines on Personal Protective Equipment (PPE)


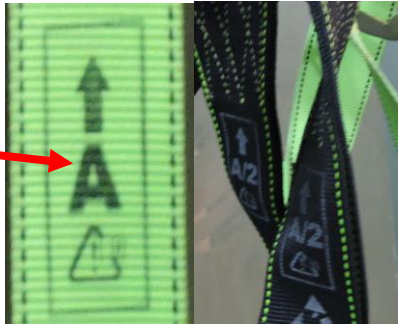
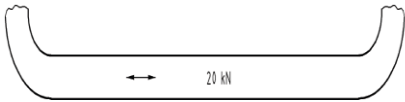

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
1	<b>Work at Height ( height &gt; 2 M) Contd...</b> 	<b>I) Safety Shoe (A)</b>   <p>A Typical specimen of marking.</p>	<p>The safety shoe shall have following marking as per IS 15298 ( part -2 ) :</p> <ol style="list-style-type: none"> <li>size;</li> <li>manufacturer's identification mark;</li> <li>Year of manufacture and at least quarter;</li> <li>License No ( CM/L)</li> <li>IS Mark</li> </ol> <p>Category of Safety Shoe</p> <p>Category of Safety shoe (S1,S2,S3 etc) as required as per Table 16 of IS 15298 (part 2) : 2011</p> <p>S1 : Closed seat region, Antistatic properties , Energy absorption of seat region</p> <p>S2 : S1 plus Water penetration and water absorption.</p> <p>S3 : S2 plus Penetration resistance (S3) Cleated outsole</p>	<ul style="list-style-type: none"> <li>Striking against stationary object.</li> <li>Striking by moving object</li> <li>Stepping on hot object</li> <li>Stepping on sharp object</li> <li>Penetration (S3 category)</li> <li>Water penetration and absorption. (S2 &amp; S3 category)</li> </ul>	<ul style="list-style-type: none"> <li>Not suitable for hazards like Chemical burns , electrical flash, welding spark and heat radiation</li> <li>Not suitable if it is necessary to minimise electrostatic charges in the shortest possible time .</li> <li>Not suitable for work in explosive work area.</li> </ul>		<ul style="list-style-type: none"> <li>Exceeding one year from the date of first use of the shoe .</li> <li>sign of crack / damage .</li> <li>Excessive wear</li> <li>As per Manufactures recommendations.</li> </ul>

## Guidelines on Personal Protective Equipment (PPE)




SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<p>Work at Height ( height &gt; 2 M) <b>Contd...</b></p> 	<p><b>II) Full body Safety Harness with energy absorber : ( Alternative -I)</b></p> <ul style="list-style-type: none"> <li>Lanyard along with 5 Point ( 1 Dorsal + 2 Textile loops+ 2 sternal D ring) harness to be used for rescue or tower climbing</li> </ul> <p><b>The ABC's of Fall Protection</b></p> 	<p>1. The full body harness shall conform to EN 361</p> <p>Marking on the full body harness shall conform to 2.2 of EN 365:1992 and any text shall be in English. In addition to conforming to 2.2 of EN 365:1992 the marking shall include the following.</p> <ul style="list-style-type: none"> <li>On the full body harness, a pictogram to indicate that users shall read the information supplied by the manufacturer.</li> </ul>  <ul style="list-style-type: none"> <li>A capital letter "A" at each fall arrest attachment element;</li> <li>The model/type identification mark of the full body harness;</li> <li>The number of this European Standard, i.e. EN 361.</li> </ul> <p>2. Connector shall conform to EN 362 and Marking on the connector shall conform to EN 365. The marking shall include:</p> <ul style="list-style-type: none"> <li>The model/type identification mark of the connector.</li> <li>EN number &amp; the letter of the class e.g. EN 362:2004/A</li> </ul>	<p>Accidental fall</p> <ul style="list-style-type: none"> <li>Direct the loads to legs.</li> <li>Keeping body upright.</li> <li>Prevent the neck damage</li> <li>slightly opens the breathing way.</li> <li>Prevents from colliding with the ground or structure in case of a fall.</li> <li>Antistatic characteristics</li> </ul>	<ul style="list-style-type: none"> <li>Shall be of no use if anchor point / life line / lanyard is not properly designed.</li> <li>There should be proper arrangement for rescue</li> <li>After accidental fall &amp; before safety harness becoming effective, the person should not strike ground / object. (Prevent risk of bottoming out)</li> </ul> <p><b>SAFETY BELT NOT TO BE USED</b></p>		<ul style="list-style-type: none"> <li>Sign of crack / damage/ stitching giving way</li> <li>Webbing and rope for cuts, tears, excessive wear and damages</li> <li>If in doubt "Throw it Out"</li> <li>As per Manufact ures recomme ndations</li> </ul>



## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<p>Work at Height ( height &gt; 2 M) <b>Contd...</b></p>	<p><b>A Typical specimen of marking.</b></p>  	<ul style="list-style-type: none"> <li>Marking of major axis strength with gate closed &amp; locked.</li> </ul>   <p>Please see required PPE of "Energy absorbing lanyard " for attaching to safety Harness. Energy absorbing lanyard double 'Y' Type</p> <p>To be attached to full body harness at one end and life line at other end</p> <ul style="list-style-type: none"> <li>Must if full body harness being used for protection against fall.</li> <li>The total length of a lanyard connected to an energy absorber (including terminations and connectors) shall not exceed 2 m.</li> </ul>				

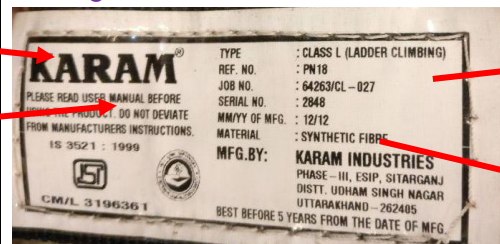
## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<p>Work at Height (height &gt; 2 M) - Contd...</p> 	<p>III) Full body Safety Harness with energy absorber (Alternative -II)</p> 	<p>Full body harness conforming to IS 3521 may be allowed in <b>"Green field project"</b> where antistatic safety harness are not required. Following marking to be ensured in case of IS marked full body Harness.</p> <ul style="list-style-type: none"> <li>The name, trade-mark or other means of identification of the manufacturer or the supplier who is responsible for acting on behalf of the manufacturer for claiming compliance with this standard;</li> <li>Manufacturer's product identification information that shall include the manufacturer's batch or serial number that enables the origin of the item to be traced;</li> <li>The year of manufacture; The identity of the fibre used as the material of construction;</li> <li>Information that states by appropriate means the intended purpose of each attachment element and to identify specifically those attachment elements that are designed to be used as part of a complete fall arrest system; and</li> <li>Warning for not to deviate from the manufacturer's instructions.</li> </ul>	<p>Accidental fall</p> <ul style="list-style-type: none"> <li>Direct the loads to legs.</li> <li>Keeping body upright.</li> <li>Prevent the neck damage</li> <li>slightly opens the breathing way.</li> <li>Prevents from colliding with the ground or structure in case of a fall.</li> </ul>	<ul style="list-style-type: none"> <li>Shall of no use if anchor point / life line / lanyard is not properly designed.</li> <li>There should be proper arrangement for rescue</li> <li>After accidental fall &amp; before safety harness becoming effective, the person should not strike ground / object. (Prevent risk of bottoming out)</li> <li><b>SAFETY BELT NOT TO BE USED</b></li> <li><b>ISI marked full body harness are not antistatic hence not recommended in running plants.</b></li> </ul>		<ul style="list-style-type: none"> <li>Sign of crack / damage/ stitching giving way</li> <li>Webbing and rope for cuts, tears, excessive wear and damages</li> <li>If in doubt "Throw it Out"</li> <li>As per Manufactures recommendations</li> </ul>

Name of Manufacture and other details

ISI Mark and number

A Typical specimen of marking

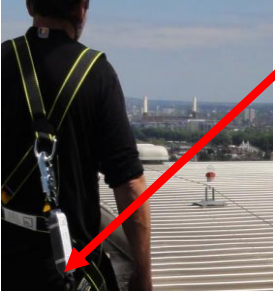
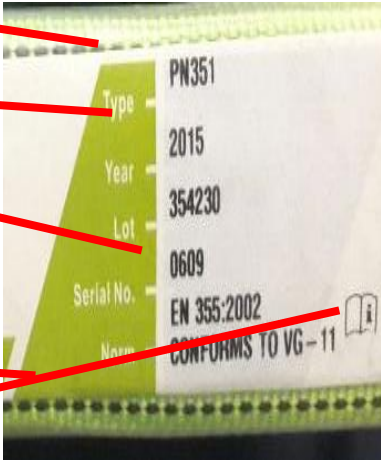




Other details such year of manufactures , batch number etc


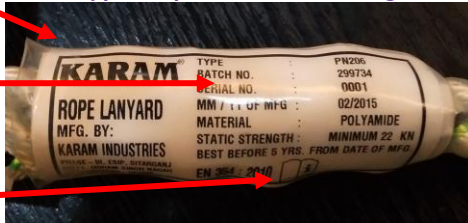


Material used



## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<p><b>Work at Height ( height &gt; 2 M) - Contd...</b></p>  <p>Model / Type and identification mark</p> <p>Year of manufacturing</p> <p>EN number</p> <p>Maximum length</p> <p>Pictogram</p>	<p><b>Energy absorbing lanyard double 'Y' Type</b></p> <p>To be attached to full body harness at one end and life line at other end</p> <ul style="list-style-type: none"> <li><b>Must if full body harness being used for protection against fall.</b></li> <li>The total length of a lanyard connected to an energy absorber (including terminations and connectors) shall not exceed 2 m.</li> </ul> <p><b>A Typical specimen of marking</b></p> 	<p>Energy absorbing lanyard shall conform to EN 355 and shall have the following marking :</p> <p>a) On the energy absorber, a pictogram to indicate that users shall read the information supplied by the manufacturer (see figure);</p>  <p>b) the maximum length allowed of the energy absorber including lanyard;</p> <p>c) the model/type identification mark of the energy absorber;</p> <p>d) the number of this European Standard, i.e. EN 355.</p> <p><b>The marking shall conform to EN 365 and additionally shall include the following :</b></p> <ol style="list-style-type: none"> <li>Means of identification, e.g. manufacturer's name, supplier's name, or trademark;</li> <li>Manufacturer's production batch or serial number or other means of traceability;</li> <li>Model and type/identification;</li> <li>Number and year of the document to which the equipment conforms;</li> <li>Pictogram or other method to indicate the necessity for users to read the instructions for use.</li> </ol>	Accidental Fall	<ul style="list-style-type: none"> <li>Shall of no use if anchor point / life line is not properly designed.</li> <li>There should be proper arrangement for rescue</li> <li>After accidental fall &amp; before safety harness becoming effective, the person should not strike ground / object. (Prevent risk of bottoming out)</li> </ul>		<ul style="list-style-type: none"> <li>Sign of cut / damage</li> <li>After every fall.</li> <li>As per manufacturer's recommendation.</li> </ul>

## Guidelines on Personal Protective Equipment (PPE)




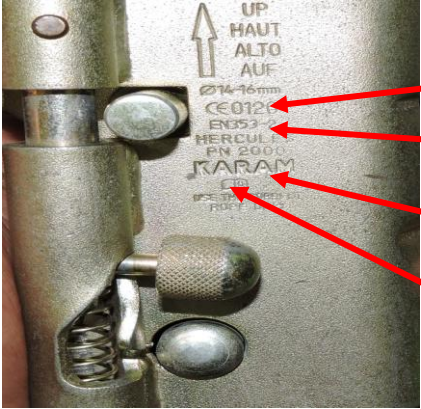

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection  Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<b>Work at Height ( height &gt; 2 M) - Contd...</b> 	<b>IV) Restraint lanyard</b> <ul style="list-style-type: none"> <li>To be secured to properly designed anchorage</li> <li>The restraint lanyards need not have shock absorption element incorporated in them</li> </ul>	<p>Lanyard shall conform to EN 354 (latest edition). Connector incorporated in lanyard shall conform to EN 362.</p> <p>Marking on the lanyard shall conform to EN 365 and, in addition, shall include at least the following:</p> <p>a) the maximum lanyard length, in accordance with 4.1.6; b) the month and year of manufacture.</p> <p>As per EN 365 marking shall include :</p> <ul style="list-style-type: none"> <li>Means of identification, e.g. manufacturer's name, supplier's name, or trademark;</li> <li>Manufacturer's production batch or serial number or other means of traceability;</li> <li>Model and type/identification;</li> <li>Number and year of the document to which the equipment conforms;</li> <li>Pictogram or other method to indicate the necessity for users to read the instructions for use.</li> </ul> <p><b>A Typical specimen of marking</b></p> 	<p>Accidental fall - Lets a worker travel just far enough to reach the edge but not far enough to fall over</p>	<ul style="list-style-type: none"> <li>Shall be of no use if life line &amp; anchor points are not properly designed.</li> <li>To ensure that fall restraint lanyards are never used for the purpose of fall arrest</li> </ul>		<p>Check metal fittings for sharp edges, excessive wear, correct operation and distortion.</p> <ul style="list-style-type: none"> <li>If in doubt "Throw it Out"</li> </ul>  <ul style="list-style-type: none"> <li>As per Manufactures recommendations</li> </ul>

Name of manufacture

Batch Number, serial Number, Material, Static strength, Pictogram





Pictogram

## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<p><b>Work at Height ( height &gt; 2 M) - Contd...</b></p> 	<p><b>(V) Rope Grab (in case of vertical lifeline being used)</b></p> <p>The rope grab immediately grabs on the line in the event of a fall, thereby arresting the fall</p>   <p>Pictogram</p>	<p>Rope grab shall conform to EN 353-2 : 2002 &amp; Marking on the guided type fall arrester and the flexible anchor line shall conform to EN 365 . In addition shall include the following:</p> <ul style="list-style-type: none"> <li>Means of identification, e.g. manufacturer's name, supplier's name, or trademark;</li> <li>Manufacturer's production batch or serial number or other means of traceability;</li> <li>Model and type/identification;</li> <li>Number and year of the document to which the equipment conforms;</li> <li>Pictogram or other method to indicate the necessity for users to read the instructions for use.</li> </ul> <p><b>A Typical specimen of marking</b></p> 	<ul style="list-style-type: none"> <li>Accidental fall</li> <li>The anchorage line in connection with the given rope grab provides necessary shock absorption.</li> </ul>	<p>Shall be of no use if life line &amp; anchor points are not properly designed.</p>		<ul style="list-style-type: none"> <li>Check metal fittings for sharp edges, excessive wear, correct operation and distortion.</li> <li>If in doubt "Throw it Out"</li> <li>Coloured tracer strand which loses its colour in due course of time to show that the rope is now unfit for future use</li> <li>As per Manufactures recommendations</li> </ul>


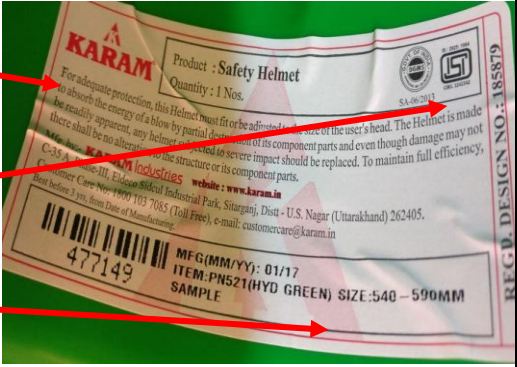

**Note : PPE mentioned at III, IV & V above may not be required simultaneously while working at height. These use shall depend upon type of activity**

## Guidelines on Personal Protective Equipment (PPE)


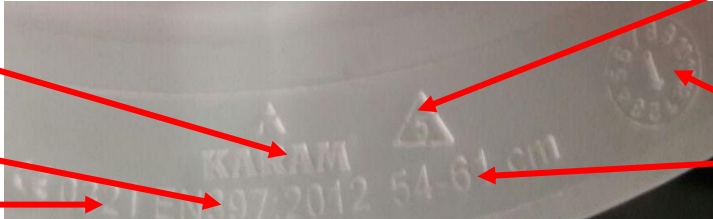


SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
1	<b>Work at Height</b> ( height > 2 M) 	<b>VI) Helmet (A)</b> 	The helmet shall conform to EN 12492 and shall have following markings :  a) the number of this European Standard; b) the name or trademark of the manufacturer and/or his authorized representative; c) the designation of the model; d) the year and quarter of manufacture; e) the size or size range (in cm).	<ul style="list-style-type: none"> <li>Shock absorption</li> <li>Penetration</li> <li>Impact</li> </ul> Within limits stipulated in EN 12492	<ul style="list-style-type: none"> <li>The protection given by a helmet depends on the circumstances of the accident and wearing a helmet cannot always prevent death or long term disability.</li> <li>There may be a foreseeable risk that helmets could become trapped and thereby cause a risk of strangulation.</li> <li>Cannot provide protection against hazard like splash of hot liquid, work in hot area, cryogenic or corrosive liquid , flying hot particles like chipping, welding, direct fire hazard, contact with bare live electrical conductor .</li> </ul>	 	<ul style="list-style-type: none"> <li>Sign of crack / damage .</li> <li>De-colouration</li> <li>failing in lab test to be done every 1-2 years depending on condition</li> <li>cradle to be changed after every one year</li> <li>On sustaining a severe blow even if damage is not apparent</li> <li>As per Manufactures recommendations.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p>For cleaning, maintenance or disinfection, use only substances ( No Solvent) that have no adverse effect on the helmet and are not known to be likely to have any adverse effect upon the wearer, when applied in accordance with the manufacturer's instructions and information).</p> </div>






## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
2	a) Excavation. b) Fire pump Operation. c) Testing of Pressure Gauge	<b>1) Helmet (B)</b> 	<p>The helmet shall conform to either IS 2925 or EN 397</p> <p>a) The helmet conforming to IS 2925 shall have following marking</p> <ul style="list-style-type: none"> <li>Manufacturer's name or trade-mark,</li> <li>Size of helmet.</li> <li>The helmets may also be marked with the ISI Certification</li> <li>Mark.</li> </ul> <p><b>A Typical specimen of marking</b></p> 	<ul style="list-style-type: none"> <li>Shock Absorption Resistance</li> <li>Penetration Resistance</li> <li>Impact</li> </ul> <p>Protection as per EN 397</p> <ul style="list-style-type: none"> <li>Shock absorption</li> <li>Penetration resistance</li> <li>Impact</li> </ul> <p>The above protection shall be within the limitations of various test as stipulated in IS 2925 /EN-397.</p> <p>Marking for Optional test as per EN 397 as per clause no 7.2.2.</p> <p>Each helmet shall carry moulded or impressed marking or shall carry a durable self-adhesive label stating the optional requirements complied with, as follows: Optional requirement Marking/Label</p> <ul style="list-style-type: none"> <li>Very low temperature - 20 °C or - 30 °C as appropriate</li> <li>Very high temperature + 150 °C</li> <li>Electrical insulation 440 V a.c.</li> <li>Lateral deformation LD</li> <li>Molten metal splash MM</li> </ul>	Not suitable for hazards like splash of hot liquid, work in hot area, cryogenic or corrosive liquid, flying hot particles like chipping, welding, direct fire hazard, contact with bare live electrical conductor	 <ul style="list-style-type: none"> <li>Sign of crack / damage .</li> <li>De-colouration</li> <li>cradle to be changed after every one year</li> <li>On sustaining a severe blow even if damage is not apparent</li> <li>As per Manufactures recommendati ons</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><i>For cleaning, maintenance or disinfection, use only substances ( No Solvent) that have no adverse effect on the helmet and are not known to be likely to have any adverse effect upon the wearer, when applied in accordance with the manufacturer's instructions and information).</i></p> </div>	







## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
2	<b>Contd</b>  a) Excavation.  b) Fire pump Operation.  c) Testing of Pressure Gauge		<p>b) In case helmet conforming to EN 397 to be used to facilitate various attachment for providing protection against hazards like splash of hot liquid, flying hot particles like chipping, welding, direct fire hazard the following moulded or impressed marking to be ensured.</p> <p>a) number of this European Standard ie 397            b) name or identification mark of the manufacturer;            c) year and quarter of manufacture;            d) type of helmet (manufacturer's designation). This shall be marked on both the shell and the harness;            e) size or size range (in centimetres). This shall be marked on both the shell and the harness.            f) abbreviation for the material of the shell shall be in accordance with EN ISO 472. (For example, ABS, PC, HDPE, etc.)</p> <p style="text-align: center;"><b>A Typical specimen of marking</b></p> 	Type of Helmet     Year of Manufacture   Size			
		<p>II) Safety shoe- (A)</p> 	<p>• Please refer (I) on page 4</p>				<p>Please refer (I) on page 4</p>

## Guidelines on Personal Protective Equipment (PPE)





SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
3	Excavation work Involving dewatering works : <b>Contd..</b> 	I) <b>Helmet</b> as per IS and EN (B) 	<ul style="list-style-type: none"> <li>Please refer (I) on page 12 &amp;13</li> </ul>				Please refer (I) on page 12 &13.

