




Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-AB-0001</b>	Contract No. <b>66-6695</b>
	<b>Document Matrix</b>			<b>नालको NALCO</b> नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
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<p><b>tkIS India / Vendor</b></p> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small; margin-right: 5px;">Category Codes (Submission Purpose)</div> <div style="display: flex; flex-direction: column; gap: 5px;"> <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 &amp; Approved  <input type="checkbox"/> 8 Released for Construction </div> </div> <hr/> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small; margin-right: 5px;">Acceptance Codes (Approval Codes)</div> <div style="display: flex; flex-direction: column; gap: 5px;"> <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 </div> </div> <p style="font-size: x-small; margin-top: 10px;"> <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 style="font-size: x-small; margin-top: 10px;"> <b>This approval / review does not absolve the supplier from the full responsibility for design and fabrication.</b> </p> <p style="font-size: x-small; margin-top: 10px;"> Date : __/__/____      Name : _____ </p>	<p><b>tkIS India / Owner / Client</b></p> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small; margin-right: 5px;">Category Codes (Submission Purpose)</div> <div style="display: flex; flex-direction: column; gap: 5px;"> <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 &amp; Approved  <input type="checkbox"/> 8 Released for Construction </div> </div> <hr/> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small; margin-right: 5px;">Acceptance Codes (Approval Codes)</div> <div style="display: flex; flex-direction: column; gap: 5px;"> <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 </div> </div> <p style="font-size: x-small; margin-top: 10px;"> Date : __/__/____      Name : _____ </p>
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01		Finalized after NALCO's review and Issued for tender	16-02-18	RNJ	16-02-18	PRM	16-02-18	LNN/SJP	
00		Issued for tender	30-10-17	RNJ	30-10-17	PRM	30-10-17	LNN/SJP	-
Rev.	Status	Description	Date	Prepared	Date	Checked	Date	Approved	AC
				Barcode					Category Code: -
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## 1 GENERAL

This document describes the various documents/drawings which shall be submitted by the Contractor for Owner/Consultant's in various categories as given in table.

Owner/Consultant's Approval / review shall be limited to critical documents and to verify compliance to the major requirements of the tender documents. However, it shall be the Contractor's responsibility to ensure full compliance to the tender requirements, all applicable statutory requirements, codes and standards and to fulfill the performance requirements as specified in various clauses of the tender documents. Owner/Consultant's Approval / review shall not relieve the Contractor of these obligations.

Prior to submitting the documents the Contractor shall provide declaration of compliance to the tender requirements. The declaration shall list the tender documents referred in preparing/checking the document.



In case of re-submission of any document, Contractor shall submit "Comment Resolution Sheet" clearly mentioning the Owner/ Consultant comment and resolution adopted.

## 2 DISCIPLINE-WISE LIST OF DOCUMENTS



### 2.1. GENERAL

Sr. No.	Description	Documents required with bid	For Consultant / Owner's consideration during detail Engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Information			
1	COMPREHENSIVE PROJECT INSPECTION TEST PLAN COVERING ALL EQUIPMENTS AND COMPONENTS IN THE PACKAGE.	-	Y	-	-	-	Y	to be submitted within 3 weeks after receipt of LOI/ PO/ order confirmation.
2	Project execution philosophy	-	-	Y	-	-		
3	Interface management plan	-	-	Y	-	-		
4	Write-up on Project Planning, Scheduling, Monitoring and Control System	Y		Y				
5	Manpower Deployment Schedule including for Planning	Y						



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Sr. No.	Description	Documents required with bid	For Consultant / Owner's consideration during detail Engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Information			
6	Front End Schedule (for 90 days)			Y				
7	WBS for detail project Schedules & Function Schedules			Y				Refer Plannin g writeup
8	Detailed Project Schedule (bar chart)			Y				
9	Engineering,Orderi ng , Manufacturing & Delivery Schedule			Y				Refer Plannin g writeup
10	Subcontracting Schedule			Y				Refer Plannin g writeup
11	Progress Measurement Methodology			Y				
12	Progress 'S' Curves			Y				
13	Loopwise Piping Completion Schedule			Y				Refer Plannin g writeup
14	Systemwise Completion Schedule			Y				Refer Plannin g writeup
15	Pre-commissioning / Commissioning Schedule			Y				Refer Plannin g writeup
16	Recovery Schedule			Y				
17	Monthly Programme other than construction			Y				Refer Plannin g writeup

