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| Plant<br><b>1.0 MTPA ALUMINA<br/>REFINERY STREAM-5</b>                            | Client<br><b>NALCO</b>                     | Contract Code<br><b>NAL</b> | Document ID<br><b>6695-PMG-G00-BD-0006</b> | Contract No.<br><b>66-6695</b>  |
|  | <b>IT Requirements for LSTK Contractor</b> |                             |  | <b>नालको NALCO</b><br>नेशनल एल्युमिनियम कम्पनी लिमिटेड<br>National Aluminium Company Ltd. |
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| <b>tkIS India / Vendor</b>  |  | <b>tkIS India / Owner / Client</b>            |  |
| <b>Category Codes</b><br>(Submission Purpose)   | <input type="checkbox"/> 1 For Approval<br><input type="checkbox"/> 2 For Review / Comments<br><input type="checkbox"/> 3 For Information<br><input type="checkbox"/> 4 For Engineering<br><input type="checkbox"/> 5 For Enquiry<br><input type="checkbox"/> 6 For Order Placement<br><input type="checkbox"/> 7 Final & Approved<br><input type="checkbox"/> 8 Released for Construction | <b>Category Codes</b><br>(Submission Purpose) | <input type="checkbox"/> 1 For Approval<br><input type="checkbox"/> 2 For Review / Comments<br><input type="checkbox"/> 3 For Information<br><input type="checkbox"/> 4 For Engineering<br><input type="checkbox"/> 5 For Enquiry<br><input type="checkbox"/> 6 For Order Placement<br><input type="checkbox"/> 7 Final & Approved<br><input type="checkbox"/> 8 Released for Construction |
| <b>Acceptance Codes</b><br>(Approval Codes)   | <input type="checkbox"/> 1 Approved<br><input type="checkbox"/> 2 Approved for Manufacturing / Fabrication with Comments as marked<br><input type="checkbox"/> 3 Not Approved / Resubmit<br><input type="checkbox"/> 4 Retained for information / Records<br><input type="checkbox"/> 5 Reviewed<br><input type="checkbox"/> 6 Reviewed as Noted / Resubmit                                | <b>Acceptance Codes</b><br>(Approval Codes)   | <input type="checkbox"/> 1 Approved<br><input type="checkbox"/> 2 Approved for Manufacturing / Fabrication with Comments as marked<br><input type="checkbox"/> 3 Not Approved / Resubmit<br><input type="checkbox"/> 4 Retained for information / Records<br><input type="checkbox"/> 5 Reviewed<br><input type="checkbox"/> 6 Reviewed as Noted / Resubmit                                |
| Remarks for AC2 : 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. |  |   |  |
| This approval / review does not absolve the supplier from the full responsibility for design and fabrication.   |  |   |  |
| Date : / / Name :   |  | Date : / / Name :                             |  |



|      |                         |             |      |          |             |            |      |          |                  |
|------|-------------------------|-------------|------|----------|-------------|------------|------|----------|------------------|
| 0    | ISSUED FOR ITB FOR LSTK | 30/10/17    | PKA  | 30/10/17 | YGR/AMR/NGK | 01/11/2017 | SV   | -        |                  |
| Rev. | Status                  | Description | Date | Prepared | Date        | Checked    | Date | Approved | AC               |
|      |                         |             |      | Barcode  |             |            |      |          | Category Code: - |
|      |                         |             |      |          |             |            |      |          |                  |

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## 1 Purpose

This document gives an overview of Information Technology requirements by the Contractor to be deployed for the execution of LSTK services for NALCO's Alumina Project Unit at Damnjodi in Odisha.

## 2 Definitions & Abbreviations

|            |  |
|------------|--|
| Client     | National Aluminium Company. (NALCO)                                  |
| PMC        | M/s.thyssenkrupp Industrial Solutions (India) Pvt. Ltd. (tkIS India) |
| Contractor | LSTK Contractor  |
| PMC        | Project Management Consultant  |
| IT         | Information Technology   |
| LAN        | Local Area Network   |
| WAN        | Wide Area Network  |

## 3 IT Execution Philosophy /Concept

Contractor shall arrange to submit an overall IT execution philosophy / concept for execution of the Project. Contractor shall include but not limited to the following details:

### 3.1 Infrastructure set up in Home office and at Site office

#### 3.1.1 In Home Office

Contractor shall provide details of Infrastructure set up of their Home office that will be used on the project, along with following details:



- Details of hardware :Operating System, Antivirus, Data backup, etc.
- Networking capabilities : LAN/WAN details, Internet speed etc.
- Proposed communications links

Communications I Collaboration Systems : Email, Audio Video conferencing, etc.

Contractor to include any other details in addition to the above that will be required and utilized for successful execution of the Project.

#### 3.1.2 At Site

Contractor shall furnish the Proposed IT setup of their Site office at Damanjodi to carry out the Site execution activities. This shall include but not limited to IT infrastructure (hardware & software) including secured network connectivity and state-of-the-art communication facilities such as e-mail, etc. The IT set up shall include all the infrastructure components along with the software applications as required for smooth operation of the Site and overall Project execution.