## Guidelines on Personal Protective Equipment (PPE)





SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
3	Excavation work Involving dewatering works : <b>Contd</b>  	<b>II) Gum Boot -Safety</b>   <b>A Typical specimen of marking</b>   <p>Month and year of manufacture →</p> <p>ISI Mark →</p> <p>Size →</p> <p>Name of Manufactures →</p>	<p>The gum shall conform to IS 12254 and have following marking :</p> <ul style="list-style-type: none"> <li>Name of the manufacturer or its recognised trade-mark, if any;</li> <li>Size No.;</li> <li>Batch No., and</li> <li>Month and year of manufacture.</li> </ul>	<ul style="list-style-type: none"> <li>Striking against stationary object.</li> <li>Striking by moving object</li> <li>Stepping on sharp object</li> <li>Water, alcohols, acids and alkalise</li> </ul>	<ul style="list-style-type: none"> <li>Not suitable for hazards like Chemical burns , electrical flash, welding spark and heat radiation</li> <li>Not suitable if it is necessary to minimise electrostatic charges in the shortest possible time .</li> <li>Not suitable for work in explosive work area.</li> </ul>		<ul style="list-style-type: none"> <li>exceeding one year from the date of first use of the shoe .</li> <li>sign of crack / damage / cut</li> <li>Excessive wear</li> <li>As per Manufactures recommendations</li> </ul>






## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Typical Industrial Operation	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<p>Excavation work Involving dewatering works : <b>Contd..</b></p> 	<p><b>III) Goggle :</b></p>  <p><b>A Typical specimen of marking</b></p>  <p>Scratch Resistance Manufacture Name</p> <p>CE Marking Optical Class</p>	<p>The goggles shall conform to EN 166 and EN 170 &amp; shall have following markings :</p> <ul style="list-style-type: none"> <li>Marking on the lens as Impact resistance (B) Optical Class (1) , anti fogging (N), Anti Scratch resistance (K), no 2-1.2 marked 2C</li> <li>shade as per EN 170, Manufacture's Name CE and any other point as per discretion of IOCL in line with EN 166 and 170</li> </ul>	<ul style="list-style-type: none"> <li>surround the eye area, give more protection in situations where one encounters splashing liquids, fumes, vapors, powders, dusts, and mists</li> </ul>	<p>Limitation : Uncomfortable to wear with other head gear like helmet, ear muffs or respirator</p>		<ul style="list-style-type: none"> <li>exceeding one year from the date of first use of the goggles .</li> <li>sign of crack / damage .</li> <li>Excessive wear</li> <li><b>As per Manufactures recommendations</b></li> </ul>








## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
3	<p>Excavation work Involving dewatering works : <b>Contd..</b></p>  <p>Name of Manufacture —→</p> <p>CE Marking —→</p> <p>Size —→</p> <p>EN Number and pictograms —→</p> <p>EN Pictogram —→</p>	<p><b>IV) Gloves</b></p> <p><b>Alternative - I :</b> Gloves as per EN stand 374 and 388.</p>  <p><b>A Typical specimen of marking</b></p> 	<p>Gloves shall conform to EN 374 and 388 &amp; gloves shall have the following markings as per as per EN 420</p> <p>a) Name, trade mark or other means of identification of manufacturer or his authorized representative;</p> <p>b) Glove designation (commercial name or code allowing the user to identify clearly the product within the manufacturer's/authorized representative's range);</p> <p>c) Size designation;</p> <p>d) Date of obsolescence a if applicable per clause 7.2.3</p> <p>e) Pictogram (s) appropriate to the standards accompanied by the reference of the applicable standards and performance levels which shall always be in the same fixed sequence as defined in the corresponding standard</p> <p>Cat -III Certificate to be ensured.</p>	<ul style="list-style-type: none"> <li>• Tear</li> <li>• cut</li> <li>• Abrasion</li> <li>• Puncture</li> </ul>	<p>Not suitable for hazards like electrical flash, welding spark and heat radiation</p>		<ul style="list-style-type: none"> <li>• sign of crack / damage / cut</li> <li>• Excessive wear</li> <li>• <b>IMPORTANT</b> All gloves must be thrown away (in the hazardous waste bin if required) no more than 8 hours after initial contact with the chemical.</li> <li>• Achieving date of obsolescence</li> <li>• <b>As per Manufactures recommendations</b></li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>WARNING</b> If you work with moving machine parts, choosing a glove that is the right size and made from a less durable material is vital, since the glove easily tears apart if you get caught in the machinery.</p> </div>




## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
3	Excavation work Involving dewatering works : <b>Contd..</b> 	<b>Alternative - II</b>  Gloves as per IS 6994. 	<b>Alternative -II</b>  Alternatively Gloves shall conform to IS : 6994 (Part I) - 1973 & shall have the following marking .  a) The manufacturer's name or recognized trade-mark;  b) The type and nominal size of the gloves;  C) Year of manufacture; and  d) Where applicable, the words 'light mass', 'medium mass', or 'heavy mass '  The gloves may also be marked with the Standard Mark.  <b>Light Abrasion ix of table 2</b>  Recommended type of Gloves. is 1, 2, 8, 14. 15. 16	<ul style="list-style-type: none"> <li>• Light handling operation</li> <li>• Tear</li> <li>• Puncture</li> <li>• Cut</li> </ul>	Not suitable for hazards like electrical flash, welding spark and heat radiation		<ul style="list-style-type: none"> <li>• sign of crack / damage / cut</li> <li>• Excessive wear</li> <li>• As per Manufactures recommendations</li> </ul> <p>IMPORTANT All gloves must be thrown away (in the hazardous waste bin if required) no more than 8 hours after initial contact with the chemical.</p> <div style="border: 2px solid black; padding: 10px; margin-top: 10px;"> <p><b>WARNING</b> If you work with moving machine parts, choosing a glove that is the right size and made from a less durable material is vital, since the glove easily tears apart if you get caught in the machinery.</p> </div>
<p style="color: red; text-align: center;">As of May 2017 there is no party having BIS license. Use of this product is permitted assuming that in future some party may get BIS license.</p>							

## Guidelines on Personal Protective Equipment (PPE)







SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Typical Industrial Operation	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
4	Blast cleaning - (confined space / external) 	I) <b>Helmet (A)</b> 	Please refer (VI) on page 11					Please refer (VI) on page 11
		II) <b>Safety Shoe</b> 	Please refer (I) on page 4					Please refer (I) on page 4
		III) <b>Goggle</b> 	Please refer (III) on page 16					Please refer (III) on page 16

## Guidelines on Personal Protective Equipment (PPE)






	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard																						
4	<div>Blast cleaning - (confined space / external) - Contd</div> <div><table><tr><th colspan="2">Permissible Noise exposure as per OSHA 29 CFR 1910.95</th></tr><tr><th>DB</th><th>Hours</th></tr><tr><td>90</td><td>8</td></tr><tr><td>92</td><td>6</td></tr><tr><td>95</td><td>4</td></tr><tr><td>97</td><td>3</td></tr><tr><td>100</td><td>2</td></tr><tr><td>102</td><td>1.5</td></tr><tr><td>105</td><td>1</td></tr><tr><td>110</td><td>0.30</td></tr><tr><td>115</td><td>0.15 or less</td></tr></table></div> <div><div>Name of manufacture</div><div>CE Marking</div><div>EN Number</div></div>	Permissible Noise exposure as per OSHA 29 CFR 1910.95		DB	Hours	90	8	92	6	95	4	97	3	100	2	102	1.5	105	1	110	0.30	115	0.15 or less	<div>IV) Ear Muff of suitable size</div> <div>"Medium size range "fit satisfactorily in majority of Industrial Application</div> <div></div> <div>A Typical specimen of marking</div>	<div>Ear muff shall conform to EN 352 shall have following marking :</div> <div>a) the name, trade mark or other identification of the manufacturer or his authorised representative; b) the model designation; c) the number of this EN Standard, i.e "EN 352" d) in the case of ear-muffs intended by the manufacturer to be worn in a particular orientation, an indication of the FRONT and/or TOP of the cups, and/or an indication of LEFT and RIGHT cup.</div> <div>Check the NRR (Noise Reduction Rating,) to ensure noise exposure within permissible limits</div> <div>Model No</div>	<div><div>• Extreme noise</div><div>• Noise induced hearing losses</div></div> <div>Note : In addition to hearing loss, excessive noise exposure may contribute to mental and physical stress, certain illnesses, and accidents</div>	<div><div>• Over 8 hours may be uncomfortable in hot environments</div><div>• Eyeglass wearers may not get a good seal Resonate (vibrate) at lower sound frequencies</div></div>	<div></div>	<div><div>• Ear muff with cracked, cut, or missing gaskets</div><div>• Excessive wear &amp; tear</div><div>• Damage if any.</div><div>• As per Manufactures recommendations</div></div>
Permissible Noise exposure as per OSHA 29 CFR 1910.95																													
DB	Hours																												
90	8																												
92	6																												
95	4																												
97	3																												
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102	1.5																												
105	1																												
110	0.30																												
115	0.15 or less																												






## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
4	<b>Blast cleaning - (confined space / external) Contd</b> 	<b>V) Gloves</b>  <b>Alternative -I</b>  Hand gloves - involving high pressure as per EN 388 and 374. 	• Please refer (IV) on page 17				Please refer (IV) on page 17.
	<b>Blast cleaning - (confined space / external) Contd</b> 	<b>Alternative -II -</b> Gloves as per IS 6994 	• Please refer (IV) on page 18  <b>Gross Abrasion sr no. VIII of table 2</b>  Recommended type of Gloves. is 2,8				Please refer (IV) on page 18.

## Guidelines on Personal Protective Equipment (PPE)




SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
4	<b>Blast cleaning - (confined space / external) - Contd</b> 	<b>VI) Apron</b>  <b>Alternative -I : Apron as per EN 13982 -1</b> 	<p><b>The apron shall conform to EN 13892-1 and shall have following markings :</b></p> <ol style="list-style-type: none"> <li>The marking shall be clearly visible and as durable as adequate for the life of the clothing.</li> <li> <ol style="list-style-type: none"> <li>name, trademark or other means of identification of the manufacturer;</li> <li>manufacturer's type number, identification number or model number;</li> <li>type of this chemical protective clothing, i.e. type 5;</li> <li>reference number and date of publication of this part of ISO 13982 (i.e. ISO 13982-1:2004);</li> <li>year of manufacture and, if appropriate, the expected shelf-life of the clothing (this information may be marked on every commercial packaging unit instead of being marked on every item of clothing);</li> <li>size designation as defined in EN 340:2003, Clause 6;</li> <li>pictogram showing that the suit is for protection against chemicals [ISO 7000-2414; see Figure 1 a)] and pictogram to show that the manufacturer's instructions should be read [ISO 7000-1641; see Figure 1 b)];</li> </ol> </li> </ol> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">   a) </div> <div style="text-align: center;">   b) </div> </div>	Protection to the full body against airborne solid particulates.	<ul style="list-style-type: none"> <li>Not suitable for flame and Hot material</li> </ul>	Damage / infection to skin etc 	<ul style="list-style-type: none"> <li>exceeding six month from the date of first use of the apron .</li> <li>sign of crack / damage .</li> <li>Excessive wear</li> <li><b>As per Manufactureres recommendations</b></li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li>Do not use compressed air to clean as this will create dust in the air.</li> <li>Clean and decontaminate tarps and other equipment on the worksite.</li> </ul> </div>

## Guidelines on Personal Protective Equipment (PPE)



SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitati on of PPE	Hazard of Not wearing of PPE	When to be discard
4	<b>Blast cleaning - (confined space / external) : Contd</b>	<p><b>A Typical specimen of marking</b></p>  <p>Name of Manufacture</p> <p>Size</p> <p>CE marking</p> <p>Other information</p> <p>Pictograms as per EN</p> <p>Year of manufactures</p>	<p>2.</p>  <p>Type 5 – Protection against airborne solid particulate chemicals (Norm: EN ISO 13982-1)</p> <p>3. Apron / instructions shall have following pictogram indicating the intended purpose . ( Table E-2 of EN 340)</p>  <p>Protective clothing (equipment) for abrasive blasting operation</p> <p>ISO 7000-2482</p>				







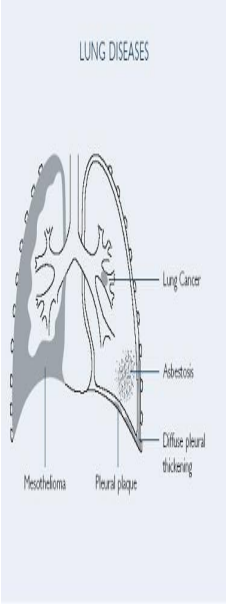
## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<b>Blast cleaning - (confined space / external) Contd</b> 	<b>Alternative -II : Apron as per IS 4501</b> 	<b>Alternative -II :</b> Alternatively suit shall conform to IS : 4501 : 1981 shall have the following marking .  The marking shall be clearly visible and as durable as adequate for the life of the clothing. <ul style="list-style-type: none"> <li>marked inside with manufacturer's name or recognized trade mark, if any. The ink shall be non-irritating to skin and shall not impair the quality of aprons.</li> <li>The aprons may also be marked with the ISI Certification Mark.</li> <li>The finished material shall be white or of a suitable colour on two sides as agreed to between the purchaser and the supplier.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <b>As of May 2017 there is no party having BIS license. Use of this product is permitted assuming that in future some party may get BIS license.</b> </div>	Protection to the full body against airborne solid particulates.	<ul style="list-style-type: none"> <li>Not suitable for flame and Hot material</li> </ul>	Damage / infection to skin etc 	<ul style="list-style-type: none"> <li>exceeding six month from the date of first use of the apron .</li> <li>sign of crack / damage .</li> <li>Excessive wear</li> <li><b>As per Manufactureres recommendations</b></li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li>Do not use compressed air to clean as this will create dust in the air.</li> </ul> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li>Clean and decontaminate tarps and other equipment on the worksite.</li> </ul> </div>










## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Blast cleaning - (confined space / external) Contd	<b>Alternative -III : Boiler suit / coverall</b> 	Alternative -III : Cloth and stitching should be of good quality on visual inspection	Protection to the full body against airborne solid particulates.	<ul style="list-style-type: none"> <li>Not suitable for flame and Hot material</li> </ul>	Damage / infection to skin etc 	<ul style="list-style-type: none"> <li>exceeding six month from the date of first use of the apron .</li> <li>sign of crack / damage .</li> <li>Excessive wear</li> <li>As per <b>Manufactures recommendations</b></li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li>Do not use compressed air to clean as this will create dust in the air.</li> </ul> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li>Avoid blasting in windy conditions to prevent the spread of any hazardous materials.</li> </ul> </div>






## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	<b>Blast cleaning - confined space - Contd</b>  <p>Name of Manufactures</p> <p>EN Number</p> <p>CE Marking</p>	<b>VII) Half face mask</b> <b>A Typical specimen of marking</b>  	<p>1. The half air mask shall conform to EN 140 and shall have following :</p> <ol style="list-style-type: none"> <li>The manufacturer shall be identified by name, trade mark or other means of identification.</li> <li>All units of the same model shall be provided with a type-identifying marking.</li> <li>Size (if more than one size is available).</li> <li>The number and the year of this European Standard. ie EN 140</li> <li>Where the reliable performance of components may be affected by ageing, means of identifying the date (at least the year) of manufacture shall be given</li> </ol> <p>Parts which are designed to be replaced by the authorized user and sub-assemblies with considerable bearing on safety shall be readily identifiable.</p> <p>For parts which cannot reasonably be marked e.g. straps of head harness, the relevant information shall be included in the information supplied by the manufacturer.</p> <p>The end of shelf life may be indicated on packing eg e.g. by the following pictogram.</p> <div style="text-align: center;"> <p><u>Code for dates</u></p> <p>xx/xx</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">               Month           </div> <div style="text-align: center;">             Year           </div> </div> </div>	<p>Respiratory protection.</p> <p>Protection against inhaling dust, etc.</p>	<p>Not suitable for heavy gas concentration</p>	<p>Silicosis Occupational lung diseases.</p> <p>Deposition of particulate matter in Lung.</p> 	<ul style="list-style-type: none"> <li>Sign of crack / damage</li> <li>Excessive wear</li> <li>Damage of strap</li> <li>After end of shelf life</li> <li>Change of filter / cartridges at least every six month</li> <li>Performance of the components may be affected by aging</li> <li><b>As per Manufactures recommendations</b></li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Cleaning</b> Always clean the half-mask after use. First remove the filter and remove dust with compressed air. Use a cloth to remove any stubborn deposits. If necessary, dismantle the parts and rinse in warm water with a small quantity of mild detergent. Never use solvents. The inhale and exhale valves should be removed and cleaned thoroughly .</p> </div>

## Guidelines on Personal Protective Equipment (PPE)






SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
5	Painting - confined space / external 	I) Helmet (A) 	• Please refer (VI) on page 11				Please refer (VI) on page 11
		II) Safety Shoe 	• Please refer (I) on page 4				Please refer (I) on page 4
		III) Goggles 	• Please refer (III) on page 16				Please refer (III) on page 16

## Guidelines on Personal Protective Equipment (PPE)



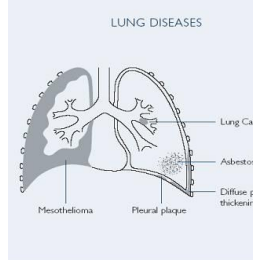
SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
5	Painting -(confined space / external ) : <b>Contd</b> 	<b>VI) Gloves</b>  <b>Alternative -I</b>  Hand gloves - involving high pressure as per EN 388 and 374 		• Please refer (IV) on page 17			Please refer (IV) on page 17
		<b>Alternative -II -</b> Gloves as per IS 6994 		• Please refer (IV) on page 18  Spraying paints or cellulose lacquers sr no. XIV of table 2 :  Recommended type of Gloves. is 1,8			Please refer (IV) on page 18