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Sr. No.	Description	Documents required with bid	For Consultant / Owner's consideration during detail Engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Information			
18	Monthly Programme for construction			Y				Refer Plannin g writeup
19	List of documents required for Statutory approval	Y		Y				
20	Start up and commissioning spares	Y			Y		Y	
21	Mandatory spares	Y			Y		Y	
22	Special tools and tackles	Y			Y		Y	
23	1 year operational spares list ( with optional price, validity of the offer for one year )	Y			Y		Y	



**Note: Refer the following documents for construction documents,**

- **Construction Management Requirements “6695-CMG-G00-CA-0004”**
- **Construction HSE Requirements “6695-CMG-G00-CA-0003”**
- **Construction QAQC Requirements “6695-CMG-G00-CA-005”**

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## 2.2. PROCESS



Sr. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Records			
1.	<b>Process &amp; Instrumentation Diagrams (including Utility P&amp;IDs)</b>	Y	Y					
1.1	Process P&IDs			Y				
1.2	Utility P&IDs				Y		Y	
1.3	All Process & Utility P&IDs – As Built				Y			
2.	<b>Utility Summary</b>	Y		Y				
3.	Effluent Summary							
4.	Detailed engineering calculations of Critical items, like Hydraulic calculations for pumps & critical lines, Safety valve capacity, Flare header sizing & Drain header sizing							
5.	Thermal Design Calculations for Heat Exchangers							
6.	Hydrodynamic calculations for columns/Tower							
7.	Detailed hazardous area classification drawings		Y					
8.	HAZOP Report		Y					
9.	HAZOP Closure Report (showing compliance to recommendations)		Y					
10.	SIL Review Report			Y			Y	
11.	Operating Manual			Y				
12.	Pre-commissioning / Commissioning Procedures including Loop-wise Flushing Schemes			Y				
13.	Technical Bid Evaluation Report			Y				For critical items defined by consultant

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Sr. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Records			
14.	Purchase Specifications (Order Specification)				Y			
15.	Fabrication Drawings / Engineering datasheets							
16.	Battery Limit & Interface documents (for eg, Tie-in list)	Y	Y					
17.	3D Model Review (30%, 60%, 90%)			Y				

**Notes:**

- These documents would be reviewed by Consultant for critical / major equipment. List of critical / major equipment shall be identified during Kick-Off Meeting or Detailed Engineering.
- During the course of detail engineering, Consultant /Owner may request documents for any other equipment which are not listed above. Contractor shall furnish requested documents for Consultant /Owner review as and when requested.
- Consultant /Owner reserves the rights to comment, if necessary, on documents listed as 'For Records' or 'For Information'.
- Inspection Test Plans for process items of all FIMs shall be approved by Consultant /Owner. For respective packages, Inspection Test Plans for critical process items as indicated elsewhere in the ITB shall be approved by Consultant /Owner. Inspection Test Plans for non-critical process items as indicated elsewhere in the ITB shall be for record by Consultant /Owner.
- All documents and drawings shall be first reviewed/approved by respective contractors. Documents and drawings shall be furnished to Consultant /Owner for Review/Approval only after the same is Reviewed/Approved by contractor with duly stamped and signed.
- In case any deliverable furnished by contractor is not getting cleared(i.e. reviewed/approved) by Consultant /Owner within two submission cycles due to non-compliance of Consultant /Owner comments by contractor (or its sub-Suppliers), then contractor(along with his sub-Supplier, as applicable) shall come to Consultant's office and resolve all such pending issues across the table. Alternatively, video conference discussion shall be suitably arranged by respective contractor with Consultant /Owner to resolve such issues. It's contractor's responsibility to ensure that document/drawing review schedule is being strictly followed.
- Review of documents by Consultant/Owner representative does not relieve the responsibility of contractor to provide complete and safe operation.