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### 3.2 Software Systems in Home office and at Site

- Contractor shall provide list of software / in house design tools to be used for carrying out Engineering, Procurement, Construction and Commissioning activities.
- Contractor should submit detailed concept on project execution using various software highlighting methods of document management, data consolidation, integration (across all EPC functions and software applications), consistency and quality checks. tkIS India may review the same using electronic reports / application files from Contractors during project execution so that overall project quality can be ensured.
- Contractor should submit mechanism of technical and progress reviews (document &/or data) by tkIS India at mutually agreed intervals.
- The technical review by tkIS India may include 3D Model Reviews. In addition review of other technical information may be done as per mutually agreed procedure, including electronic document and application databases.
- The Contractor shall use suitable robust document management system to ensure document structuring, revisioning, and security. At site, Contractor shall transfer various documents/drawings electronically to save precious project time.
- Contractor shall use suitable project planning, scheduling and progress, cost control applications allowing for project execution as per Client's / tkIS India's work breakdown structure and well integrated with Contractor's all major EPC software's.
- Change order, claims etc. handling shall be facilitated in proper system and provided to tkIS India in predefined formats by tkIS India as described elsewhere in the ITB. The schedule format shall be suitable to be uploaded in tkIS India's planning system i.e. Primavera.
- Contractor shall develop a cost control system and a cost coding structure for the package.
- Contractor shall use robust procurement, expediting & construction systems suitable for material tracking, pre-fabrication & fabrication, work packaging, tracking of shipment either by road or by any other means, erection, mechanical completion, material reconciliation and commissioning with reports to tkIS India. Emphasis is to be given on mechanized construction activities as much as possible.
- Contractor may be required to provide application database backups of E-P-C software for tkIS India's review at mutually agreed intervals.
- Contractor shall submit electronic documents for tkIS India's review with electronic markup as far as possible.

Refer Annexure - I at the end of this document for indicative IT Tools to be used on the project.

## 4 Information Protection



Suitable IP Protection measures should be considered by the Contractor as per the Confidentiality or non-disclosure agreement signed between the Owner and Contractor. Contractor to submit IP Protection philosophy for execution of the Project. Information Security Audits can be conducted as and when required.

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## - Annexure-I

The below mentioned IT tools are indicative and Contractor shall use the same or equivalent softwares. The IT Tools should be clearly indicated by Contractor in the Technical offer.

|  |   |
|--|---|
| <b>2D CAD</b>  |   |
| PFD  | AutoCAD 2016  |
| PID  | AutoCAD 2016  |
| Other Drawings   | AutoCAD 2016  |
| <b>3D CAD</b>  |   |
| 3D Modeling  | PDMS 12.0 SP 6  |
| Model Review   | NavisWorks / Aveva Review/ SmartPlant Review 2014   |
| Stress Analysis  | Caesar II 2016  |
| <b>Process</b>   |   |
| Process Simulation                                       | Aspen plus 8.6  |
| Hazop Study  | PHAWorks 5.21   |
| Heat exchanger thermal design                            | HTRI 7.2.1  |
| <b>Equipment</b>   |   |
| Equipment Specifications                                 | Contractor to use appropriate system  |
| Heat Exchanger Mechanical Design                         | PV Elite 2016 / Auto Pipe Vessel  |
| Column / Vessel Design                                   | PV Elite 2016   |
| <b>Piping</b>  |   |
| Specification & MTO                                      | Contractor to use robust Piping Specification System with reference data for 3D Model   |
| <b>Instrumentation</b>                                   |   |
| Instrument Index / BOM / Specification                   | Contractor to use appropriate Engineering tool  |
| SIL Study  | exSILentia 3.3  |
| <b>Electrical</b>  |   |
| Electrical Database, Motor List, Feeder List, Cable List | Contractor to use appropriate Engineering tool  |
| Electrical System Study                                  | ETAP 12.6   |
| <b>Civil</b>   |   |
| Structural Analysis for Civil                            | StaadPro V8i  |
| <b>Engineering Data Consolidation</b>                    | Contractor to use appropriate Engineering Data Consolidation tool   |
| <b>Planning</b>  |   |
| Project Planning & Progress Control                      | Primavera Enterprise 8.2  |
| Document Management System                               | Contractor to use robust DMS system   |
| Document Transfers with PMC                              | <a href="https://fileexchange.thyssenkrupp.info/Start">https://fileexchange.thyssenkrupp.info/Start</a> method followed for document transfer |

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|---|--|
| <b>Procurement</b>  |  |
| Technical Services for Procurement / Purchase Requisition, PO   | Contractor to use robust system for Procurement                      |
| <b>Inspection &amp; Expediting</b>                              |  |
| Inspection, Expediting & Reports                                | Contractor to use robust system for Inspection & Expediting          |
| <b>Consignment Tracking</b>                                     | Contractor to use appropriate Logistics tracking system              |
| <b>Cost Control</b>   | Contractor to use robust system for cost control system              |
| <b>Construction</b>   |  |
| Site Stores Management / Progress Calculation / Erection System | Contractor to use robust Site Systems                                |
| Mechanical Completion   | Contractor to use robust Mechanical Completion /Commissioning System |
| <b>Other / General Software</b>                                 |  |
| For Standard office Application                                 | MS Office 2010   |
| E Markup and other Application                                  | Acrobat Writer 10.0 / Latest Version                                 |