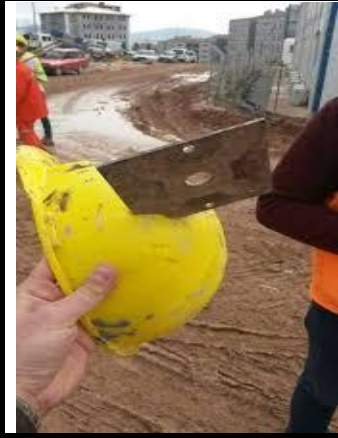


## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Painting -(confined space / external ) : <b>Contd</b> 	<b>V) Apron :Alternative -I Apron as per EN 13982</b> 	<ul style="list-style-type: none"> <li>Please refer (VI) on page 22 and 23</li> </ul>				Please refer (VI) on page 22 and 23
		<b>Alternative -II Apron as per IS 4501</b> 					Please refer (VI) on page 24

## Guidelines on Personal Protective Equipment (PPE)





SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Painting -(confined space / external 	VI ) Half face mask 	• Please refer (VII) on page 26				Please refer (VII) on page 26

## Guidelines on Personal Protective Equipment (PPE)






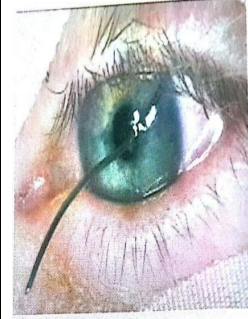
	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
6	a) Working in Confined space b) Testing of Gas sensor c) Tank Gauging d) De Gassing of LPG Cylinder e) Shuttering works	<b>I) Safety Helmet (B)</b> 		• Please refer (I) on page 12 &13			Please refer (I) on page 12 &13
	f) Brick masonry g) Handling of Battery	<b>II) Safety Shoe (A)</b> 		• Please refer (I) on page 4			Please refer (I) on page 4






## Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
6	<b>Contd..</b>  a) Working in Confined space  b) Testing of Gas sensor  c) Tank Gauging  d) De Gassing of LPG Cylinder  e) Shuttering works  f) Brick masonry  g) Handling of Battery	<b>III) Gloves</b>  <b>Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374</b>  		Please refer (IV) on page 17			Please refer (IV) on page 17
		<b>Alternative -II Gloves as per IS 6994</b>  		Please refer (IV) on page 18  <b>Light Abrasion ix of table 2</b>  Recommended type of Gloves. is 1, 2, 8, 14. 15. 16			Please refer (IV) on page 18





## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
7	a) Road work b) Reinforcement c) Concreting	I) Helmet (B) 		• Please refer (I) on page 12 &13			Please refer (I) on page 12 &13
		II) Gum Boot 					Please refer (II) on page 15
		III) Goggles 					Please refer (III) on page 16






## Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
7	<b>Contd..</b> a) Road work b) Reinforcement c) Concreting	<b>VI) Gloves</b>  <b>Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374</b>  	Please refer (IV) on page 17				
		<b>Alternative II as per IS 6994</b>  	Please refer (IV) on page 18				
			Light Abrasion ix of table 2  Recommended type of Gloves. is 1, 2, 8, 14. 15. 16				



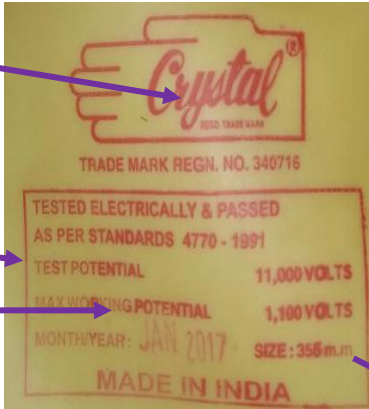

## Guidelines on Personal Protective Equipment (PPE)

N	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
8	a) Grass Cutting  b) Blinding and de-blinding flange work	<b>I) Gum Boot</b> 	• Please refer (II) on page 15				Please refer (II) on page 15
		<b>II) Helment (B)</b> 	• Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13

## Guidelines on Personal Protective Equipment (PPE)




SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
9	Electrical works  Electrical sub-station current carrying equipment 	<b>II) Safety Shoe (B)</b>   	<p>The safety shoe shall have following marking as per IS 15298 ( part -2) :</p> <ul style="list-style-type: none"> <li>a) size;</li> <li>b) manufacturer's identification mark;</li> <li>c) Year of manufacture and at least quarter;</li> <li>d) License No ( CM/L)</li> <li>e) IS Mark</li> </ul> <p>Category of Safety shoe (,S3 etc) as required as per Table 16 of IS 15298 (part 2) : 2011</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><i>The sole shall be regulated to high voltage test upto 15 KV voltage applied across the sole for 1 min. Necessary test certificate for this test from FDI/NABL accredited party to be furnished .</i></p> </div>	<ul style="list-style-type: none"> <li>• Striking against stationary object.</li> <li>• Striking by moving object</li> <li>• Electrical resistance</li> </ul>	<ul style="list-style-type: none"> <li>• Not suitable for work in explosive work area.</li> <li>Or</li> <li>• Work activities requiring antistatic work</li> </ul>		<ul style="list-style-type: none"> <li>• Exceeding one year from the date of first use of the shoe .</li> <li>• Sign of crack / damage</li> <li>• Excessive wear</li> <li>• As per Manufactureres recommendations</li> </ul>

## Guidelines on Personal Protective Equipment (PPE)








SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
9	<b>Electrical works : Electrical sub-station current carrying equipment Contd</b> 	<b>II) Electrical Hand gloves Insulating Rubber Electrical Gloves</b> 	<p>The gloves shall be marked indelibly at the back with the following information as per IS 4770</p> <ul style="list-style-type: none"> <li>Size and type of glove;</li> <li>Maximum working potential in <b>Volts</b>,</li> <li>followed by the word 'working' in brackets;</li> <li>Identification of the source of manufacture; and</li> <li>Month and year of manufacture</li> </ul> <p>moisture absorption certificate to be checked.</p> <p style="text-align: center;"><b>A Typical specimen of marking</b></p>  <p>Type -1 Gloves not to used</p>	<p><b>Type 2</b>—For use at voltage not exceeding 1 100 ac rms</p> <p><b>Type 3</b>—For use at voltage not exceeding 7 500 ac rms</p> <p><b>Type 4</b>—For use at voltage not exceeding 17 000 ac rms.</p>	<p>1) Type of the PPE restricts the maximum voltage at which it can be used</p> <p>2) Other precautions to be taken while working on electrical installation</p>		<ul style="list-style-type: none"> <li>Frequently used Gloves to be re-tested at intervals of not more than 6 months.</li> <li>Gloves issued for occasional use shall be re-tested after use or in any case at intervals of not more than 12 months.</li> <li>Gloves Showing any defects</li> <li>As per Manufactures recommendations</li> </ul>



## Guidelines on Personal Protective Equipment (PPE)





SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
9	<p>Electrical works : Electrical sub- station current carrying equipment Contd</p> 	<p>Helmet as per EN 397</p> 	<ul style="list-style-type: none"> <li>Please refer (I) on page 12 &amp; 13</li> </ul>				<p>Please refer (I) on page 12 and 13</p>

## Guidelines on Personal Protective Equipment (PPE)




SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
10	<p>Working with possibility of splashes of hot, cryogenic or corrosive liquids</p> 	<p>I) Helmet (B) as per EN 397</p> 	<ul style="list-style-type: none"> <li>Please refer (I) on page 12 and 13</li> </ul>				<p>Please refer (I) on page 12 and 13</p>
		<p>II) Safety Shoe</p> 	<ul style="list-style-type: none"> <li>Please refer (I) on page 4</li> </ul>				<p>Please refer (I) on page 4</p>
		<p>III) Goggles</p> 	<ul style="list-style-type: none"> <li>Please refer (III) on page 16</li> </ul>				<p>Please refer (III) on page 16</p>








## Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
10	Working with possibility of splashes of hot, cryogenic or corrosive liquids. <b>Contd</b>  	<b>IV) Gloves</b>  <b>Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374</b>  	• Please refer (IV) on page 17				Please refer (IV) on page 17
		<b>Alternative - II</b>  Gloves as per IS 6994.  					• Please refer (IV) on page 18  Light Abrasion ix of table 2  Recommended type of Gloves. is 1, 2, 8, 14. 15. 16






## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Working with possibility of splashes of hot, cryogenic or corrosive liquids Contd	V) Apron  Alternative -I Apron as per EN 13982  	Please refer (VI) on page 22 &23				Please refer (VI) on page 22 &23
		Alternative -II Apron as per IS 4501  	Please refer (VI) on page 24				Please refer (VI) on page 24






## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
11	<p>Welding and cutting work</p> 	<p>I) <b>Helmet attachable welding shield (A)</b></p>  <p>II) <b>Welding Helmet with welding Shield (B)</b></p>  <p>Name of Manufacture CE Mark and EN Mark</p> <p><b>Name of Manufacture EN166 FT</b></p>	<p>a) Helmet mountable welding shield.</p> <ul style="list-style-type: none"> <li>Conforms to EN 175</li> <li>Protective lens made of clear high impact resistant. polycarbonate conforming to EN 166 and ANSI Z 87.1</li> <li>polypropylene Impact Resistance Shell conform to EN 175 F</li> <li>The welding shield shall be CE marked</li> <li>Marking on protective shall be fully visible</li> <li>Ocular marking shall be as per clause 9.2 of EN 166</li> </ul> <p>b) Welding Helmet with welding Shield</p> <ul style="list-style-type: none"> <li>Protective lens made of clear high impact resistant. polycarbonate conforming to EN 166 and ANSI Z 87.1</li> <li>polypropylene Impact Resistance Shell conform to EN 175 F</li> <li>Marking on protective shall be fully visible</li> <li>Ocular marking shall be as per clause 9.2 of EN 166</li> </ul> 	<p>Protection during welding.</p> <p>Liftable welding lens allows clear view while restricting harmful dust particles.</p>	<p>To be used only in conjunction with safety helmet &amp; should not be used independently.</p> <p>However welding helmets can be used independently.</p>		<ul style="list-style-type: none"> <li>Exceeding one year from the date of first use of the goggles .</li> <li>sign of crack / damage on lenses</li> <li>Excessive wear</li> <li>As per Manufact ures recomme ndations</li> </ul>

## Guidelines on Personal Protective Equipment (PPE)






	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
11	Welding and cutting work : <b>Contd</b> 	II) <b>Safety Shoe</b> 	Please refer (I) on page 4				Please refer (I) on page 4
		Helmet as per EN 397 ( in case Helmet attachable welding shield being used) 	• Please refer (I) on page 12 & 13				Please refer (I) on page 12 and 13

## Guidelines on Personal Protective Equipment (PPE)




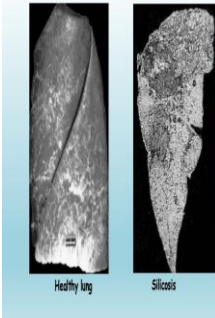
SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
11	<b>Welding and cutting work Contd.</b> 	<b>III) Apron</b>  <p>A Typical specimen of marking</p> <p>15 EN ISO 11611:2015</p>  <p>F1 class 1 A1 + A2</p> 	<ul style="list-style-type: none"> <li>Apron shall conform to EN ISO 11611 &amp; shall have the following markings :</li> <li>classification: :</li> <li>Class 1: the number and year of this International Standard (ISO 11611) followed by the graphical symbol shown in below and the indication “Class 1” and the indication “A1” or “A1 + A2” as appropriate for Limited Flame Spread;</li> <li>Class 2: the number and year of this International Standard (ISO 11611) followed by the graphical symbol shown in Figure 1 and the indication “Class 2” and the indication “A1” or “A1 + A2” as appropriate; garments conforming to Class 2 shall meet Class 2 for all performance requirements;</li> <li>instructions for cleaning shall be marked (e.g. on a label).</li> </ul>	<ul style="list-style-type: none"> <li>minimize skin burns caused by sparks, spatter, or radiation</li> </ul>	<ul style="list-style-type: none"> <li>Additional electrical insulation layers will be required where there is an increased risk of electric shock; garments meeting the requirements of clause 6.10 of EN ISO 11611 (6.10) are designed to provide protection against short term, accidental contact with live electric conductors at voltages up to approximately 100 V d.c.</li> <li>any identified hazards against which the clothing is intended to protect (e.g. flames, molten metal spatter, radiant heat, and short term accidental electrical contact); for protective clothing, a warning that additional partial body protection may be required, e.g. for welding overhead;</li> </ul>		<ul style="list-style-type: none"> <li>On contaminated with flammable material.</li> <li>Manufacturers shall include the information that welder's protective clothing be cleaned regularly in accordance with the manufacturer's recommendations. After cleaning, the clothing shall be visually inspected for any sign of damage.</li> <li>Similarly, users should be advised that if they experience sunburn-like symptoms, UVB is penetrating.</li> <li>In either case, the garment should be repaired (if practicable) or replaced and consideration given to the use of additional, more resistant, protective layers in future.</li> <li>As per Manufactures recommendations</li> </ul>







## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
12	Tank cleaning 	I) <b>Helmet (B)</b> 	Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13
		II) <b>Gum Boot</b> 	Please refer (II) on page 15				Please refer (II) on page 15

## Guidelines on Personal Protective Equipment (PPE)


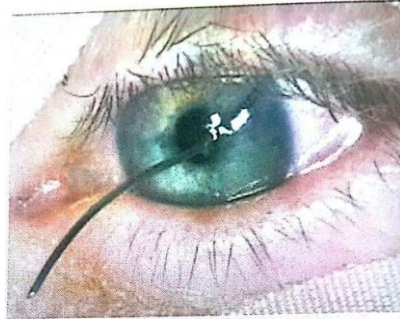
SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
12	<b>Tank cleaning Contd.</b> 	<b>III) Apron</b> <b>Alternative -I Apron as per EN 13982</b>  <b>Alternative -II Apron as per IS 4501</b> 		<ul style="list-style-type: none"> <li>Please refer (VI) on page 22-23 &amp; 24</li> </ul>			Please refer (VI) on page 22-23 & 24

## Guidelines on Personal Protective Equipment (PPE)





SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
12	<b>Tank cleaning : Contd</b> 	<b>IV) Gloves</b>  <b>Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374</b>  	<ul style="list-style-type: none"> <li>Please refer (IV) on page 17</li> </ul>				Please refer (IV) on page 17
		<b>Alternative - II</b>  <b>Gloves as per IS 6994.</b>  	<ul style="list-style-type: none"> <li>Please refer (IV) on page 18</li> </ul> <p>Light Abrasion ix of table 2</p> <p>Recommended type of Gloves. is 1, 2, 8, 14. 15. 16</p>				Please refer (IV) on page 18












## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
13		I) Helmet (B) 	. Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13
		II) Safety Shoe 	. Please refer (I) on page 4				Please refer (I) on page 4
		III) Goggles 	. Please refer (III) on page 16				Please refer (III) on page 16

## Guidelines on Personal Protective Equipment (PPE)

SN	Activity  (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
13	Product pump house operation Contd  	IV) Gloves :Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374  	• Please refer (IV) on page 17				Please refer (IV) on page 17 & 18
		Alternative - II  Gloves as per IS 6994.  					

## Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
14		<b>I) Helmet (B)</b> 	<ul style="list-style-type: none"> <li>Please refer (I) on page 12 &amp;13</li> </ul>				Please refer (I) on page 12 &13
		<b>II) Safety Shoe (B)</b> 	<ul style="list-style-type: none"> <li>Please refer (II) on page 36</li> </ul>				Please refer (II) on page 36
		<b>III ) Ear Muff</b> 	<ul style="list-style-type: none"> <li>Please refer (IV) on page 20</li> </ul>				Please refer (IV) on page 20
		<b>IV) Electrical Gloves</b> 	<ul style="list-style-type: none"> <li>Please refer (II) on page 37</li> </ul>				Please refer (IV) on page 37

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# Guidelines for prevention and risk management of COVID19 at Project Construction Sites

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## DECLARATION

These guidelines are to prevent and to manage risks of COVID-19 while restarting the activities at construction project sites of tkIS India.



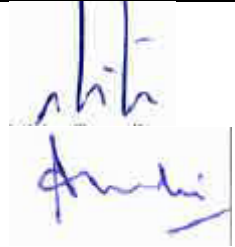
It serves as information to our Customers and Business Associates and provides tkIS India employees with guidelines to prepare site specific SOP.

These guidelines may be made available to our customers and Business Associates on request. However, it may be noted that these guidelines are internal document of tkIS India.

These guidelines shall neither be construed as basis for any contractual or legal obligations of tkIS India nor it shall accrue any right in favour of any person who receives it. Obligations of tkIS India shall arise solely from Contracts entered into with Customers / Business Associates.

The guidelines are subject to revision.

**Issued: April 2020**

	NAME		Sign
Prepared by	Indranil Chakraborty	HoF-OSH & E	
Checked by	Rajnish Bhandari	HoF- CSSM	
Approved by	Nitin V Pandit / Arun Kumar Ladia	HoG - QM&E & OSH / HoG – CM	

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## 1. PURPOSE

To provide guidelines to sites for preparation of Site Specific SOPs for preventing and managing the risk of spreading COVID-19 after restart of activities at sites.

## 2. Scope

These guidelines are applicable for preventing and managing risks due to COVID-19 and its spread out across all construction sites of tkIS India while restarting activities post lock down.

These guidelines are intended to supplement, not to replace requirements stated by central, state government, local authorities and customer. This document sets out the minimum requirements to be followed across the projects, however, sites can exercise additional stringent measures and frame their SOP depending on the site conditions and authority / customer requirements.

These requirements shall be applicable to Project sites, irrespective of activity being carried out by tkIS – India and any other stakeholder.

## 3. Roles & Responsibilities

Site Manager (SM) / RCM (tkIS India & Contractor)	<ul style="list-style-type: none"> <li>i) Responsible to develop site specific SOP on the basis of these guidelines and ensure effective implementation of the procedure.</li> <li>ii) Promote self-hygiene and respiratory hygiene</li> <li>(iii) Ensuring Pre start up inspection</li> <li>(iv) Reviewing the situation periodically</li> </ul>
tkIS India Construction Engineer / Admin	<ul style="list-style-type: none"> <li>i) Responsible to monitor performance of contractor for implementation of the Site Specific SOP, under their respective field of work, with active involvement, and initiating corrective actions whenever required.</li> <li>ii) Promote self-hygiene and respiratory hygiene.</li> <li>iii) Participating Pre start up inspection.</li> <li>iv) Reviewing the situation periodically</li> </ul>



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tkIS India HSE Personnel	<ul style="list-style-type: none"> <li>(i) Responsible to assist SM in developing site specific SOP on the basis of these guidelines and facilitate effective implementation of this procedure.</li> <li>(ii) To ensure identification of potential emergency situations for the site.</li> <li>(iii) To prepare Site specific pandemic and emergency preparedness &amp; response plan for the identified emergency situations.</li> <li>(iv) To ensure availability of necessary PPEs and safety gadgets.</li> <li>(v) Promote self-hygiene and respiratory hygiene</li> <li>(vi) Pre start up inspection</li> <li>(vii) Reviewing the situation periodically</li> <li>(viii) Displaying related posters</li> </ul>
Contractor Engineers/ Supervisors/ HSE Personnel / Admin	<ul style="list-style-type: none"> <li>(i) Overall responsible for the implementation of the procedure.</li> <li>(ii) Ensure that personnel under their supervision understand and adhere to this procedure.</li> <li>(iii) Ensure that necessary records required by the procedure are maintained and submitted to tkIS India.</li> </ul>
All personnel working at the construction site	<ul style="list-style-type: none"> <li>(i) Personnel carrying out work relevant to the procedure must be aware of the situations, requirements of this procedure and adhere to the requirements of the procedure.</li> <li>(ii) Strict adherence to the procedure</li> </ul>

#### 4. Transportation

##### **Following guidelines to be implemented before / while using site transportation:**

- Self-declaration from the driver (Declaration form as per the annexure)
- Screening of drivers (visually)
- Wearing of mask to cover nose and mouth.
- Seating arrangement by maintaining social distancing

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- As per MHA's consolidated guidelines dated 15.04.2020. transportation vehicles should be allowed only with 30 to 40% passenger capacity.
- Cleaning / Sanitization of vehicles on daily basis and checklist to be maintained/recorded
- Employees coming in their own car should ensure that no more than 2 persons are travelling in the vehicle, one at driver's seat and one at the back seating diagonally.
- In case of travel by two-wheelers only one employee should travel.
- For workers coming from outside, special transportation facility should be arranged without any dependency on the public transport system. These vehicles should be allowed to work only with 30-40% passenger capacity.
- Personnel staying in containment zone (areas declared hot spot by authorities) will not be allowed to travel.
- Personnel who have been directed by authorities to remain under home/ institutional quarantine will also not be allowed to travel.