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### 2.3. STATIC EQUIPMENT

Contractor shall submit documents to Consultant/Owner/Licenser for review/comments for equipment which are critical. The extent of Consultant review for equipments shall be limited to:-

- Code/Statutory requirements,
- Applicable codes/Standards & specifications
- Design data, MOC, NDT, PWHT requirements
- Painting, insulations and fire proofing data
- Details and internals
- Technical requirements indicated in specification and data sheets

Additionally for Shell & Tube heat exchangers, following data shall be reviewed by Consultant



- Setting plan drawing, shell & tube side nozzle arrangement
- Tube layout
- Tube bundle details
- Tube to tube sheet joint details etc.

Table-1 below gives details of document to be submitted by Contractor and corresponding scope for Consultant/Owner for approval category.

Sr. No.	Documents/Drawings	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information
			Approval	Review	Information		
1	Technical Bid analysis & Purchase requisition before final order placement including design drawings/data sheets	-	-	Y	-	-	-
2	GA Drawings	-	-	Y	-	Y	Y
3	Detail of Nozzles, manholes, dished ends	-	-	Y	-	-	Y
4	Details of Internals	-	-	Y	-	-	Y
5	Details of External attachments (non-pressure parts)	-	-	-	Y	-	Y
6	Shell developmental drawings with all welded attachments	-	-	-	Y	-	Y
7	Bill of materials	-	-	-	Y	-	Y
8	Design calculations for pressure parts and non pressure parts	-	-	Y	-	-	Y
9	As-Built drawings	-	-	-	Y	-	Y for sr. no. 2 to 8

Above mentioned documents shall be furnished by Contractor to Owner/Licenser/Consultant for Review / Approval / Information for the critical static equipment which will be decided during KOM after order finalisation. This will be based on understanding the criticality of the equipment.





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**NOTE:**

- 1) Contractor may note that typical comments provided on above documents for equipments are to be incorporated in the subsequent submission of the documents. Further, the comments of the general nature marked on above listed equipment shall be applicable for other equipments also which are not requested for consultant review.



In case Contractor is unable to follow the comments, resolution must be sent for Consultant/Owner approval.

- 2) For all other equipments, as built drawings/documents to be submitted by EPC Contractor only for Consultant/Owner information / records.
- 3) During the course of detail engineering, Consultant/Owner may request documents for any other equipment which are not listed above. Contractor shall furnish requested documents for Consultant/Owner's review as & when requested.



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## 2.4. ROTATING EQUIPMENT

Sl. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information
			Approval	Review	Records		
1	Material Requisition (Enquiry Specifications) For Critical equipment			Y			
1.1	Material Requisition (Enquiry Specifications) For other equipment				Y <sup>#</sup>		
2	Technical Proposal of recommended vendor				Y		
3	Bid Evaluation Report (with Proven Track Record for critical equipment)			Y			
3.1	Bid Evaluation Report (with Proven Track Record for equipment other than critical items)				Y <sup>#</sup>		
4	Purchase Requisition (Order specifications) for critical equipment			Y			Y
4.1	Purchase Requisition (Order specifications) for other equipment				Y <sup>#</sup>		Y
5	List of Vendor drawings /documents to be submitted for critical equipment			Y			
5.1	List of Vendor drawings /documents to be submitted for non-critical equipment				Y <sup>#</sup>		
6	Vendor drawings, documents for critical equipment			Y			Y
7	Vendor drawings, documents for other equipment						Y
7.1	Data Sheet, Performance curves				Y <sup>#</sup>	Y	
7.2	General Arrangement & footprint drawing				Y <sup>#</sup>	Y	

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7.3	P&I Diagram with bill of material for Process fluid, lubrication & sealing systems, Nitrogen, instrument air, cooling				Y <sup>#</sup>	Y	
7.4	Equipment start-up / normal operation /normal & emergency shutdown block sequence diagrams for rotating equipment				Y		
7.5	Individual vendor Inspection and Test Plan				Y		
7.6	Mechanical, performance and functional test procedures				Y <sup>#</sup>		
7.7	Utility consumption list (start up, normal operation & shutdown)				Y		
7.8	Cross-sectional drawings with bill of materials (driven equipment, driver, gear box, couplings, seal assemblies)				Y	Y	
7.9	Lateral & torsional analysis reports (as applicable)				Y		
7.10	Sizing Calculations for safety valves, control valve & flow element				Y		
7.12	Noise mapping report including noise plot				Y		
7.13	Inspection & test reports (all tests)				Y		
7.14	Lubrication schedule				Y		
7.15	Final documentation				Y		
8	Pump & compressor data sheets	Y					
9	Equipment List	Y					