## 5. Access Control System at Project Sites

- Personnell (above 60 years and as per MHA guidelines), with co morbidity such as Bronchitis/ Emphysema/ Asthma/ chronic respiratory ailment/ chronic immuno-suppressed conditions (those being treated for Cancer, COPD, chronic renal failure etc.), as well as pregnant women shall be suggested to work from home.
- Personnel staying in containment zone (areas declared hot spot by authorities) are not allowed to resume their duties.
- All Personnel who have been directed by health authorities to remain under strict home/ institutional quarantine for a period as decided by local Health authorities.
- Site Specific "Self-Declaration Form" shall be obtained from all personnel one day prior to restart the work
- Personnel should be encouraged to download "Aarogya Setu" App.
- Pre-approval to be obtained from Project Head/Unit Head for deployment of new workmen in line with MHA guidelines. Also, "Self-declaration Form" shall be obtained from such workmen prior to screening to determine the COVID-19 risk level
- Separate rooms to be allocated for the new workmen in the workmen habitat preferably those are coming from the same location shall be accommodated together.
- Number of new workmen to be restricted in the rooms considering social distancing norms
- Ensure regular visit by medical practitioner at workmen habitat.
- Contactless thermal scanning to be done for all personnel at entry gate

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- Employees detected with exceeding threshold value/ fever shall not to be allowed inside the projects/factories
- Contactless attendance system to be implemented.
- Hand washing / Sanitization facility shall be available
- Wearing of standard mask(covering face and mouth) as per MHA guidelines is mandatory
- Maintain social distancing (Minimum 1.8 meter or 6 feet)
- If required marking to be done for standing of the people.
- No person having unknown history/ symptoms of corona virus should be allowed inside.
- Parcel/ courier from outside plant to be stopped at entry gate.
- Employees shall be permitted inside the gate only if they are wearing face mask. If not available, face mask shall be given to them.
- Multiple entry and exit points to project site/refinery shall be identified to avoid crowding.
- No workmen shall be allowed to enter the project area whoever is coming from their residence (other than workmen camp) for initial few days.
- Employees with COVID symptoms such as fever and cough shall be taken to quarantine room and later to Govt. hospitals

## 6. Visitors:

Visitors will not be allowed till further notifications. However, for the purpose of business contingency visitors in special cases may be permitted under following terms and conditions:

- Encourage digital meetings with vendors/customers/suppliers etc.
- For the, visitors may be allowed by following the below mentioned precautions,
- Pre-approval to be obtained from the Unit Head for any Visitor
- Self-Declaration Form” by mail confirmations shall be obtained from visitors prior to their visit to project
- Visitors who were advised for home quarantine/under treatment/visited hotspots during the lockdown period shall not be permitted to visit.
- Allowed Visitor shall be informed via email/phone to come with a N95 or surgical nose mask and encouraged to travel to project construction site location by personal car/cabs rather than public transport.
- Contactless thermal scanning to be done for visitors at gate
- Visitors detected with exceeding threshold value not to be allowed inside gate
- The concerned staff shall brief visitors about steps taken for COVID-19 prevention and a record shall be maintained.
- Visitors shall adhere to hand sanitization process using 70% alcohol based sanitizer
- Movement of visitors in the office should be restricted. Visitors shall be attended in a dedicated identified room.

- This dedicated room shall be sanitized before and after the meeting.
- Visitors shall not be allowed inside the project construction site location; concerned staff shall meet them at the project/factory office (designated conference room dedicated for this purpose). Such room/s can be accessed only by special permission.
- For meeting, more than 4 people including visitors shall not be allowed. During the meeting social distancing shall be maintained inside the dedicated conference room.
- All couriers / parcel etc. shall be collected by security personnel at gate for distribution later. Close contact with mail or courier personnel shall be avoided. Collected parcel shall be disinfected and kept at designated location for over 24 hours before circulation.

## 7. Work Area

### 7.1 Managing COVI-19 Risks at Construction Sites:

#### Disinfection Treatment & Sanitization:

- Sanitization of all workplaces should be done
- All vehicles and machineries should be disinfected mandatorily.
- Provide hand sanitizers at convenient locations
- Work places should be disinfected and sanitized in accordance with MHA guidelines dtd 15<sup>th</sup> April'20 and its annexures (please see attachment of MHA guideline).
- Generally used and recommended chemicals for disinfection area s follows:

## FOR CLEANING & DISINFECTION:

Product	Available chlorine (%)	1 percent
Sodium Hypochlorite – liquid bleach	3.5	1 part bleach to 2.5 parts water
Sodium Hypochlorite – liquid	5	1 part bleach to 4 parts water
NaDCC (sodium dichloro-isocyanurate) powder	60	17 grams to 1 litre water
NaDCC (1.5 g/ tablet)- tablets	60	11 tablets to 1 litre of water
Chloramine- powder	25	80 g to 1 litre of water
Bleaching powder	70	70g to 1 litre of water
Any other	As per manufacturer's instructions	

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- Log register for disinfections to be maintained.
- Adequate stock of Sanitizers, masks, disinfectants, other cleaning/ disinfecting agents, as per requirement, is to be maintained by all agencies.
- Adequate supply of soap to be maintained in the washrooms / hand washing areas.
- Display boards regarding the procedure of disinfection shall be displayed at entrances / prominent places.
- Ensure availability of hand sanitizers at common locations.
- Maintain regular housekeeping practices, including routine cleaning and disinfecting of surfaces, equipment, and other elements of the work environment
- Do's and Don'ts related to disinfection treatment shall be displayed at prominent location of project/factories
- Follow the manufacturer's instructions for use of all cleaning and disinfection products (e.g., concentration, application method and contact time, PPE).
- Disinfection efforts should be focused on frequently touched surfaces such as door handles, water tap, common printer touch panel etc.,
- Conference rooms shall be disinfected before and after the meeting.
- Required PPE such as face masks etc. shall be made available to the people involved in disinfection treatment, cleaning, sanitizing works.

## 7.2 Working Hours:

- Changes in the working methodology shall be made, to avoid crowding and maintaining social distance norms, during working.
- Working in staggered shifts shall be considered to avoid crowding in a particular workplace wherever possible
- There should be a gap of at least half an hour in between two shifts to avoid overcrowding

## 7.3 Managing the social distancing while deployment and working

Developing a strategy for workmen deployment at sites considering the social distancing requirements and COVID 19 risks which may include

- Sequence of work - ensure the planning of work as per sequence of work with minimum number of workmen.

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- Deploy workmen in different locations, wherever feasible to ensure social distancing. Marking shall be made available to facilitate social distancing.
- Staggered deployment of workmen in case of congested work locations
- Discourage workers from using other workers' phones, clothes, wallets, things or other work tools and equipment, as far as possible.
- Adopt queue system by ensuring social distancing while entry to buildings, workplaces, loading points, bus, canteen etc.
- Ensure that all doors and windows of site offices/containers/rest rooms/ canteens are kept in open condition where ever possible.
- Before restarting Identifying multiple rest areas for workmen within the site premises considering number of workmen at the project .

## 7.4 OSH&E Induction

- Number of workmen participating in Induction shall be restricted so as to maintain the social distance during training. Sitting arrangement can be made accordingly in advance.
- Marking shall be done inside the room to main social distance
- Apart from the regular safety induction, workmen will be trained on COVID 19 risks and the precautionary measures covering the following topics
  - a) Symptoms of COVID19
  - b) How virus spreads
  - c) Preventive measures
  - d) Social distancing
  - e) Roles & responsibility

## 7.5 Tool Box Talk

TBT shall include hazards, risks and controls related to COVID-19. During the TBT the following to be discussed,

- a) How to ensure social distancing during the work
- b) Whether any workmen showing symptoms
- c) Sanitization methods
- d) Spots of high risk for transmission of virus such as handrails, door handles etc.
- e) Proper social distancing should be maintained during TBT

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## 7.6.During Work

### 7.6.1Staff:

- Staff and Supervisors (contractor's office/store) shall work from their desk and avoid going to other's desk as far as possible.
- Internal as well as external F2F meetings shall be avoided as far as possible and staff shall be encouraged to do discussions / interactions through conference calls using Telephone/ mobile (where it is permitted) / VC/ Conference Calls/ other modes to maintain social distance. Such meetings shall be conducted in sanitized and allocated / designated meeting rooms
- All staff shall be strictly adhering to the social distance of minimum 6 ft during work
- Staff shall be encouraged to refer soft copy of files instead of hard copy where ever possible.
- Face to face /Classroom Trainings (except safety induction and COVID 19 training) remain suspended till further notice.
- Physical joining of new recruits to be avoided till everything normalizes.
- As far as possible, air conditioning shall be avoided inside the site offices

### 7.6.2 Worker

- All workers shall be briefed on COVID-19 preventive measures by concerned supervisor prior to start the activities
- Workers shall be instructed to maintain social distancing of minimum "6 feet" all times during tool box meeting, tea time, lunch time, rest hours and drinking water area
- Daily Tool Box Meeting/STA shall contain the awareness about COVID 19 and preventive measures to prevent spread.
- All Workers shall be instructed not to have group gatherings.
- Workers shall keep their working area clean and hygiene.
- Sub-contractors shall apply disinfectant spray/powders daily at common places such as store etc.
- All workers shall be instructed to keep separate water bottles
- All workers shall be equipped with adequate nos of nose masks and hand gloves at workplace (PPE)
- Workers identified with fever/cough/sneeze shall be taken to nearest quarantine room
- All worker shall be instructed to avoid close interaction with other agency workers at workplace.
- Discourage workers from using other workers' phones, clothes, wallets, things or other work tools and equipment, as far as possible

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## 7.7 Canteen/Rest Rooms/Dining Rooms:

- Staggered timings for both staff and workmen canteen shall be ensured to maintain social distance during lunch hours
- Marking shall be done at each table to ensure not more than 2 employees having their lunch at a time
- Marking shall be done at all the rest rooms and dining rooms to maintain social distance
- Employees shall be encouraged to use separate water bottles. Common drinking water points must be discouraged.
- All persons should bring home made food as far as possible.
- Multiple rest rooms/canteen/dining rooms shall be arranged considering the no. of workmen to ensure social distance
- Regular disinfection treatment shall be done at canteen/rest rooms/dining rooms
- All staff/workers/supervisors shall be advised to take additional precautions including sanitization and social distancing while using customer facilities such as canteen, rest room, wash room, etc.
- Provide enough space for rest and seating of the workers keeping social distancing.
- Regular cleaning / disinfection procedure shall follow

## 7.8 Seating Facility / Office Safety

- Re-organize office spaces, if required, keeping Social Distancing in consideration, seating should be done with a gap of at least 6 feet . If required, work plan with staggered presence may be explored.
- Employees shall work from their seats and avoid going to other's seats as far as possible.
- Control of Visitors – on basis of self-declaration tkIS will review and may allow.
- Employees will be only allowed after screening and sanitization
- PPE's to be worn by cleaning staff's
- Regular cleaning / disinfection procedure shall follow. Records to be maintained.
- Minimum movement to be ensured within the office.
- Keep social distancing during eating
- Employees/Contract workers to bring home-food as far as possible.
- Appropriate PPE's (Mask and hand gloves) to be provided for food service persons
- Closed dustbins to be provided for food waste
- Food-waste to be disposed on regular basis as per procedure.



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## 8.Training & Awareness

Training will be conducted for ERT members, staff, frontline supervisor's specific to COVID19 risks and control measures through virtual platform. The training shall include:

### 8.1 ERT(Emergency Response Team) Members:

- Social distancing measures
- Isolation, containment, treatment of symptomatic workmen
- Handling suspected cases of COVID19
- Keeping updated on COVID 19 response from HQ / Local Government authorities
- Specific roles & responsibilities related to COVID 19 response

### 8.2 Staff Members:

- Plan & Strategy adopted for COVID 19 risk management
- Action items from this SOP related to staff members
- Specific roles & responsibilities related to COVID 19response
- Social distancing measures and promoting self-hygiene & respiratory hygiene
- Handling suspected cases of COVID 19 & informing to ERT members

### 8.3 Workers:

- Promoting self-hygiene & respiratory hygiene
- Action items from this SOP related to workers
- Importance of maintaining Social distance and frequent hand sanitization
- Importance of maintaining clean and hygiene at workplace and rooms
- Safe usage of nose masks, hand gloves etc.
- Identifying COVID-19 symptoms
- Specific roles & responsibilities related to COVID 19 response
- Informing suspected cases to supervisors

### 8.4Frontline Supervisors

- Action items corresponding to Frontline supervisors from this SOP
- Specific roles & responsibilities related to COVID 19response

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- Social distancing measures
- Promoting self-hygiene & respiratory hygiene
- Handling suspected cases of COVID 19 & informing to Staff / ERT members

## 9.Resources

Items and other resources required specifically to manage the COVID19 risks shall be planned, identified, procured and made available at site in adequate quantities. The resources which are required to manage COVID 19 risks may include:

- Liquid Soap
- Sanitizers
- Nose masks (as per approved standard)
- Thermal scanners
- Hand washing arrangement
- Team for cleaning & disinfection
- Hand gloves (latex type)
- Quarantine Facilities (as per guidelines) for accommodating symptomatic workmen
- Posters & Promotional material for creating awareness
- Additional rest areas and dining spaces
- Additional exit & entry points to avoid overcrowding
- Sample poster from tkIS and Ministry of Health & Family Welfare given below

## 10.Operational Control

A specific meeting shall be organized at the site including Unit Head / RCM /PM, all Area In-charges and senior staff members. Sample Pandemic Plan (already circulated) may also be referred.

This SOP shall be discussed point wise and site-specific action plan shall be drawn including, action point location wise / Dept. wise

- Allocation of responsibilities and accountabilities for each action item
- Resources required
- Target dates
- Pre-requisites before starting the activities

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## 11. Monitoring & Control

- The points mentioned in these guidelines shall be converted into an action plan and periodically verified for compliance.
- Targeted inspection specific to COVID 19 risks shall be conducted to verify compliance to this SOP.
- Site manager shall ensure the compliances related to guidelines in the site specific SOPs
- SM should report the summary of the compliance to HoFs(Construction & HSE) before starting the operations and after that on a weekly basis.

## 12. Management Review

- The compliance should be reviewed during reviews meetings with the sites.

## 13. Emergency Response in case of COVID 19 exposure

**Pandemic Emergency can be categorized into three broad levels on the basis of seriousness and response requirements, namely: –**

(a) **Level 1:** This is an emergency or an incident which

- (i) Can be effectively and safely managed, and contained within the project by the available resources;
- (ii) Has no impact outside the project site.

(b) **Level 2:** This is an emergency which –

- (i) Cannot be effectively and safely managed or contained at the project by available resource and additional support required;
- (ii) Is having or has the potential to have an effect beyond the project site, and where external support of mutual aid partner ( others) may be involved;

(c) **Level 3:**

This is an emergency with off-site impact which could be catastrophic and is likely to affect the community inside and outside the installation, and management and control is required by District administration. Although the Level-III emergency falls under the purview of Govt. Authority but till they step in, it should be responsibility of the unit to manage the emergency.

Note: Level-I and Level-II shall normally be grouped as onsite emergency and Level-III as off-site emergency.

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## Emergency Response in case of COVID 19 exposure

- The existing ERP shall be updated with COVID 19 as one of the emergencies.
- ERT team shall be reconstituted if required
- HSE team shall train all the ERT members on COVID 19 response and their roles & responsibilities as ERT member
- A site specific COVID 19 emergency response shall be evolved based on these guidelines.
- Recommendations from local authority
- Availability of assistance from local authority
- Reporting of suspected cases from site
- Quarantine of suspected individuals
- Isolation & treatment
- Reporting to local authorities
- Disinfecting areas worked by the suspected individual
- Tracing (primary and secondary contacts with suspected individuals as per guidelines) of people worked with the suspected individual
- Reporting to HO for further coordinated response
- Transport of suspected cases (as per MHA/ local authority guidelines) shall be done by Govt. authorized ambulances only
- Customer specific requirement if any

## 14. Special Note:

### a) Additional PPEs and safety gadgets for COVID-19

In addition to the regular PPE, Nose masks and hand gloves are required. All types of PPE must be:

- Properly fitted and periodically refitted, as applicable (e.g. respirators).
- Consistently and properly worn when required.
- Regularly inspected, maintained, and replaced, as necessary.
- Properly removed, cleaned, and stored or disposed of, as applicable

### a) Staff & workmen at high-risk

- Individuals with other co morbid conditions such as diabetics, blood pressure, renal ailments etc. are at high risk from COVID 19 infection.

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- Hence new workmen who fall in the above category shall not be deployed till normalcy is restored
- Staff with the above conditions shall be instructed to take additional care & precautions from COVID 19. In addition to the precautions taken by other staff members, they shall consult a doctor and follow the precautions as per his advice.

### **b) Communication (Notice Board)**

- All policies to be displayed
- Latest advisories/ circulars/ govt notices to be displayed.
- Pamphlets to be displayed
- Cautionary measures to be displayed
- Do's & Don'ts to be displayed
- Display of Banners & Posters in local language
- Hospitals/ clinics in the nearby areas which are authorized to treat COVID-19 patients, should be identified and list displayed

### **c) Others**

- Clear guidelines will be detailed on the procedure to be followed in case of re-joining after a quarantine (self-sickness/ travel)
- Spitting is strictly prohibited in public places and punishable as per MHA guidelines
- Strict ban on gutkha, tobacco etc. in project sites
- Nose mask shall be provided to site staff and workmen.
- Everyone should use face mask and maintain social distancing
- Medical confidentiality of suspected cases shall be maintained
- Isolate suspected cases immediately, take immediate steps to limit spread.
- No. of doctor visits shall be enhanced

## **15. Do's & Don'ts**

### **Do's**

- Maintain personal hygiene and social distancing.

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- Practice frequent hand washing. Wash hands with soap and water or use alcohol-based hand rub. Wash hands even if they are visibly clean.
- Cover your nose and mouth with hand kerchief / tissue while sneezing and coughing.
- Throw used tissues into closed bins immediately after use.
- Maintain a safe distance from persons during interaction, especially with those having flu-like symptoms.
- Sneeze in the inner side of your elbow and do not cough into the palms of your hands.
- Visit a doctor if you feel unwell (fever, difficulty in breathing and coughing). While visiting doctor, wear a mask/cloth to cover your mouth and nose.
- Sanitization of common touch points.
- Temperature screening at entry gate.
- Conducting Awareness programmes.
- Display of banners / posters
- Updated with latest advisories / circulars.
- PPEs to be worn.
- Use of Aarogya Setu app to be encouraged for all personnel.