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**Notes:**

1. Each Purchase Requisition (Order specifications) shall have following as a minimum:
  - Data sheets for equipment, driver, auxiliaries & instruments updated with vendor data.
  - Performance curves.
  - Detailed purchase specifications for equipment, driver, auxiliaries and instruments
  - Agreed Deviation List
  - Utility consumption list
  - Type Test certificate for Electrical Equipment
  - Sub vendor list
  - Write up for control philosophy, inclusive of interface to DCS / PLC
  - Detailed Vendor Data Requirement/ Schedule
- 2 Contractor shall first submit the completely filled-in Purchase Requisition (Order specifications) for review/records. No vendor Data/Drawings shall be submitted before submission of the Purchase Requisition (Order specifications).
- 3 Each vendor Drawing / Data (listed under Approval, Review & Record) shall have been reviewed by the Contractor for ensuring strict compliance to the Bid Specification requirements and shall carry the Reviewer's signature/seal of the Contractor, prior to submission for PMC's Review / Approval and as Final Documentation. Drawings submitted without Contractor's review shall be returned. Any Deviation to Purchase Specifications (Order specifications) shall be clearly brought out through Deviation Waiver's Permits for PMC's Approval.
- 4 Purchase Requisition (Order specifications) of all critical items is required to be submitted to PMC before placement of order on finally selected vendor for the equipment.
- 5 Engineering documents / drawings related to Electrical and Instrumentation for rotating items (as applicable) have not been included in the above matrix. However, EPC CONTRACTOR shall submit these documents for review / records in line with the approval matrix for Electrical and Instrumentation. This shall be discussed and finalized during the Kick-Off Meeting.





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## 2.5. PIPING AND MATERIAL HANDLING

Sl. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Records			
1	Drawing Index			Y				List of drawings with scheduled/ actual date of release and current revision status on monthly basis.
2a	Line List				Y			List of lines as per process scope of work
2b	Tie-in List		Y					Indicating Tie-in number, line size, service, co-ordinates & reference PNCP drawings
3	Detailed OVERALL PLOT PLAN and UNIT PLOT PLANS with adequate sections	Y	Y					
4	Civil information drawings for steel structure and concrete with load data related to piping.				Y			
5	Key plan and area division drawing				Y			
6	Access ways and escape route plans.			Y				To be generated on unit plot plans as per general engg specification for plant layout
7	Documents and drawings for statutory approval				Y			Submission of documents like tech spec, test certificates, isometric, equipment layout etc. for approval from actual statutory body
8	Material Requisition (MR) including vendor list for all special items viz., Expansion bellows, NACE items, if any special valves & all Material Handling Equipment. One representative MR of particular item viz. Pipes strainers springs etc.				Y			
9	Final documentation				Y			For erection at site





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Sl. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Records			
10	AS BUILT documentation.				Y			Incorporate all the design changes at site for isometrics, equipment layout, Piping plans, special supports, line list etc.
11	AS BUILT 3D MODEL				Y			
12	Vendor Drawing Index			Y				Drawing for review by CONSULTANT/ Owner from this list shall be indicated by CONSULTANT.
13	As built drawing notes.				Y			All relevant changes at site to be incorporated.
14	Final As-built 3D model				Y			All relevant changes at site to be
15	Details at the Battery Limits with plans and sections indicating the tie-in points including routing & supporting of lines from the Tie-in points			Y				
16	flow diagram			Y			Y	
17	G.A. Drawings of all belt conveyors			Y			Y	
18	G.A. Drawing of modified CV 06 Belt conveyor			Y				
19	Motor Power calculations for all belt conveyors, including modified belt conveyor CV 06				Y		Y	
20	Stock pile capacity calculations				Y		Y	
21	Filled in data sheets for conveyors				Y		Y	
22	G.A. Drawing of all Prisam / Diverter gates			Y			Y	
23	G.A. Drawing of all Slide gate valves				Y		Y	
24	G.A. Drawing of all Belt weighs scales			Y			Y	
25	G.A. Drawing of crusher house			Y			Y	

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26	G.A. Drawing of Vibrating screens			Y			Y	
27	G.A. Drawing of Crushers			Y			Y	
28	G.A. Drawing of Stacker			Y			Y	
29	G.A. Drawing of Bucket wheel Reclaimer			Y			Y	
30	G.A. Drawing of Cross band magnetic separator				Y		Y	
31	G.A. Drawing of Metal detectors				Y		Y	
32	G.A. Drawing of sampling cutter				Y		Y	
33	G.A. Drawing of EOT crane			Y			Y	
34	G.A. Drawing of Dust Supression systems			Y			Y	
35	G.A. Drawing of Apron feeder with spillage conveyor			Y			Y	
36	G.A. Drawing of Surge bin with rod gate			Y			Y	
37	G.A. Drawing of Hoists / chain pulley blocks				Y		Y	
38	G.A. Drawing of interconnecting chutes				Y		Y	
39	Filled in data sheet for Crusher	Y		Y				
40	Filled in data sheet for Vibrating screens	Y		Y				
41	G.A. Drawing of Stand by hopper			Y			Y	
42	Hydraulic calculation of -Fire water network -Sprinkler/ spray system -Automatic spray/sprinkler system				Y			
43	Contaminated rain water(CRW)/ Oily waste (OWS)/Process Waste Collection system flow calculations				Y			
44	Storm water system				Y			
45	Fire Water layout				Y			



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Sl. No.	Description	Docu- ments required with bid	For Consultant/ Owner's consideration during detail engineering phase			Constructi on phase	Final Doc phase for information	Remarks
			Appro val	Revi ew	Recor ds			
46	Firefighting : MR's/ PR's/ Vendor drawings for hydrants,monitors, long range monitors, deluge valves,water spray nozzles, landing valves, valves, portable extinguishers, hose boxes and hose reels, eye wash/ safety showers.				Y			
47	Test certificates, guarantee certificates, TAC or equivalent approval certificates				Y			
48	Installation, operation & spare parts manual for firefighting equipment				Y			
49	Overall Fire Fighting Scheme			Y				

**Notes:**



1. All documents /drawings submitted for Owner/ CONSULTANT/Licenser's review /approval shall comply with the contract documents viz. Design basis, Job specifications, relevant standards /specifications /procedures, P&IDS, Licenser's requirements mentioned in the bid document Owner/ owner's representatives reserves the right to change the category of documents from review to approval/information and vice -versa.
2. Contractor shall proceed for further detail engineering after incorporation of owner/ owner's representative's comments.
3. Review of documents by Owner/ owner's representative does not relieve the contractor of responsibility to provide complete and safe operation





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## 2.6. ELECTRICAL



Sr. No.	Description	Document s required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approv al	Review	Information			
<b>A</b>	<b>Drawing &amp; Document Index</b>			Y				
<b>B</b>	<b>Design calculations, System study (in ETAP)</b>							
1	Transformer sizing calculation			Y				
2	Cable sizing calculation (MV/LV)			Y				
3	Battery & charger sizing calculation			Y				
4	UPS sizing calculation			Y				
5	Earth grid sizing & lightning protection			Y				
6	Illumination level calculations				Y			
7	Cable tray / trench sizing				Y			
8	Power factor improvement capacitor sizing calculation			Y				
9	System study reports - Short circuit/ Load flow/ Largest motor starting/ Harmonics			Y		Y	Y	
<b>C</b>	<b>SLD, Block Diagram</b>							
1	Key SLD - Power		Y			Y	Y	Size A0 or A1
2	Detail SLD (Power) including all ratings, protections and metering		Y			Y	Y	Size A0 or A1
3	Lighting & Small Power SLD including Normal, Emergency, DC Critical lighting and Convenience receptacles			Y		Y	Y	
4	SLD for DC Supply Network				Y	Y	Y	
5	SLD for UPS Supply Network				Y	Y	Y	
<b>D</b>	<b>Lists / Schedules</b>							
1	Electrical Load List & Load summary	Y(Note 8)		Y		Y	Y	
2	Feeder List				Y	Y	Y	
3	Cable list (HV, LV Power & Control, Lighting etc. )				Y	Y	Y	
4	Cable Routing List				Y	Y	Y	