### **Don'ts**

- Gutka and tobacco are strictly prohibited
- Spitting in public places, dustbins and on roads
- Handshake
- Having a close contact with anyone, if you're experiencing cough and fever.
- Touching your eyes, nose and mouth.
- Sneeze or coughing into palms of your hands.
- Participating in large gatherings, including sitting in groups at canteens.
- Visiting gyms, clubs and crowded places etc.
- Spreading rumours or panic
- Do not attend office in case you are having any symptoms of cold/ flu or COVID-19.
- Avoid touching surfaces
- Don't call visitors to office.
- Don't visit crowded places.

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## ***16. Important :***

- Persons violating quarantine will be liable to applicable legal action.
- Imposing penalty on the violation of the site specific SOP should be considered in consultation with the customer

## ***17. Annexure: 1) MHA Order No. 40-3/2020-DM-I(A) dated 15<sup>th</sup> April, 2020***

### ***2) Instructions and suggestions***



### ***3) Related Posters***

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**SPECIFICATION  
FOR  
QUALITY MANAGEMENT SYSTEM**



**[ANNEXURE- VI TO SPECIAL CONDITIONS OF CONTRACT]**



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## CONTENTS

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5.0	QUALITY SYSTEM REQUIREMENTS
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## 1.0 SCOPE

This specification establishes the Quality Management System requirements to be met by BIDDER for following purpose:

- QMS requirements to be met by suppliers/contractors after award of work/ during contract execution.

## 2.0 DEFINITIONS

### 2.1 Bidder

For the purpose of this specification, the word "BIDDER" means the person(s), firm, company or organization who is under the process of being contracted by PMC/OWNER for delivery of some products (including service). The word is considered synonymous to supplier, contractor or vendor.

### 2.2 Project Quality Plan

Document tailored from Standard Quality Management System Manual of BIDDER, Specifying how the quality requirements of the project will be met.

### 2.3 Owner



Owner means the owner of the project for which services / products are being purchased and includes their representatives, successors and assignees.

## 3.0 REFERENCE DOCUMENTS

Specification for Documentation Requirements from Contractors  
Specification for Documentation Requirements from Suppliers

## 4.0 QUALITY MANAGEMENT SYSTEM — GENERAL



Unless otherwise agreed with Owner, the BIDDER proposed quality system shall fully satisfy all relevant requirements of ISO 9001 "Quality Management Systems — Requirements." Evidence of compliance shall be current certificate of quality system registration to ISO 9001 or a recent compliance audit

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recommending registration from a certification agency. The quality system shall provide the planned and systematic control of all quality related activities for execution of contract. Implementation of the system shall be in accordance with BIDDER'S Quality Manual and PROJECT specific Quality Plan.



## 5.0 QUALITY SYSTEM REQUIREMENTS

- 5.1** BIDDER shall prepare and submit for review / record, Project Quality Plan / Quality Assurance Plan for contracted scope / job. The BIDDER'S Quality Plan shall address all of the applicable elements of ISO 9001, identify responsible parties within BIDDER'S organization, for the implementation / control of each area, reference the applicable procedures used to control / assure each area, and verify the documents produced for each area. The Project Quality Plan shall necessarily define control or make reference to the relevant procedures, for design and engineering, purchase, documentation, record control, bid evaluation, inspection, production/manufacturing, preservation, packaging and storage, quality control at construction site, pre-commissioning, commissioning and handing over (as applicable) in line with contract requirement and scope of work.
- 5.2** BIDDER shall identify all specified or implied statutory and regulatory requirements and communicate the same to all concerned in his organization and his sub contractor's organization for compliance.
- 5.3** BIDDER shall deploy competent and trained personnel for various activities for fulfilment of PO / contract. BIDDER shall arrange adequate infrastructure and work environment to ensure that the specification and quality of the deliverable are maintained.
- 5.4** BIDDER shall do the quality planning for all activities involved in delivery of order. The quality planning shall cover as minimum the following:
- Resources
  - Product / deliverable characteristics to be controlled.
  - Process characteristics to ensure the identified product characteristics are realized
  - Identification of any measurement requirements, acceptance criteria
  - Records to be generated
  - Need for any documented procedure



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The quality planning shall result into the quality assurance plan, inspection and test plans (ITPs) and job procedures for the project activities in the scope of bidder. These documents shall be submitted to /Owner for review/approval, before commencement of work.

- 5.5 Requirements for sub-contracting / purchasing of services specified in contract / tender shall be adhered to. In general all outsourced items will be from approved vendors. Wherever requirements are not specified, or approved sub vendors do not exist, the sub-contractor shall establish and maintain a system for purchasing / sub-contracting to ensure that purchased product / service conforms to specified requirements. Criteria for selection of sub-contractor, evaluation, re-evaluation, maintenance of purchasing data and verification of purchased product (subcontractor services), constitute important components of this requirement.
- 5.6 BIDDER shall plan and carry production and service provision under controlled conditions. Controlled conditions shall include, as applicable
- the availability of information that describes the characteristics of the product
  - the availability of work instructions
  - the use of suitable equipment
  - the availability and use of monitoring and measuring devices
  - the implementation of monitoring and measurement
  - the implementation of release, delivery and post-delivery activities
- 5.7 BIDDER shall validate any processes for production and service provision where resulting output cannot be verified by subsequent monitoring and measurement. This includes any process where deficiencies become apparent only after the product is in use or service has been delivered.
- 5.8 BIDDER shall establish a system for identification and traceability of product / deliverable throughout product realization. Product status with respect to inspection
- 5.9 BIDDER shall identify, verify, protect and safeguard / Owner property (material document) provided for use or incorporation into the product. If any Owner / property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the / Owner.
- 5.10 BIDDER shall ensure the conformity of product / deliverable during internal processing and delivery to the intended destination. Requirements mentioned in the tender shall be adhered to.

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- 5.11 BIDDER shall establish system to ensure that inspection and testing activities are carried out in line with requirements. Where necessary, measuring equipment's shall be calibrated at specified frequency, against national or international measurement standards; where no such standard exists, the basis used for calibration shall be recorded. The measuring equipment's shall be protected from damage during handling, maintenance and storage.
- 5.12 BIDDER shall ensure effective monitoring, using suitable methods, of the processes involved in production and other related processes for delivery of the scope of contract.
- 5.13 BIDDER shall monitor and measure the characteristics of the product/deliverable to verify that product requirement has been met. The inspection (stage as well as final) by BIDDER and / Owner personnel shall be carried out strictly as per the ITPs forming part of the contract. Product release or service delivery shall not proceed until the planned arrangements have been satisfactorily completed, unless otherwise approved by relevant authority and where applicable by Owner /.
- 5.14 BIDDER shall establish and maintain a documented procedure to ensure that the product which does not conform to requirements is identified and controlled to prevent its unintended use or delivery.
- 5.15 All non-conformities (NCs) / deficiencies found by the BIDDER'S inspection / surveillance staff shall be duly recorded, including their disposal action shall be recorded and resolved suitably. Effective corrective and preventive action shall be implemented by the BIDDER so that similar NCs including deficiencies do not recur.
- 5.16 All deficiencies noticed and reported by / Owner shall be analysed by the BIDDER and appropriate corrective and preventive actions shall be implemented. BIDDER shall intimate / Owner of all such corrective and preventive action implemented by him.
- 5.17 BIDDER should follow the standards, specifications and approved drawings. Concessions/Deviations shall be allowed only in case of unavoidable circumstances. In such situations Concession/deviation request must be made by the BIDDER through online system of eDMS. URL of edms is <http://edocx. . Co. in/portal>.
- 5.18 BIDDER shall have documented procedure for control of documents.

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5.19 All project records shall be carefully kept, maintained and protected for any damage or loss until the project completion, then handed over to / Owner as per contract requirement (Refer Specification Nos. 6-78-0002 - Specification for Documentation Requirements from Contractors and 6-78-0003 - Specification for Documentation Requirements from Suppliers), or disposed as per relevant project procedure.

## 6.0 AUDITS

BIDDER shall plan and carry out the QMS audit for the job. Quality audit programme shall cover design, procurement, construction management and commissioning as applicable including activities carried out by sub-vendors and sub-contractors. This shall be additional to the certification body surveillance audits carried out under BIDDER'S own ISO 9001 certification scheme.



The audit programmes and audit reports shall be available with bidder for scrutiny by Owner. Or Owner's representative reserves the right to attend, as a witness, any audit conducted during the execution of the WORKS.

In addition to above, Owner and third party appointed by /Owner may also perform Quality and Technical compliance audits. BIDDER shall provide assistance and access to their systems and sub-contractor / vendor systems as required for this purpose. Any deficiencies noted shall be immediately rectified by BIDDER.

## 7.0 DOCUMENTATION REQUIREMENTS

BIDDER shall submit following QMS documents immediately after award of work (Within one week) for record / review by / Owner.

- Organization chart (for complete organization structure and for the project)
- Project Quality Plan/Quality Assurance Plan
- Job specific Inspection Test Plans, if not attached with PR
- Job Procedures
- Inspection/Test Formats

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In addition to above QMS documents, following documentation shall be maintained by the BIDDER for submission to / Owner on demand at any point of time during execution of the project.

- Quality Manual
- Certificate of approval for compliance to ISO: 9001 standard
- Procedure for Control of Non-conforming Product
- Procedure for Control of Documents
- Sample audit report of the QMS internal and external audits conducted during last one year
- Customer satisfaction reports from at least 2 customers, during the last one year
- Project QMS audit report
- Technical audit reports for the project
- Corrective action report on the audits

Documents as specified above are minimum requirements. BIDDER shall submit any other document/data required for completion of the job as per /PMC/OWNER instructions.

**thyssenkrupp Industrial Solutions (India) - Quality Management System**

**1.1 tkIS-India Quality Management System:**

thyssenkrupp Industrial Solutions (India) Private Limited having its offices at Mumbai, Pune is a group company of thyssenkrupp Industrial Solutions AG, Germany. tkIS- India has a well-established Quality Management system which is certified in accordance with the requirements of **ISO 9001 since 1994**.

Services rendered by the group companies of thyssenkrupp Industrial Solutions AG follow the same quality principles and a uniform quality system. Quality Management System of The thyssenkrupp Industrial Solutions AG and its group companies across the globe is certified in accordance with the requirements of **ISO 9001-2015** covering the entire gamut of activities namely Development, Project Management, Sales, Engineering, Procurement, Manufacturing, Construction, Commissioning and Services of technologies, plants, components and machines, under a Common Group Certification by **M/s TÜV Nord**.

**Both Mumbai and Pune offices of tkIS – India are covered under this Group certification**  
**Present certification is valid up to March 2021.**

**1.2 Corporate Quality Organisation**

The Quality Management (QM) function is responsible for implementing, maintaining and ensuring effectiveness of the Quality Management System (QMS) in the Company.

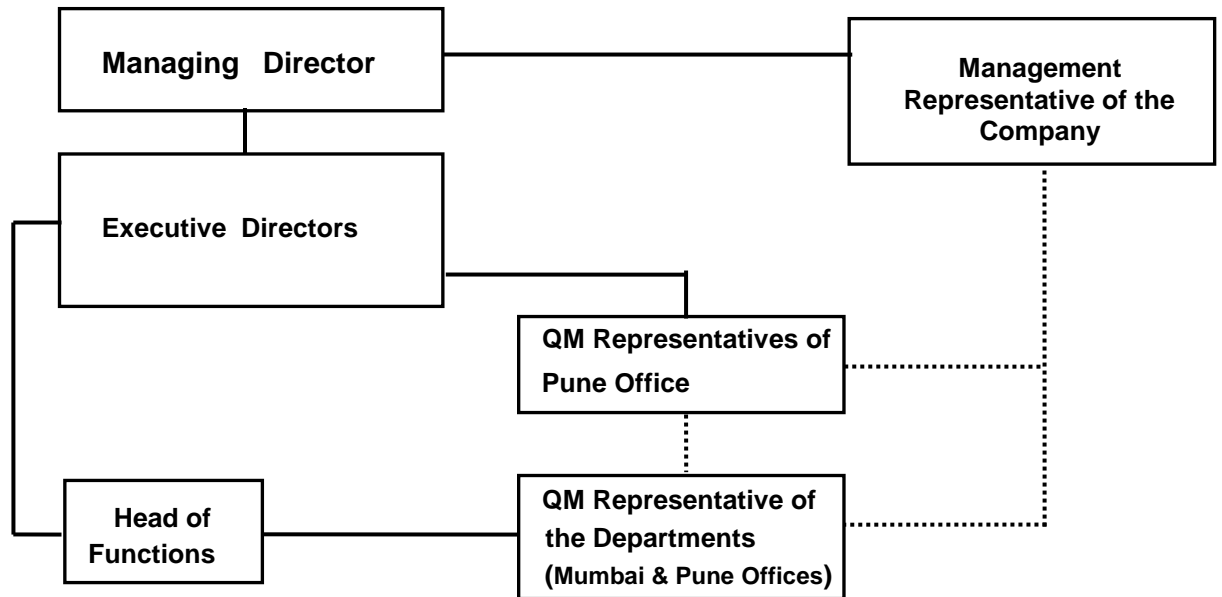
**Management Representative (MR)** of the company heads the QM & HSE Department. He is independent of other line functions and reports directly to the **Managing Director**.

**Quality Management Representatives** in each department assist the Management Representative in his function.

They are further supported by a team of Qualified Internal Auditors (~40 – 45 Nos.)



Following diagram illustrates QMS organization of the company.



: Supported by a team of ~40-50 Qualified internal Auditors

**Legend :**     — : Technical and Disciplinary Responsibility  
                   ..... : Quality System related Responsibility

**Fig. 1 :Quality Management System Organisation**

### 1.3 Structure of the Quality Management System :

tkIS - India's Quality Management System is a well-documented system consisting of:

- Quality Manuals
- Procedures ( Global & Local)
- Instructions ( Global Local)
- Guidelines ( Standard Engineering Procedures (SEPs),
- Technical Standards

Quality Manual describes the Quality System in brief and is structured on the lines of ISO 9001 and interprets each element of the standard in relation to tkIS - India's business.

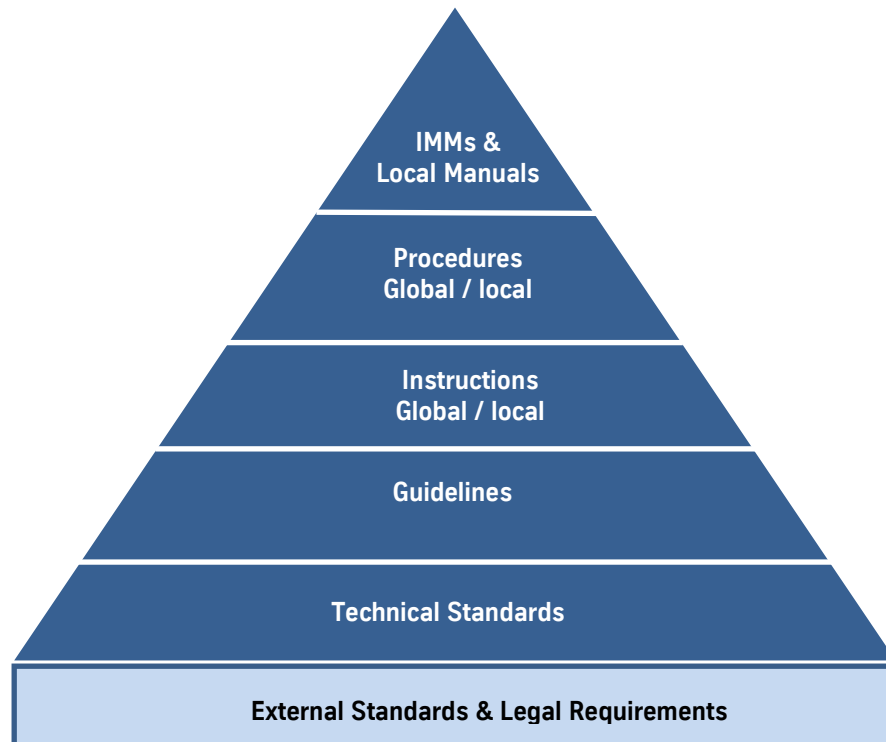
Quality Procedures & Instructions describe in detail the application of some of the important elements of the ISO 9001 standard, in day-to-day business.

Guidelines ( SEPs) are detailed processes/sub-processes for key activities & deliverables along with clear definition of responsibilities for checking and approval.

They are further supported by relevant Technical Standards.

In addition, Department Manuals, developed through experience over the years, supplement the Quality System.

**Following diagram illustrates Structure of the QMS.**



## **1.4 Highlights of the Quality Management System(Salient Features)**

### **1.4.1 Project Quality Plan ( Q-Plan)**

To ensure the on- job quality, Project Manager prepares a Project Quality Plan for every project. The Plan is in line with the requirements of ISO 10005 and covers all the aspects of Quality Management System applicable for the project.

Annexure 1 gives the Typical Index of a Q-plan.

## **1.4.2 Quality Audits**

### **1.4.2.1 Internal Quality Audits**

A planned system of internal auditing is prevalent. Project Task force Audits covering all disciplines are conducted periodically. Defects, if any, are highlighted and actions are taken in time by the concerned Lead Engineers and co-ordinated by Project Managers / Engineering Managers. Corrective actions are identified and actions taken by respective heads of departments, to avoid recurrences.

Similar audits are conducted at Site during Construction phase covering all construction processes.

Audit results are recorded in a Detailed Audit Report.

### **1.4.2.2 SPOT Audits**

In addition to Internal Quality Audits, Spot Audits, with more emphasis on technical aspect of the activity, are conducted.

These audits are Activity / Deliverable , based.

Key activities / deliverables of various disciplines are identified.

Based on the actual status of such activities / deliverables, audits are conducted.

(e.g. Design Basis / GES / Critical Equipment Specifications / Piping Specifications / Unit Plot Plans etc. are covered under Spot Audits.)

Audit results are recorded.

**All Audits are conducted by Independent Auditors.**

### **1.4.2.3 Design Reviews**

Design Reviews are conducted to systematically conceptualise, examine and evaluate the capacity of design to fulfill the defined requirements, identify problems, if any and provide proper solutions

Reviews are conducted, as applicable, at the following stages:-

- a) Concept Meeting : Design concept stage
- b) Detail Design Review (DR) : On receipt of frozen data
- c) Final Design Review (FDR) : 85-90% of Engineering Progress

Reviews a & b are conducted within the Task force. Review c is conducted by Technical expert from the concerned Department.

#### **1.4.2.4 Business Process Audits**

Periodic Audits of all key business processes are conducted.

#### **1.4.3 Quality Objectives & Process Measures**

Quality Objectives are set with focus on achieving Continual Improvement.

Process Measures are in place and help in monitoring effectiveness & efficiency of the business processes

#### **1.4.4 Training**

A training process involving systematic identification of training needs and providing appropriate training to the employees is practiced.

#### **1.4.5 Lessons Learnt Process**

A well-established Lessons Learnt process is in place. Learnings are captured in a structured format. They are analysed and solution/suggestions for future are arrived at after a detailed brain storming. Data base of Learnings is maintained.

At the beginning of any new the project, Learnings database is visited, applicable learnings are identified and necessary actions are suitably planned and implemented.

#### **1.4.6 Customer Feedback**

Customer feedback is obtained in a systematic way and analysed. It provides valuable input for improvement initiatives.

System of obtaining feedback from Vendors is also practised.