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Sr. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Information			
5	Operation Mode List			Y		Y	Y	Includes control philosophy (hardwired / soft link) for each process consumer
6	Lighting / Power Panel Schedule				Y	Y	Y	
7	Junction Box Schedule				Y	Y	Y	
8	Cable Termination Schedule / Interconnection diagrams including Package Units				Y	Y	Y	
9	Drum Schedule				Y	Y		
10	Load Shedding Philosophy and Load list for Load Shedding			Y		Y	Y	
11	Protective relay setting Schedule/Table			Y		Y	Y	
12	Interface I/O list (for SCADA)			Y		Y	Y	
<b>E</b>	<b>Procurement Engineering</b>							
1	<b>Inquiry Specifications :</b> Technical Specification, Datasheet , Control Schematics & Inspection Test Plan for inquiry of the main Equipment like - Transformers HV & LV Switchgears & Distribution Boards LV Bus duct HV & LV Motors HV & LV Cables VFDs, UPS & ACDBs, Battery & Battery Charger & DCDBs			Y				
2	<b>Inquiry Specifications :</b> Technical Specification, Datasheet & Inspection Test Plan for inquiry of other / bulk items i.e Light Fixtures, Cable Trays, Lighting & Small Power Boards, LCS, LBS,				Y			

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Sr. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Information			
	JBs, Sockets etc.							
3	Technical Specification, Scope of work and Supply BOQ, Installation BOQ for Erection Tender.			Y				
4	Technical Bid Analysis for all electrical items as per E.1 above			Y				
5	Technical Bid Analysis for all electrical items as per E.2 above				Y			
6	Purchase requisitions / Order Specs. for all electrical items				Y	Y	Y	
<b>F</b>	<b>Vendor documentation</b>							
1	Vendor document index			Y				
2	Technical Documents: SLD, GA, Layout. Datasheets, Control schematic & wiring diagrams, Application check, Performance curves, Name plate.			Y		Y	Y	Refer Note 5
3	Other Documents : Bill of material Loading details Civil information Terminal details, End connection details.				Y	Y	Y	Refer Note 5
4	Type Test Reports				Y	Y	Y	
5	Inspection Test Plans / QAP				Y	Y	Y	
6	Inspection Test Reports with Routine, Type and Acceptance test Certificates				Y	Y	Y	
7	Catalogues and Brochures				Y	Y	Y	
8	Operation, Maintenance, Preservation, Installation, Testing & Commissioning Manual.				Y	Y	Y	
9	Statutory Approval Certificates				Y	Y	Y	



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Sr. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Information			
<b>G</b>	<b>Layouts</b>							
<b>1</b>	<b>Substations and MCC Rooms</b>							
1.1	Equipment layout / Arrangement		Y			Y	Y	Including clearances, Cutouts, Safety and statutory requirements, Erection reqmts. etc.
1.2	Cable tray / trench layout – Plan & sections		Y			Y	Y	Including Cable tray elevation, number, sections, connection details etc.
1.3	Lighting Layout			Y		Y	Y	
1.4	Earthing & Lightning protection layout			Y		Y	Y	
1.5	Communication & FA system layout			Y		Y	Y	
<b>2</b>	<b>Layouts – Overall / Unit wise</b>							
2.1	Overall cable routing (tray / trench), Earthing and Lighting layouts		Y			Y	Y	
2.2	Unit wise including control room & other buildings. Electrical Equipment Layouts, Cable tray routing layouts , Earthing & Lightning Protection layouts, Lighting layouts, FA & Communication System layouts			Y		Y	Y	
<b>H</b>	<b>Material take-off for electrical bulk material</b>							
1	Earthing & Lightning Protection material, lighting, Bulk material i.e. Cable glands, Steel, Termination kits, Cable trays, sockets, etc.				Y	Y	Y	
2	MTO for FA system, PA system, Telephone system, SCADA				Y	Y	Y	
<b>I</b>	<b>Installation, Testing &amp; Commissioning</b>							

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Sr. No.	Description	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information	Remarks
			Approval	Review	Information			
1	Standard installation drawings / Hookups for Installation : Shall include all Power, Lighting, Earthing & Lightning Protection, FA, Communication, etc.				Y	Y	Y	
2	Civil information drawings.				Y			
3	QAP for Site Installation, Testing and Commissioning Procedures. Site Testing Protocols / Formats			Y		Y	Y	
4	Documentation for Mechanical Completion			Y		Y	Y	
<b>J</b>	<b>Other Documents</b>							
1	Drawings and documents required for Interface with other agencies i.e. Package vendors, sub Contractors, etc.				Y	Y	Y	
2	Drawings and Documents required for Statutory Approval				Y			
3	Final as-built of all drawings and documents (engineering deliverables, vendor documentation, etc.)				Y	Y	Y	
4	Modelling of the following electrical items in 3D PDMS model – Above ground - Cable Trays ( 300 mm and above), Cable Tray supports, Junction Boxes, Field mounted Lighting / Power panels and other Aux. / Control panels, Local control station & Load break switch, Socket outlets ( welding, convenience), FA equipment, Communication System equipment. Underground facilities such as Cable trench, conduits for cables, Street light / high mast light foundations. Earth pits, Conduits for road crossing.			Y				

"Y" indicates YES – In LSTK Contractor Scope Of Work

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**NOTES:**

1. The above list is indicative. Any other document / drawing / deliverable / interface / service not listed above but required to carry-out engineering / procurement / Installation / Testing and Commissioning / Maintenance shall also be prepared by LSTK contractor during detail engineering and submitted to Owner / PMC for approval / review / information.
2. Owner / PMC reserve the right to change the category of documents during detail engineering from review to approval / information and vice versa depending on the criticality of the document.
3. All the above documents, as applicable, are also required for the package units ordered by the LSTK contractor.
4. LSTK contractor shall first review / approve the vendor documents. After their review / approval is complete, the documents shall then be forwarded to Owner / PMC for their review / approval.
5. Detail scope of approval / review / information of vendor documents shall be decided during detail engineering based on the document index for each equipment and the type of equipment.
6. Documents and Drawings shall be complete with all necessary details required as per best engineering practices. All details required for review and approval e,g dimensions, isometric and 3D views, material of construction, data sheets, clarity for installation, testing and commissioning shall be included.
7. For No. of copies of drawings / documents to be issued by LSTK Contractor for approval / review /information, refer Vendor Documentation Procedure.
8. **LSTK Contractor shall specify the maximum power demand in MW alongwith the bid.**

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## 2.7. INSTRUMENTATION

Sr. No.	Documents/Drawings	Document s required with bid	For Consultant/ Owner's consideration during detail engineering phase			Constructi on phase	Final Doc phase for information	Remarks
			Approval	Revie w	Information			
1	Documents / drawings list and schedule		Y			Y	Y	
2a)	Sizing calculations for			Y	Y		Y	Note - 1,2
2b)	Control valves, Flow elements							
3	Enquiry Specifications for all critical instrumentation items (as indicated in Note -3)		Y	Y			Y	Note -3
4	Bid evaluation for critical items (as indicated in Note -4)				Y		Y	Note - 4
5	Order specifications for all critical instrumentation items (as indicated in Note -3)			Y		Y	Y	Note -3
6	Enquiry Specifications for non critical instrumentation items (items other than those indicated in Note -3)				Y		Y	
7	Order specifications for non critical instrumentation items (items other than those indicated in Note -3)				Y	Y	Y	
8	Level sketches				Y	Y	Y	
9	Logic diagrams			Y	Y	Y	Y	Note - 1,2