#### **1.4.7 Management Reviews of QM System**

Periodic Management Reviews of QM System are organised.

Analysis of Audit Findings, Customer Feedback, Feedback from Vendors, is reviewed with Top Management.

Review also covers status of Corrective/Preventive actions, as well as Improvement potentials.

**Annexure 1 – Table of Contents of Typical Q - Plan**

**Quality Plan**

**for**

**xxxxx Project**



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Attachment 1: Project Specific Procedures \*



Attachment 2: Internal Procedures \*


\* Documents will be prepared on award of contract

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**SPECIFICATIONS FOR DOCUMENTATION REQUIREMENTS FROM CONTRACTORS  
[ANNEXURE–VII TO SPECIAL CONDITIONS OF CONTRACT]**

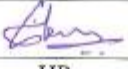

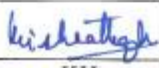
**MRPL DOCUMENTATION PROCEDURE**

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**SPC-000009**

0	01/09/2015	Revised, Renumbered and Reissued			
Rev No	Rev Date	Description	Prepared By	Checked By	Approved By

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## 1. OBJECTIVE

- 1.1 This procedure provides general guidelines to compile and submit the Final Documents to MRPL by any agency executing a specific job against a W.O. or a P.O. issued by MRPL or by any agency on behalf of MRPL.
- 1.2 Final Document as per these guidelines shall be prepared *in addition* to the documents issued during project execution (construction documents), which is normally released in piece meal basis while the job is in progress.
- 1.3 This is a general guideline for all projects of MRPL, however any addition or deletion of the clauses based on the specific project requirement shall be approved by PMC or the Engineer-in-charge of MRPL. An approved deviation note shall be furnished for this purpose.

## 2. COMPONENTS OF THE FINAL DOCUMENTS

### 2.1 BASIC DESIGN & EXTENDED BASIC DESIGN PACKAGES

Basic and extended design packages shall be compiled and the revision control shall be maintained by the respective PMC or the similar agency of the project. At the completion of the project complete and updated sets of design packages with all latest revisions shall be handed over to MRPL.

### 2.2 MASTER INDEX FOR DOCUMENTS & DRAWINGS



- 2.2.1 These shall be treated as a key document for reviewing completeness of the documentation at any point of time. It shall show details of documents/ drawing applicable for any equipment / system / service. Master Drawing/Document Index shall have following columns :-


Unit	Job No	Doc Folder No.	Sr. No.	Drw./Doc. No.	Rev.	No of Sheet	Equip.	Drawing Title	Remarks

Rev	Date	Prepared by	Checked by	Approved by PMC/Consultant	Approved by MRPL

- 2.2.2 A detailed list of PO/Contract to be furnished to MRPL Engineering Documentation Centre to ensure that documentation of equipment / contract is/are submitted in totality.

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**2.2.3** A complete list of drawings and documents including document control index to be submitted in addition to clause 2.2.1.

## 2.3 SECTIONS OF THE FINAL VENDOR/ENGINEERING DOCUMENT FOLDER

### 2.3.1 Section A : Contents

Shall have following columns:-

Sr. No.	Drawing No.	Rev.	No of Sheet	Equipment	Drawing Title	Digital file name (SOFTCOPY)

This content to be certified by the PMC/Consultant/Engineer-in-charge of MRPL for its completeness in all respects.

### 2.3.2 Section B : Technical Documents/Drawings

An approved Vendor Data Requirement Sheet (VDR) shall be obtained from PMC / Engineer-in-charge of MRPL under following headings and drawings and documents shall be submitted accordingly.

- B1-Mechanical
- B2-Electrical
- B3-Instrumentation
- B4-Civil / Structural
- B5-Process Engineering
- B6-Any Others

### 2.3.3 Section C : Inspection and Test Records including IBR/Statutory certificates



### 2.3.4 Section E : As built drawings


In this section asbuilt drawings for all site fabricated items, engineering drawings like process, piping, civil, electrical, instrumentation, plot plan, line schedules, pipe supports index/register, piping isometrics, fire fighting etc. shall be compiled in an orderly manner.

- The file format shall be labeled as mentioned in section 3
- All as built drawings shall be approved by authorised signatory of (with sign & seal)

### 2.3.5 Section G : Digital Copy

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1. Two sets of digital copies shall be submitted in CD/DVD with proper label. If size of the total files of a PO/Equipment is crossing more than 20GB same to be submitted in external hard disk.
2. All drawings shall be on the latest version of AutoCAD. If drawing is prepared in other format same need to be converted in to the latest AutoCAD version..
3. Caesar II / PVElite : Native files of engineering documents/drawings prepared using Caesar II / PVElite shall be submitted in soft copies.
4. Operating manuals and others documents shall be on MS Word / Excel or on searchable pdf. format. Soft copy should have separate files as per clause no. 2.3.1 contents of the document folder.
5. Hand written/filled test reports to be submitted in pdf format.
6. Radiography films preferably to be submitted in digital format.



## 2.4 FIELD INSPECTION DOCUMENTATION


- 2.4.1 A detailed index to the content shall be available at the beginning of each file
- 2.4.2 Each inspection reports shall be indexed with the report number and number of pages
- 2.4.3 All Documents/Reports shall be approved in its totality by stamping & signing the Master Indexes as per section 2.2.1.
- 2.4.4 Radiography films shall be indexed and included with the final documentation package.
- 2.4.5 All radiographic films shall be put in an aluminum box/container with lock and key.
- 2.4.6 As built drawings if any shall be compiled as per section 2.3.6
- 2.4.7 Digital Copy : as per clause no. 2.3.7

## 3. FILE FORMAT OF DOCUMENTATION FOLDER

- 3.1 **Filing** : As far as possible separate folder has to be prepared for each equipment / system / service, however if documentation for a particular equipment / system /service are required to be filed in more than one files due to the volume, identical folder no. suffixing numbers of files e.g. 1/5, 5/5 etc shall be mentioned. On the other hand if the volume of documentation is less

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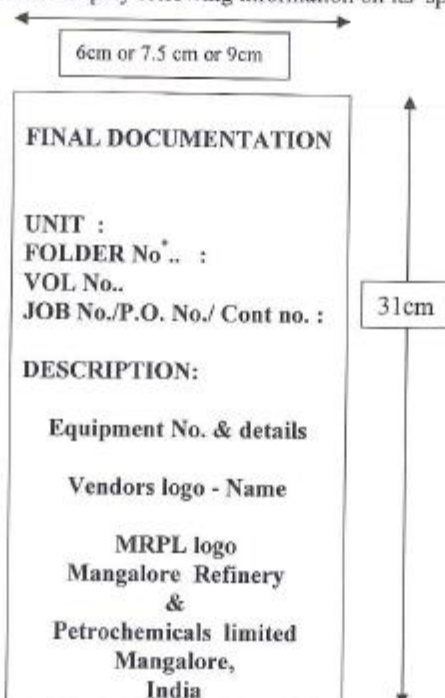
Plant <b>MRPL Mangalore</b>	Client <b>MRPL</b>	Contract Code <b>WSS for PFCC Flue Gas</b>	Document ID	
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one folder may be used for more than one equipment of the same group, e.g. two or more pumps may be filed in one file, but not pumps, compressors, exchanger etc in one single file.

- 3.2 **Drawing Filing** : Each single drawing shall be put in separate transparent A/4 size drawing pouch and shall not be punched.
- 3.3 **File size** : All documents and drawings shall be compiled in A4 size file(s) ( 28cm x 31cm), with 2-clips. Width of the file can be, 6.0 cm or 7.5 cm or 9.0 cm. based on the volume of documents
- 3.4 **Document size** : The documents / drawings submitted in file shall be in its original size (A0/A1/A2/A3/A4), and to be folded in A4 size to accommodate in the A4 size drawing pouch as mentioned in 3.2.
- 3.5 **Digital Copies** : Each single CD/DVD shall have proper labels and to be filed in a separate distinct section of the document folder.



File label : Each file shall display following information on its spine.




\* To be provided in consultation with PMC / MRPL Engineering Documentation Centre.

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#### 4. SUBMISSION OF DOCUMENTS

- 4.1 All final documents duly compiled by this procedure alongwith deviation note as mentioned in section 1.3 shall be handed over to MRPL Engineering Documentation Centre through PMC / consultant / Engineer-in-charge of the project.
- 4.2 Completion Certificate from PMC/Consultant/Engineer-in charge, as per following format shall be attached in all document folder

##### COMPLETION CERTIFICATE OF FINAL DOCUMENTATION

Name of Supplier/ Contractor :  
Customer :  
Project :  
Project No. :  
Purchase Order No./ Contract No. :  
Purchase Requisition No./ Tender No. : Rev.No.:  
Name of the work/Equipment :  
MRPL Equipment Tag. No. :  
Supplier's / Contractor's Works Order No. :  
No of files :



Certified that the Engineering Documents / Manufacturing & Test Certificates submitted by the supplier are duly checked by us and found complete in all respect in accordance with the final documentation procedure No. SPC-000009 and approved VDR (clause 2.3.2).


Signature : ..... Signature : .....  
Date : ..... Date : .....  
Name : ..... Name : .....  
Designation : ..... Designation : .....  
Department : ..... Department : .....

Supplier /Contractor

PMC/Overall contractor

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4.3 Piecemeal submission shall be avoided.



4.4 If any document /drawing is required to be submitted in later date after submission of final folder, shall clearly appear in the content (section 2.3.1) with a note "LATER" duly approved by PMC / Consultant / Engineer-in charge

4.5 Number of sets of Final Documents

Sr.No.	Document Group	# Copies	Digital File
1	Basic /Extended Design Packages	6	2
2	Vendor / Engineering Documentation / Drawings (As-Built Final)	3	2
3	Final Field Inspection Reports (Documents)	1	2
4	Final Field Inspection Reports (Drawings)	3	2
5	Radiography films	1	2



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**CALIBRATION REQUIREMENTS OF MONITORING AND  
MEASURING DEVICES AT CONSTRUCTION SITE**

**[ANNEXUREVIII- TO SPECIAL CONDITIONS OF CONTRACT]**



Plant <b>MRPL Mangalore</b>	Client <b>MRPL</b>	Contract Code <b>WSS for PFCC Flue Gas</b>	Document ID	
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## CALIBRATION REQUIREMENTS OF MONITORING AND MEASURING DEVICES AT CONSTRUCTION SITES

### Abbreviations



<b>ABS</b>	<b>: ABS Consultancy</b>
<b>BIS</b>	<b>: Bureau of Indian Standards</b>
<b>BV</b>	<b>: Bureau Veritas</b>
<b>CEIL</b>	<b>: Certification Engineering International Ltd</b>
<b>DNV</b>	<b>: Det Norske Veritas</b>
<b>IRS</b>	<b>: Indian Registrar for Shipping</b>
<b>LRS</b>	<b>: Lloyd's Register Group Limited</b>
<b>NABL</b>	<b>: National Accreditation Board for Testing and Calibration Laboratories</b>
<b>PMI</b>	<b>: Positive Material Identification</b>



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#### Requirement for control of monitoring and measuring devices



Sl. No	Description	Calibration requirements	Frequency	Remarks
<b>A.</b>	<b>Civil-Survey</b>			
<b>A.1.</b>	Theodolite	To check for permanent adjustments by traversing and observing the closing error	once in a year or project duration whichever is earlier	Record to be maintained <b>(See note below)</b>
<b>A.2.</b>	Levels	To check by Back sight/ Foresight readings, the temporary adjustments of level	Every use	Record to be maintained (See note below)
<b>A.3.</b>	Steel measurement tapes	.....	.....	a."Freemans" make or BIS approved make shall be used. b. Mutilated, or broken tapes shall not be used. c. Marking on the tape shall be legible
<b>A.4.</b>	Cross staff	.....	.....	Same as 3b&3c above
<b>A.5.</b>	Distomat	Actual Physical Verification at Site	Before using first time at site	Records to be maintained
<b>A.6.</b>	Total Station	To check for permanent adjustments by traversing and observing the closing error,etc.	once in a year or project duration whichever is earlier	Record to be maintained (See note below)
<b>B.</b>	<b>Civil Laboratory</b>			
<b>B.1.</b>	All balances-Mechanical	Check for zero error	Whenever used	.....

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Sl. No	Description	Calibration requirements	Frequency	Remarks
<b>B.2.</b>	Weigh Batcher/Batching Plant	Calibration of scales	Once in three Months	Records to be maintained
<b>B.3.</b>	Cube testing machine	Calibration certificate from manufacturers or from reputed calibrating agency.	As per manufacturer specification or once a year whichever is earlier	Records to be maintained
<b>B.4.</b>	Moisture Meter	Calibration of scales	6 months	Records to be maintained

**Note:-** If Error is found, it has to be sent to manufacturers or their authorized agents for rectification and certification. Reputed calibrating agency shall be NABL accredited for relevant testing.

Sl. No	Description	Calibration requirements	Frequency	Remarks
<b>C.</b>	<b>Mechanical/Electrical/Welding</b>			
<b>C.1</b>	Pressure Gauges	Calibration certificate from reputed laboratories or calibrate by dead weight testers with standard weights or with master Gauge	Once in 6 months	Records to be maintained
<b>C.2</b>	Dial Gauges	Check for Zero Error	Whenever used	.....
<b>C.3</b>	Dead Weight Tester	Calibration from manufacturer or reputed Calibrating agency. Calibration certificate shall not be older than one month from the date of mobilization.	As per manufacturer's recommendation or once in a six month whichever is earlier.	Records (Calibration certificate) to be maintained
<b>C.4</b>	Vernier Caliper/ screw gauge	Check for Zero error	Whenever used	.....
<b>C.5</b>	Holiday Tester	Calibration from manufacturer or reputed calibrating agency or by calibrating by zeep meter.	Once in 6 months	Records to be maintained

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Sl. No	Description	Calibration requirements	Frequency	Remarks
<b>C.6</b>	Elcometer	Check with standard test films supplied by the manufactures	Before use	Records to be maintained
<b>C.7</b>	Universal Testing Machine	Calibration Certificate from any reputed third party inspection agency. viz, CEIL, LRS, BV, ABS, DNV or IRS	As per manufacturer's recommendation or once a year whichever is earlier	Records to be maintained
<b>C.8</b>	Charpy V-notch Impact testing machine	Calibration Certificate from any reputed third party inspection agency. viz, CEIL, LRS, BV, ABS, DNV or IRS	As per manufacturer's recommendation or once a year whichever is earlier	Records to be maintained
<b>C.9</b>	Hardness testing Machine	Check with the standard test block supplied with the machine as per manufacturer's Recommendation	Before use	Records to be maintained
<b>C.10</b>	Chemical Analysis, ex: PMI etc.	Check with the standard samples	Before use	Records to be maintained
<b>C.11</b>	Various Digital and Analog meters	Calibration Certificate from reputed laboratories or the manufacturer	Once in Six Months or as per manufacturer's recommendation whichever is earlier.	Records to be maintained
<b>C.12</b>	Variable current, voltage and resistance generators	Calibration Certificate from reputed laboratories	Once in 6 months	Records to be maintained
<b>C.13</b>	Temperature/ Pressure Recorders	Calibration from manufacturer or any reputed calibrating agency	Once in 6 months	Records to be maintained

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**Note:-**If Error is found, it has to be sent to manufacturers or their authorized agents for rectification and certification. Reputed calibrating agency shall be NABL accredited for relevant testing.

Sl. No	Description	Calibration requirements	Frequency	Remarks
<b>C.14</b>	Temperature gauges	Calibration Certificate from reputed laboratories	Once in 6 months	To be discarded in case of damage or malfunctioning
<b>C.15</b>	Thermocouples	Manufacturer's Certificate or Chemical Check	.....	.....
<b>C.16</b>	Vibration probes	Calibration from reputed laboratory	Once in a year	To be discarded in case of damage or malfunctioning
<b>C.17</b>	Decibel-meter	Manufacturer's Certificate or Chemical Check	Once in a year	- do -

**Note:-**If Error is found, it has to be sent to manufacturers or their authorized agents for rectification and certification. Reputed calibrating agency shall be NABL accredited for relevant testing.

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**LIST OF IRON & STEEL PRODUCTS**  
**[ANNEXURE - IX TO SPECIAL CONDITIONS OF CONTRACT**



Plant <b>MRPL Mangalore</b>	Client <b>MRPL</b>	Contract Code <b>WSS for PFCC Flue Gas</b>	Document ID	
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## Annexure – IX

### List of Iron & Steel Products



(Refer Clause 7.2 of the guidelines)

S.No	Iron & steel products	Inputs (imported or domestic)	Minimum value addition
1.	Ductile Iron Pipe	Pig Iron/Liquid Iron	15%
2.	Wire Rod &TMT Bar	Billet	15%
3.	Structural/Sections	Bloom	15%
4.	HR Coils, Strips, Sheets & Plates	Slab	15%
5.	HR Universal/Quarto Plates	Slab	15%
6.	CR Coils/Strips	HR Coils	15%
7.	Coated Flat Steel Products/ GP/GC Sheets/Al-Zn Coated	Slab/HR Coil/Cold Rolled Coils/Strips	15%
8.	Color Coated, Painted Sheets	Slab/HR Coil/Cold Rolled Coils/Strips	15%
9.	All Kinds Of Steel Pipes & Tubes	Slabs/Plates/HR Coils	15%
10.	Seamless Tubes & Pipes	Bloom	15%
11.	Rails	Bloom	15%

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**FORMAT FOR AFFIDAVIT OF SELF-CERTIFICATION REGARDING DOMESTIC VALUE  
ADDITION IN IRON & STEEL PRODUCTS**

**[ANNEXURE – X TO SPECIAL CONDITIONS OF CONTRACT]**

Plant <b>MRPL Mangalore</b>	Client <b>MRPL</b>	Contract Code <b>WSS for PFCC Flue Gas</b>	Document ID	
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## ANNEXURE – X

### **Format for Affidavit of Self-Certification Regarding Domestic Value Addition in Iron & Steel Products to Be Provided On Rs.100/- Stamp Paper for Indian Bidders and as per country rule for Foreign Bidders**

I \_\_\_\_\_ S/o / D/o / w/o \_\_\_\_\_ Resident of \_\_\_\_\_ Hereby solemnly affirm and declare as under: That I will agree to abide by the terms and conditions of policy of government of India issued vide notification no: \_\_\_\_\_

That the information furnished hereinafter is correct to the best of my knowledge and belief and I Undertake to produce relevant records before the procuring agency (i.e. S) for the purpose of assessing the domestic value addition.

That the domestic value addition for all inputs which constitute the said iron & steel products has been verified by me and I am responsible for the correctness of the claims made therein.

That in the event of domestic value addition of the product mentioned herein is found to be Incorrect and not meeting the prescribed value-addition criteria, based on the assessment of procuring agency (i.e. S) for the purpose of assessing the domestic value-addition, I will be disqualified from any government tender for a period of 36 months. In addition, I will bear all costs of such an assessment.



That I have complied with all conditions referred in the notification no. \_\_\_\_\_

Wherein preference to domestically manufactured iron & steel products in government Procurement is provided and that the procuring agency (i.e. S) is hereby authorized to reject / black list undersigned. I also undertake to pay the assessment cost and pay the penalties as specified in the tender document.

I agree to maintain the following information in the company's record for a period of 8 years and shall make this available for verification to any statutory authority.

- I. Name and details of the bidder (registered office, manufacturing unit location, nature of legal entity).
- II. Date on which this certificate is issued.
- III. Iron & steel products for which the certificate is produced





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- IV. Procuring agency to whom the certificate is furnished
- V. Percentage of domestic value addition claimed and whether it meets the threshold value of
- VI. Domestic value addition prescribed
- VII. Name and details of the unit of the manufacturer
- VIII. Net selling price of iron & steel products
- IX. Freight, insurance and handling till plant
- X. List and total cost value of input steel (imported) used to manufacture the iron & steel products
- XI. List and total cost of the input steel which are domestically sourced
- XII. Please attach value addition certificates from suppliers, if the input is not in-house
- XIII. For imported input steel, landed cost at Indian port with break-up of CIF value, duties & taxes, port handling charges and inland freight cost.




For and on behalf of \_\_\_\_\_ (name of firm/entity)

Authorized signatory (to be duly authorized by the board of directors)

<Insert name, designation and contact no.>



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**CONSTRUCTION MANAGEMENT REQUIREMENT  
FOR EPC PACKAGE  
[ANNEXURE – XI TO SPECIAL CONDITIONS OF CONTRACT]**

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## 1. Purpose

This document describes the requirements of Construction Management to be adopted at site by EPC contractor while executing construction activities, to achieve overall completion of the project as per contractual schedule complying with construction quality and safety of PFCC UNIT FLUE GAS WET GAS SCRUBBER SYSTEM for Mangalore Refinery and Petrochemicals Limited (MRPL), at Mangalore.

These requirements shall also provide the basis for Owner/PMC to monitor EPC contractor's control on construction management.

## 2. Scope

This document applies to Construction work, Pre commissioning and Commissioning of the plant and final handover to Owner at PFCC UNIT FLUE GAS WET GAS SCRUBBER SYSTEM for Mangalore Refinery and Petrochemicals Limited (MRPL), at Mangalore.



It applies equally to permanent and temporary works, demolition and site clearance.

## 3. Reference Documents

Contract document, Project execution plan, Construction HSE requirements, Construction Quality requirements and applicable statutory documents.

## 4. Abbreviations & Definitions:

EPC	Engineering, Procurement and Construction.
Owner	Mangalore Refinery and Petrochemicals Limited (MRPL),
PMC	thyssenkrupp Industrial Solution India Pvt Ltd.
EPC Contractor	Contractor engaged by Owner for EPC packages.
Sub- Contractor	Contractor engaged by EPC Contractor
QAP	Quality Assurance Plan.
ITP	Inspection and Test Plan.
TPI	Third Party Inspector.
RFI	Request for Inspection.



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DCC	Document Control Center.
RFSU	Ready for Startup.
ODC	Over Dimensioned Consignment
RCM	Resident Construction Manager
MTO	Material take off



## 5. Requirements

### 5.1. General



- 5.1.1.** EPC Contractor shall construct the plant facilities in accordance with the requirements of the technical standards, with proven/generally accepted practices and procedures. Such facilities shall be safe, reliable and suitable for their intended purpose.
- 5.1.2.** EPC Contractor shall provide all supervision, labour, construction equipment, tools & tackles materials and consumables, temporary facilities, construction utilities, etc. and render all support services necessary for the construction, mechanical completion, precommissioning and commissioning activities.
- 5.1.3.** EPC Contractor shall plan, execute, manage and control all the construction and commissioning activities for the facilities forming part of this contract. Frontline construction supervision also is to be provided by EPC Contractor.
- 5.1.4.** EPC Contractor to ensure mechanizing of the construction activities to a great extent and working during monsoon.
- 5.1.5.** EPC Contractor is deemed to be having full knowledge of the applicable laws and regulations, conditions of labour, local conditions, site conditions, environmental aspects and shall comply with the requirements there of.
- 5.1.6.** EPC Contractor's work during construction shall include but not be limited to the following:
- Prepare and submit all the plans, procedures and documents to Owner/PMC as specified in the contract.
  - Establish requisite site organization staffed by competent and experienced specialists, supervisors and inspectors.
  - Update overall project schedule on monthly basis.
  - Supervise co-ordinate and manage the activities performed at site by the EPC contractor himself and by his Sub-contractors for execution of work and render all technical/specialist services.

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- v) Plan and schedule the construction work, monitor and take timely corrective action required to adhere to approved execution schedule.
- vi) Plan and allocate required resources, manpower, and construction equipment/materials, commensurate with construction plan/schedule.
- vii) Ensuring quality control and quality assurance as per approved QAP.
- viii) Report beforehand and take approval from Owner/PMC regarding use of any equipment and/or material not conforming to the contract, drawings and specifications.
- ix) Execute and supervise all additional works and modification works as required or suggested by Owner/PMC as a part of approved change orders.
- x) Erect and install the equipment and materials according to the approved specifications and procedures.
- xi) Establish required field inspection and testing laboratories at site to carry out tests as specified in the standards/specifications of the contract.
- xii) Organize and obtain all applicable clearances/approvals from statutory bodies/authorities, as required by the laws of land for the work executed by the EPC Contractor at site under the contract.
- xiii) Carry out inspection, non-destructive tests and certify acceptability of all welds and materials in accordance with specified technical standards/international standards. Carry out inspection and testing of incoming materials as per agreed procedures.
- xiv) Carry out material traceability during all the phases of pre-fabrication and installation as per the procedure approved by Owner/PMC.
- xv)
- xvi) Organize and conduct positive material identification (PMI) of incoming materials and after erection of facilities as per procedure approved by Owner/PMC.
- xvii) EPC Contractor to provide facilities and cooperation for audits carried out by Owner/PMC.
- xviii) Prepare detailed schemes for ODC/Heavy/Critical Equipment movement/erection/ lifting/rigging and submit the same for review/approval to Owner/PMC before undertaking such critical/heavy lifts/movements/erection. Any modifications required including dismantling and re-erection of structures/piping, etc. for the existing facilities for smooth flow of such heavy equipment shall be carried out by the EPC contractor at his own cost. However, prior approval for such modifications shall be required from the Owner/PMC.
- xix) Organize and conduct weekly project review meeting related to site construction activities.
- xx) Provide detailed daily, weekly and monthly progress reports. The content of report shall be as per requirement of Owner/PMC.



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- xxi) Prepare and submit records of all site meetings and any other related documents to all parties concerned within two (2) days of the meeting.
- xxii) Prepare and submit safety and labour relation procedures in line with all applicable codes, regulations and Owner's requirements.
- xxiii) Supervise and monitor all safety and labour relations functions as per agreed procedures and applicable laws of the land and report to Owner/PMC immediately for any violations and injuries.
- xxiv) Keep all the records generated during project execution up-to-date and in first rate condition to be made available to Owner/PMC whenever requested. These records shall be handed over to Owner/PMC on completion of the work.
- xxv) Carry out warehouse management and material control in accordance with approved procedure.
- xxvi) Ensure that incoming materials are offered to Owner/PMC for inspection as per approved ITPs and inspection records are maintained at site.
- xxvii) Take all necessary precautions and required actions to protect construction work and materials from damage by local weather conditions and ongoing construction activities in the vicinity, theft and pilferage etc.
- xxviii) Take insurance policies for materials in transit and storage-cum-erection risk and other insurance covers required for men and materials at site.
- xxix) Undertake housekeeping including sweeping, cleanup to maintain cleanliness, sanitation, removing excess materials, temporary facilities, scaffolding, etc. on daily basis.
- xxx) Ensure the control of all works with regard to its impact on the surrounding environment.
- xxxi) Inspect & certify the short bolting prior to commissioning. Records of bolt tightening for high pressure lines shall be maintained and obtain certification from Owner/PMC.
- xxxii) Load data of spring supports shall be recorded and certification of the same shall be obtained from Owner/PMC.
- xxxiii) Ensure all hot works are performed outside hazardous areas and in compliance with Owner's safety permit system requirements wherever applicable.
- xxxiv) Arrange and co-ordinate the visits of vendor(s) representative/specialists at site.
- xxxv) All material handling equipment, tools, tackles, hoisting and lifting equipment/machineries should be subjected to required load test initially and then periodically, to ensure safe/stable operation. EPC contractor to engage competent TPI certification agency for certification of all lifting tools & tackles.
- xxxvi) Execute all the tie-ins for the project as per the terms of contract and schedule fixed by Owner/PMC.

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- xxxvii) Organize field engineering work, wherever required and provide assistance to Owner/PMC in timely resolving interface problems/site constraints.
  - xxxviii) Prepare and certify material reconciliation statement on completion of work to enable Owner to take over the balance store materials, if applicable as per the contract.
  - xxxix) Organize the handing over of balance surplus materials (as applicable) and spares/tools and tackles to the Owner on completion of the work.
  - xl) Develop a phased mechanical completion program to facilitate sequential pre commissioning/commissioning activities in a logical manner to meet the overall project schedule.
  - xli) Remove/demolish all temporary structures/establishments/facilities created by the EPC Contractor/Sub- Contractors during the execution of the work and restore the site to its original condition.
- 5.1.7. EPC Contractor is required to organize and mobilize “construction management services” in a systematic and sequential manner to ensure that the plant installation is carried out in accordance with the approved engineering drawings, specifications, standards, QA/QC procedures etc. and its mechanical completion is achieved within targeted time schedule. Construction management and supervision is to be carried out by the EPC contractor himself by deploying persons on his rolls.
- 5.1.8. A construction management team headed by a RCM shall be deployed at site by EPC Contractor for construction supervision and management of their contractual scope of work. Contractor shall provide the CVs of RCM and all the lead engineers intend to be deployed at site for approval of Owner/PMC. Owner/PMC may ask for face-to-face or telephonic interview of such candidates and reserve the right to accept/reject such candidate from deployment at site. However, all HSE personnel will be necessarily interviewed by Owner/PMC prior to their deployment at site. Key personnel including RCM should have sufficient experience to meet the requirement as stated in SCC and should not be changed during course of execution without concurrence from Owner/PMC.
- 5.1.9. The construction supervision, co-ordination and management activities shall be carried out by the EPC Contractor in accordance with the construction procedures developed and submitted by the EPC Contractor and approved by Owner/PMC.
- 5.1.10. EPC Contractor shall extend all necessary assistance and provide all necessary data/documents as required by Owner/PMC for review and monitoring of the jobs performed by the EPC Contractor
- 5.1.11. EPC Contractor shall ensure delegation of adequate and sufficient powers (including financial) to his RCM for effective and smooth functioning of the construction management. EPC Contractor to inform officially Owner/PMC about authorizing their RCM for all Techno commercial authorities



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related to the project execution. HO support shall be provided to the RCM at site during construction on all matters of project execution including the following:



- Field engineering.
- Vendor specialists required during construction.
- Rectification/replacement of defective supplies, if any, noticed during construction.
- Inspection/expediting of replacement orders/field purchase orders for items ordered by site.
- Expediting replacement of imported items found short/damaged.
- Material receiving inspection at site and the required documentation
- Statutory requirements and the required documentation

5.1.12. EPC Contractor shall depute a project team at site during construction phase under a project co-coordinator for providing above-mentioned support to RCM.

5.1.13. EPC Contractor shall establish and maintain a material testing laboratory for all disciplines for carrying on field tests during execution of contracts at no extra cost to Owner All the test equipment deployed shall have valid test/calibration certificates.

5.1.14. Construction supervision and management functions to be performed by the EPC Contractor, shall include the following as key functions for effective execution, monitoring and control:

- Planning, scheduling, monitoring & reporting.
- Construction supervision, discipline wise.
  - Quality assurance and quality control, discipline wise.
  - Shipping, custom clearances, inland transportation.
  - Warehouse management and material control.
  - Field engineering & Site procurement.
  - Health, safety and environment (HSE) management.
  - Statutory clearances and enforcement of statutory rules/regulations and Labour Laws.
  - Personnel/administration/industrial relations.
  - Billing and invoicing.
  - Finance and accounts.
  - Security.

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## 5.2. Sub-Contracting Plan

If EPC Contractor proposes to engage sub-contractors for the execution of various activities at site, a preliminary sub-contracting philosophy and plan along with the identified scope of work for each sub-contract shall be furnished by EPC Contractor at the time of bid submission. However, the credentials of proposed sub-contractors shall be submitted by the EPC Contractor on award of this work, which shall be evaluated by Owner/PMC for acceptance. Sub-contractors can be engaged only after receipt of approval from Owner/PMC. EPC Contractor shall not be permitted to change the sub-contractors under any circumstances without prior approval of Owner/PMC. Non-compliance of the above shall be strictly dealt within relevant provision(s) of the contract.

## 5.3. Construction Management Plan



EPC Contractor shall submit Construction Management Plan to Owner/PMC for approval during kick-off meeting. The plan shall detail the management methodology to be applied during the construction phase of the project, along with a list of procedures to be utilized in undertaking the work.

All reference procedures and detail work plans referred to in this document must be submitted for review and approval by Owner/PMC at least (4) four weeks in advance of actual commencement of the activity concerned.



## 5.4. Construction Execution Plan

EPC Contractor shall submit construction execution plan to Owner/PMC for review/approval during kick-off meeting. The plan shall detail the execution methodology of the EPC Contractor during construction phase of the project. EPC Contractor construction execution plan shall include:

- EPC Contractor's manpower and man-hour histogram by major section and discipline and his manpower deployment schedule on monthly basis with distribution of foreign/Indian/local personnel.
- Major equipment mobilization plan on monthly basis with short description. EPC Contractor to develop this plan with due consideration to maximize the mechanization of construction activities.

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- c) EPC Contractor's plan to construct proper approach roads, drains, underground systems, cable trenches and complete major civil works well in advance before start of mechanical job.
- d) Other plans of EPC Contractor and procedures to be submitted at least four (4) weeks prior to start of respective activity at site, with the following as a minimum:
- Temporary facilities, etc.
  - Piling plan (if applicable)
  - Excavation and underground work plan
  - Civil Construction
  - Structural Erection
  - Scaffolding plan
  - Working during monsoon and de watering
  - Monsoon counter measures and preparation
  - Storm water management plan
  - Working in shifts including holidays. Separate manpower shall be considered for each lift of work
  - Heavy transport and heavy lifting plan (Rigging Plan)
  - Pre-fabrication plan
  - Hydro-test plan
  - Other activity plans e.g. piping, equipment and steel structure erection plan etc.
  - Instrument loop check plan
  - Emergency evacuation procedure
  - Sub-Contracting Plan
- a. Temporary Facilities
- EPC Contractor's construction execution plan shall include:
- Exact location of temporary work area, access and general layout inside the area.
  - Plan and description of the temporary facilities for EPC Contractor / sub- contractor.
  - Identification of borrow earth area (if required)/excess earth dumping yards.
  - EPC Contractor / sub-contractor site office and fabrication yards, open storage area and warehouse.
  - Miscellaneous workshops.

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- Temporary roads including access road to plant, fencing and gates.
- Security, watch & ward, security gates, watch towers.
- Utility supply systems viz. construction power, construction water, drinking water etc.
- Area lighting.
- Firefighting equipment.
- Drainage and sanitation.
- Labour camp accommodation.
- Field testing laboratory.
- Communication facilities viz. telephone, fax, e-mail, etc.
- Canteen for staff and workers as per Owner's rules and regulations applicable inside Refinery.
- Vehicle parking area.
- First aid arrangement/medical and health care facilities.
- EPC Contractor shall develop the temporary facilities layout for approval of Owner/PMC.



- b. Monthly Estimation of all utility consumption including drinking / construction water & power (electricity).

## 5.5. Construction Planning, Scheduling, Monitoring & Reporting

EPC Contractor shall be responsible for construction planning, scheduling, monitoring and reporting activities at site in line with the overall master schedule and details stipulated elsewhere in this document.

To ensure timely completion of the project, EPC Contractor shall establish and maintain an effective Primavera Enterprise 8.2 for Preparation of Project Schedule as Project Management Control System tool for the Project, scheduling, monitoring and control system, including mobilization of required number of professionally qualified and experienced planning engineers for design office and construction site. The system shall be capable of accurate and timely prediction of trend, evolution of adequate preventive actions for likely slippages, and formulation of suitable catch-up schedule for delays, if any, that have occurred.

Schedules, reports and documents to be prepared and submitted by the EPC Contractor for review of Owner/PMC at various stages and details of meetings to be held are described here.

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Following activities are also to be performed by the EPC Contractor at site:

#### 5.5.1. Construction Master Schedule

Construction master schedule shall be prepared and submitted by the EPC Contractor for Owner/PMC review/approval covering following aspects:

- Clearly identified activities in the master project schedule
- Major milestones
- Critical path and activity float time
- Activities conforming to the EPC Contractor's work breakdown structure
- Monsoon and holiday seasons into consideration
- Detailed activity schedule (L3, L4) shall be required for each activity identified in Master Project Schedule two months after award.



#### 5.5.2. Schedule Control

EPC Contractor shall prepare:

- Three months "Look Ahead", monthly and weekly construction schedule
- Construction progress measurement method, which is to be based on physical progress Measurement at site as approved by Owner/PMC.
- Reference to schedule change procedures.
- Catch up plans
- Hold up reports in respect of drawings, materials and front, etc.
- Daily, weekly and monthly progress reporting format to Owner/PMC.

#### 5.6. Quality Assurance and Quality Control

EPC Contractor shall submit "Site Quality Assurance Plan" prepared with reference to **Construction Quality Requirement Doc: GINT-8003-000-GEN-000002** applicable to this project to Owner/PMC for their approval. EPC Contractor shall be responsible for ensuring quality of construction carried out by them/their approved sub- contractors in accordance with the approved quality plan.

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The role of Owner/PMC is broadly envisaged as surveillance, auditing and participation in inspection of critical activities as identified. EPC Contractor shall develop a detailed procedure for field inspection notice and obtain the approval of the same from Owner/PMC for implementation.

#### **5.6.1. Methodology for Construction Quality**

The management of construction quality control is divided into the following categories: -  
Procurement of materials required for the construction works.

- a) Execution of works
- b) Documentation
- c) QA/QC Audits



##### **5.6.1.1. Procurement of Materials Required for the Construction Works :**

EPC Contractor shall develop list defining the items to be procured by the EPC Contractor along with likely vendors for approval of Owner/PMC. The vendor list shall be from approved vendor list attached with the contract document. In case, no vendor list exists in the contract for a particular item, the EPC Contractor will propose a list of vendors to Owner/PMC for approval. EPC Contractor has to satisfy himself with the capability of the vendor to deliver the product in time with quality before proposing him as a prospective vendor. EPC Contractor shall submit the QA/QC plans for all major items and carry out their procurement in line with approved plans. The EPC Contractor can either provide his own adequate qualified staff for inspection or employ a separate third-party inspection agency to carry out these functions. Involvement of Owner/PMC in the quality control plan, if required, shall be defined during approval of the same.

##### **5.6.1.2. Execution of works**

The QA plans for execution shall be developed by the EPC Contractor. Owner/PMC approval shall be taken well before start of the work for the same. The ITP's, shall be developed by EPC Contractor as per contract specifications for approval by Owner/PMC.

It is likely that the EPC Contractor may engage sub- contractor s/vendors for performance of the work. EPC Contractor shall be responsible for ensuring the implementation of approved QA plan, contract specifications and contract conditions through his sub- contractors to achieve

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the quality during all stages of construction. It shall be the responsibility of the EPC Contractor to ensure proper co-ordination between his sub- contractors and other agencies working at site.

The sub-contractors /vendors selection shall be done after evaluation by the EPC Contractor in line with contract requirements and shall be approved by Owner/PMC before engaging them for the works.

EPC Contractor shall be responsible to arrange verification of products during in process and final inspection. Relevant checks and tests shall be arranged for the works performed and records maintained. Tolerances achieved with respect to contract specification and execution drawings for various activities/processes shall be ascertained and submitted to Owner/PMC for approval. Efforts shall be made to keep checks and controls in such a way that getting a non-conformed product is avoided. However, if in an isolated case, the tolerances are variant beyond the acceptable values given in the contract/execution drawings, non-conformance resolution/waiver need to be raised by the EPC Contractor and got approved/resolved from Owner/PMC. For alloy and special piping materials and welds, PMI shall be arranged by EPC Contractor after installation but before final acceptance.



#### **5.6.1.3. Documentation**

All the necessary documentation shall be maintained by EPC Contractor till completion of project and handed over to Owner/PMC in requisite copies as a part of completion documents.

#### **5.6.1.4. QA/QC Audits**

During the execution of the works, EPC Contractor shall carry out periodical internal quality audits in all areas of work. These audits shall be conducted by a team of specialists in respective areas.

A copy of the audit report containing the findings of the audit team shall be submitted to Owner/PMC within 3 days of completion of an audit. EPC Contractor to make action plan for compliance of the audit findings and submit to Owner/PMC for concurrence before initiating compliance action on the same. A compliance report must also be generated by the EPC Contractor after completion of citification / modifications / corrective actions taken by the EPC

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Contractor on issues indicated in the audit report. A copy of this action plan and the compliance report shall be submitted to Owner/PMC for review.

Over and above the EPC Contractor's internal QA/QC audits outlined above, Owner / PMC shall also conduct periodical QA/QC audits. The programme along with the scope of such audits, shall be informed to the EPC Contractor well in advance. EPC Contractor shall participate and provide full support to the audit team and furnish all documents/reports/records as desired by the audit team. A copy of such audit report shall be furnished to the EPC Contractor. The EPC Contractor shall take all actions required to comply with the findings of the audit report and issue regular compliance reports for the same to Owner/PMC till all the findings of the audit report are fully complied.



Owner/PMC reserve the right to appoint an independent person/third party agency to conduct QA/QC systems audit for full/part of the facilities being executed by the EPC Contractor. This audit shall be in addition to the audits described above and may be carried out intermittently/continuously for all or part of the facilities being executed by the EPC Contractor.

## 5.7. Warehouse Management & Material Control

EPC Contractor shall be responsible for carrying out the warehouse management and material control in accordance with the approved warehousing procedure and material control procedure, which is to be submitted by the EPC Contractor during kickoff meeting. The activities shall include but not limited to:

- Transport liaison, both for imported materials as well as materials procured in India, from the time of dispatch up to receipt at site.
- Transportation plan (i) from source to site (ii) site to erection location.
- Receipt, handling, identification, inspection (including confirmation by an alloy analyzer for alloy steel, stainless steel and other exotic materials) and acceptance, storage and preservation of materials, codification of all materials including free issue materials to be supplied by Owner.
- Filing of insurance claims and follows up.
- Documentation for control and accounting of materials.
- Generation and upkeep of traceability records for materials.





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- Materials control & issue.
- Inventory checks.
- Field requisition and purchase.
- Spares & tools including handing over of mandatory spares/tools to the Owner as per the terms of the contract.
- Material appropriation and handing over of all items to Owner as per the terms of contract.
- Security.
- Taking up with suppliers on short supplied items and placing replacement orders for lost/damaged items.
- Intimating to their HO regarding short/lost/damaged items received at site and further replacement action, as applicable.

**EPC Contractor shall generate and issue following reports:**

- Vendor expediting report fortnightly
- Fortnightly statement of consignments in transit.
- Daily report of material received.
- Material receipt status and inventory status with respect to material delivery schedule
- Material inspection report with respect to materials received at site
- Report on excess, short, damage & reject (ESDR) against each consignment on receipt at warehouse.
- Weekly status of consignments, material receipt report (MRRs)
- Monthly status of field purchase.
- Monthly statuses of excess, short, damage & reject(ESDR) settlement.
- Monthly status of piping material MTO v/s. actual receipt.
- Log Register of rotating equipment's maintenance
- Daily stock position of cement
- Any other report as desired by Owner/PMC.

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### 5.8. Field Engineering

EPC Contractor shall be responsible for controlling and issue of technical drawings and documents, preparation of field sketches, field modifications, checking/preparation of as-built drawings, technical assistance for field purchase & field tendering etc. Specialist engineers from HO shall be deployed at site as per requirements. Site should have facilities to incorporate field changes, prepare as-built drawings at site itself, WAN facility (preferably) with H.O., printing machines and drawing control system.

### 5.9. Field Tendering

EPC Contractor shall be responsible for carrying out field tendering activities, as required if any.



### 5.10. Field Purchase

EPC Contractor shall be responsible for carrying out field purchase activities, as required. The bulk of procurement action shall be done from EPC Contractor 's HO. Field purchase items are restricted to those required for running and maintenance of the field offices, items required to expedite construction work and items found short, missing or damaged against the main order when received at the site. Any material purchased from field for usage in the plant should have proper inspection certificate and should be purchased from Owner/PMC approved vendors.

### 5.11. Health, Safety and Environment (HSE) Management

EPC Contractor shall submit "Site Specific HSE Plan" prepared with reference to **Construction HSE requirement Doc: GINT-8003-000-GEN-000003** applicable to this project to Owner/PMC for their approval. EPC Contractor shall be responsible for health, safety and environment (HSE) Management at construction site for the construction activities to be carried out by the EPC Contractor /their approved sub-contractor s in accordance with the requirements given in approved HSE plan.

It is the responsibility of the EPC Contractor to maintain general cleanliness and proper housekeeping at work site. EPC Contractor shall organize disposal of excavated

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earth/garbage/rubbish/scraps, etc. on day to day basis to identified disposal areas/safe areas and forward daily report for the same indicating the details of men and machinery deployed for the purpose.

## 5.12. Industrial Labour Relations

EPC Contractor shall be responsible for industrial relation functions and implementation of labour laws at site. EPC Contractor 's staff shall be suitably trained and experienced in labour relation functions so as to ensure a good relationship with labour and to prevent the occurrence of industrial disputes resulting in subsequent delays or work stoppages. In particular, EPC Contractor shall maintain close liaison with Owner/PMC and with official Union representatives (if any) of EPC Contractor 's work force.

EPC Contractor shall maintain proper liaison with statutory authorities and local bodies and shall be responsible to implement and observe all statutory laws at site.



EPC Contractor must have on his staff; a well experienced labour relation officer, preferably from local area.

EPC Contractor shall report immediately to Owner/PMC any problems including labour disputes, fight, and work stoppages. A written report shall be submitted to Owner/PMC within 24 hours after the incident.

EPC Contractor must submit a "Labour Relations Plan" prior to the start of the work/within one month of award of the contract, whichever is earlier.

EPC Contractor 's plan shall include:

- A detailed estimate of the number of foreign labour/local labour/labour from other states of India, both indirect and direct, sorted by craft. This estimate shall specifically include the months and durations that potential foreign labour shall be required.
- Outline of training plan for local semi-skilled labour and respective crafts.
- Outline how the respective government agencies shall be educated on maximization of local workers.
- Outline recruiting plans for all manpower requirements.
- Identify personnel involved with labour relations and outline procedures to mitigate disputes, problems should they occur with the labour force.
- Labour welfare plan
- EPC Contractor shall hold labour relations meeting twice a month with their workforce as well as a separate meeting with Owner.

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### 5.13. Construction Equipment

EPC Contractor is required to organize and mobilize the construction equipment and other tools/tackles in a sequential manner to ensure that plant installation is carried out in a mechanized manner and its mechanical completion is achieved within targeted time schedule. EPC Contractor shall, without prejudice to his responsibility to execute and complete the work strictly as per the specifications and other laid down procedures, execute all the work by mechanizing the construction activities to the maximum extent by deploying all necessary construction equipment / machinery of adequate capacities and numbers.



EPC Contractor shall ensure deployment of all the construction equipment as per the requirement to the maximum extent but not limited to

- Batching plants
- Concrete pumps
- Transit mixers
- Automatic welding machines
- Cranes of different capacities
- X-ray and Radiography sources
- Stress relieving equipment's with recording facility
- All weather fabrication sheds
- Blast cleaning and painting shop

EPC Contractor shall deploy portable alloy analyzer with printout facility and carry out 'Positive Material Identification (PMI)' of materials and welds after erection/installation but prior to hydro static testing. Any non-conformance detected shall be removed and replaced prior to final hydro static testing.

EPC Contractor shall be responsible for arranging all facilities for torque tightening/tensioning of bolts/fasteners as specified EPC Contractor shall ensure that stud bolts are ordered extra-long by one diameter to facilitate tensioning.

In order to minimize fabrication at site, major fabricated equipment like reactors, columns/towers, vessels shall be transported in single piece/minimum no. of pieces.

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EPC Contractor shall carry out the route survey for transportation of 'Over Dimensioned Consignments'(ODC) including waterways from source of manufacture/supply to site well in advance of placement of order to ensure unhindered transportation of the same to construction site. EPC Contractor shall arrange cranes of suitable capacities to match with the erection requirements and inform the source and ownership of the same. EPC Contractor shall ensure cranes are generally not more than **10 years** old fitted with all the safety devices and in good working condition. Use of hydra crane is prohibited at site. EPC Contractor shall engage new generation pick and carry cranes for construction material handling.

Crane movement roads are to be clearly identified and marked on the plot plan before planning of such movement. Construction of hard stands for positioning of crane in the fabrication yard and at erection site/locations including approach roads to the hard stands from the plant roads shall be EPC Contractor's responsibility. The hard stands shall be suitable for the crane loads provided by the crane manufacturer.

For the purpose of equipment erection, the EPC Contractor shall deploy a rigging team headed by a rigging foreman/engineer reporting to concerned area engineer. Area engineer should be well conversant with various erection techniques and shall be responsible for preparing erection schemes in accordance with the approved procedures and based on crane manuals and suiting to plant layout. Area engineer shall have to foresee various other construction activities in the surrounding areas while planning erection schemes including safety aspects of man and machinery also.

EPC Contractor shall prepare erection schedule in line with the overall project schedule of the Plant in phased manner with erection schemes of various equipment's, vessels and submit to Owner/PMC for approval. Monitoring and control of erection schedule and erection activities shall be carried out by the EPC Contractor as per the approved construction procedures.

For efficient working and maintenance of construction aids, EPC Contractor shall establish and maintain crane yard/workshop equipped with regular maintenance facilities for various construction aids for carrying out routine field maintenance during performance of the contract. Temporary approach road and hard stands, wherever required for the movement of the cranes and other vehicles for equipment erection and transportation of material shall be properly planned and made by the EPC Contractor. Weekly/fortnightly maintenance shall be planned in such a way that the same does not hamper the erection schedule.

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EPC Contractor shall ensure the timely augmentation of the men, equipment and machinery depending upon the exigencies of the work to meet the overall project schedule and as per instructions of Engineer-in-Charge.

During performances of the work, EPC Contractor must ensure that structures, materials and equipment are adequately braced with guys, struts or any other means as deemed fit & approved by Engineer-in-Charge. Such means shall be supplied and installed by the EPC Contractor s as required till the erection works is satisfactorily completed. Such guys, shoring, bracing, strutting, planking supports etc. shall not interfere with the work of other agencies and shall not damage or cause distortion to works executed by other agencies. All lifting tools, tackles and cranes shall be tested periodically by statutory/competent authorities for their load carrying capacity. Such relevant valid/test certificates shall be submitted to Owner/PMC for review before actual use of the tools, tackles and cranes.



EPC Contractor shall submit the construction equipment deployment schedule. Daily construction equipment deployment report shall be part of “Daily Progress Report” and be submitted by the EPC Contractor to Owner/PMC.

#### 5.14. Construction Manpower

EPC Contractor is required to organize and mobilize construction staff/manpower in a sequential manner to ensure that plant installation is carried out in accordance with the construction schedule defined elsewhere in this bid package. Mobilization of construction staff should be such that the progress achieved in phased manner should match with the overall project schedule.

For this purpose, the EPC Contractor shall clearly indicate in his construction methodology whether work shall be done departmentally or by engaging sub-contractor or the combination of both. EPC Contractor shall prepare detailed methodology for the work to be carried out departmentally as well as through sub-contractors clearly, defining the scope and responsibility of EPC Contractor and his sub-contractor.

The works of all sub-contractors shall be managed by the construction staff of the main EPC Contractor who shall perform the duties of construction management and shall administer, co-ordinate, and inspect the works of the sub-contractors and be responsible for the Quality and

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timely completion of respective works. The EPC Contractor shall establish the pre-requisites for successful completion of sub-contractor s work.



However, by deploying the sub-contractors, as approved by Owner/PMC for any discipline, does not absolve the EPC Contractor for his total responsibility under the subject contract.

The EPC Contractor must note that in case of any sub-contractor's failure to execute the works as per standards/specifications/drawings and/or negligence & disobedience in carrying out any order or instruction of Owner/PMC, the same shall be viewed very seriously and any action as deemed fit in accordance with provision(s) of the contract, shall be taken by Owner/PMC.

EPC Contractor must submit the construction manpower deployment schedule along with the bid. Construction manpower deployment schedule shall clearly indicate deployment of national and international (foreigner) manpower with specific man hours / man months in particular for foreign nationals who shall be deployed at site along with details of their qualification/experience and nationality. Daily construction manpower deployment report shall also be submitted by the EPC Contractor to Owner/PMC on approved format. Any additional manpower of any category required to be deployed during the actual execution of the work to meet the Project time schedule and as instructed by Owner/PMC, shall be mobilized by the EPC Contractor within a reasonable time. Mobilization of such additional manpower by the EPC Contractor shall not entitle him for any additional compensation at all.

All construction supervision, coordination and management activities shall be carried out by the EPC Contractor in accordance with the construction procedures approved by Owner/PMC. EPC Contractor shall prepare construction schedules based on the overall project schedule of the plant and submit the same to Owner/PMC for approval. Monitoring and control of the construction activities shall be carried out as per the approved construction schedule & procedures.

During the execution of works at site, if the EPC Contractor engages sub-contractor for execution of works at site as per approval obtained from Owner/PMC in line with contract's provision and in the event sub-contractor complains in writing to the Owner with regard to the non-payment of their dues from the EPC Contractor for the works executed by them (excluding final payments and payments due after termination of sub-contractor's services by the main EPC Contractor), Owner/PMC reserves the right to make such payment to the sub-contractors directly based on approved measurements with due notice to the EPC Contractor. Owner/PMC

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shall release such payments to sub-contractor at the cost and risk of the EPC Contractor in order to ensure smooth execution of work at site. All such payments made by Owner/PMC to the sub-contractor's shall be deducted from the running account bills or any other payments due to the EPC Contractor.

#### 5.15. Commissioning



EPC Contractor shall submit system/sub system wise dossiers containing all relevant documents/records on completion of mechanical completion to Owner/PMC. EPC Contractor shall supply and fill all initial lubricants, chemicals, consumable, spares required for start-up. Pre-commissioning and commissioning assistance services are in the EPC Contractor scope of work. The scope also includes providing technical experts / technician for critical equipment and equipment supplier's representatives for commissioning supervision.

#### 5.16. Closing of Contract

EPC Contractor on completion of the works in all respects as specified in the contract is required to complete the following activities but not limited to the same for closing of the contract. Payment against EPC Contractor 's final bill shall be released upon the satisfactory completion of activities pertaining to closing of the contract and submission of following documents:

- Certificate for Successful Completion of Commissioning and Performance test as per SCC (Special Conditions of Contract).
- Copy of Owner's approval for final time extension.
- Completion certificate (overall).
- Submission of completion documents as per SCC.
- Reconciliation of Free Issue Material (if any) and surplus.
- Site clearance as per Contract.
- Supply of spares as per SCC. clause reconciliation & handing over
- Submission of operating manuals, if any.
- Submission of Guarantees as specified in SCC.
- Approval from Statutory Authorities and Government bodies.
- Approval from Owner/PMC for extra claims, if any.
- No claims certificate.



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- No dues certificate.
- EPC Contractor Demobilization check list.
- Completion of contract close out checklist.
- Detailed contract close out report.
- Any other documents to be submitted as specified elsewhere in the contract.
- No liability certificate: - Self-certification from the EPC Contractor that no payment is balance to their labourers sub-contractors and vendors on account of service rendered/materials supplied by them.
- Insurance Policies required as per GCC and SCC.
- Validity Extension of various Bank Guarantees required as per contract.



The EPC Contractor shall be required to submit the documents for those activities which are completed before mechanical completion including Q.A. documents, statutory authorities approvals, as built drawings etc. concurrent to mechanical completion.

Balance documents such as completion certificate for performance guarantee test, excluding final completion certificate are to be submitted within seven working days of completion of P.G. Test.

The broad checklist is listed below. However, EPC Contractor to prepare his own exhaustive check-list including detailed procedure for contract close-out and get it reviewed by Owner/PMC before implementation.

#### **EPC Contractor Demobilization Check-list**



Description of activity	Signature with date		
	EPC Contractor	PMC	Owner
Material reconciliation			
Return of surplus material			
Removal of temporary facilities – site office, temporary water/ power connection etc.			

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Clearance of site viz. debris construction material, tool & tackles, equipment etc.			
Reconciliation of entry pass for men/material.			

### **Checklist for Contract Closing**



Item description	Signature with date			
	EPC Contractor	PMC	Owner	Remarks
Handing over of all mandatory and commissioning spares to Owner.				
Handing over of all construction surplus materials to Owner.				
Reconciliation of gate pass (Labour) & clearance.				
Reconciliation of gate pass (Materials) & clearance.				
Certification of final construction measurement & Bill.				
Final documentation handing over, including as-built drawings /documents				
Detailed close out report submission to Owner/PMC				
Ensure proper housekeeping before handing over of plant to Owner.				
Labour statutory compliances				
Submission of certificate from Govt. authority (Weigh bridge & Lifts)				
Final statement of recoveries on account of electricity charges, penalties, etc.				

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Item description	Signature with date			
	EPC Contractor	PMC	Owner	Remarks
No claim certificate by the EPC Contractor & sub-contractors.				
No dues certificate by the EPC Contractor.				
Labour liability certificate - Self certification from EPC Contractor that no payment is balance to their labourer sub- contractors and vendors on account service rendered / materials supplied by them.				
Site clearance certificate endorsed by Owner/PMC.				
Indemnity certificate issued by EPC Contractor				
Completion certificate issued by Owner/PMC (date of time extension should tally with date of completion certificate)				
Copy of Owner's approval for final time extension				
Certificate for successful completion of commissioning and performance guarantee test run				
Submission of Guarantees Certificate as specified in contract				
PF & ESI certification up to the date of completion of the job.				
Validity extension of various bank guarantees required as per contract.				
Settlement of all positive & negative change orders				

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Item description	Signature with date			
	EPC Contractor	PMC	Owner	Remarks
Any other documents to be submitted as specified elsewhere in the contract				

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**LIST OF THIRD PARTY INSPECTION AGENCIES (TPI)**  
**[ANNEXURE– XII TO SPECIAL CONDITIONS OF CONTRACT]**

**Please find below list of THIRD PARTY INSPECTION (TPI) agencies for the inspection of supplies: -**

1. M/s ABS Industrial Verification (India) Pvt. Ltd.
2. M/s Bureau Veritas (India) Pvt. Ltd.
3. M/s Certification Engineers International Ltd.
4. M/s International Certification Services Pvt. Ltd.
5. M/s IR Class Systems and Solutions Private Limited
6. M/s Projects and Development India Ltd. (PDIL).
7. M/s SGS India Pvt Ltd.
8. M/s Tata Projects Limited.
9. M/s TUV SUD South Asia Pvt Ltd.
10. M/s VCS Quality Services Private Limited.