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Sr. No.	Documents/Drawings	Document s required with bid	For Consultant/ Owner's consideration during detail engineering phase			Constructi on phase	Final Doc phase for information	Remarks
			Approval	Revie w	Information			
10	Functional loop Schematics (Only for Complex Loops)			Y	Y	Y	Y	Note - 5
11	Point data base				Y	Y	Y	
12	Cable / Tubing schedule				Y	Y	Y	
13	Instrument duct/ tray/ trench layout			Y		Y	Y	
14	Instrument location, JB location				Y	Y	Y	
15	Air supply distribution drawing				Y	Y	Y	
16	Instrument Index				Y	Y	Y	
17	Sub-vendor list		Y				Y	
18	a) Installation Standards/Hook-up Drawing b) Instrument mounting Details			Y	Y	Y	Y	Note 16
19	Certificates (statutory/ test/ calibration/ inspection)				Y	Y	Y	
20	Installation, operation				Y	Y	Y	





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Sr. No.	Documents/Drawings	Document s required with bid	For Consultant/ Owner's consideration during detail engineering phase			Constructi on phase	Final Doc phase for information	Remarks
			Approval	Revie w	Information			
	and maintenance manuals							
21	Loop Checking/ Calibration Report				Y	Y	Y	
22	As-built drawings/ documents				Y		Y	
23	Instrument power consumption				Y		Y	
24	Instrument air requirement				Y		Y	
25	Sub vendor drawings/ documents				Y	Y	Y	
26	Hardware console layout				Y	Y	Y	
27	Layout of local panel, analyser panel (as applicable)			Y		Y	Y	
28	Power supply distribution / feeder requirements			Y	Y	Y	Y	Notes - 1,2
29	Instrumentation/ Electrical interface details				Y	Y	Y	
30	Control room and rack room layout		Y			Y	Y	
31	Cable entry point for various rooms			Y		Y	Y	
33	DCS/Package PLC Input /Output Summary				Y	Y	Y	

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Sr. No.	Documents/Drawings	Document s required with bid	For Consultant/ Owner's consideration during detail engineering phase			Constructi on phase	Final Doc phase for information	Remarks
			Approval	Revie w	Information			
34	Serial Data Mapping List of various DCSs, package PLCs, Control Equipments, MCC etc.				Y	Y	Y	
35	Co-ordination Procedure with other EPC Contractors		Y				Y	
36	Inspection test plans		Y		Y	Y	Y	Note 7
37	<b>Control System (DCS/PLC/Package Control Equipment) Sub- vendor documents</b>							
i	DCS/PLC specifications		Y			Y	Y	
ii	Control panel front and rear layout (if panels are required.)			Y		Y	Y	
lii	Overall dimensional Drawing. (Including weights & clearances required for all equipments)				Y	Y	Y	
iv	Control room equipment/ panel foundation details (Channel base Drawings.)				Y	Y	Y	
v	Control System Architecture drawing		Y			Y	Y	
vi	Power consumption				Y	Y	Y	

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			Approval	Review	Information			
	list and UPS requirement							
vii	Ventilation & air conditioning requirement				Y	Y	Y	
viii	Air purity requirements for Control Room				Y		Y	
ix	Recommended illumination levels				Y		Y	
x	Nest loading details/ Input/ output assignment			Y	Y	Y	Y	Notes – 1,2
xi	Loop Wiring diagram				Y	Y	Y	
xii	Interconnection cable details				Y	Y	Y	
xiii	Graphic display Drawings, group display, trending details			Y		Y	Y	
xiv	Format (Work sheets)  for Overview, group view requirement			Y		Y	Y	
xv	All display printouts including					Y	Y	Note- 17
a)	Graphic display, log and MIS printouts			Y				
b)	Logging and log formats requirements			Y				
c)	Trending and trend grouping			Y				

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			Approval	Revie w	Information			
	requirements							
xvi	Shut down/ interlock					Y	Y	Notes – 1,2
a)	Wiring drawings. (Relay panel)				Y			
b)	Logic/Ladder diagram			Y	Y			
c)	(in case of PLC) System cabinet/ racks wiring diagrams				Y			
xvii	Bill of material				Y	Y	Y	
xviii	Software details			Y		Y	Y	
xix	Special software details			Y		Y	Y	
xx	Software loop drawings				Y	Y	Y	
xxi	Factory testing and acceptance procedures		Y				Y	
xxii	Site testing and acceptance procedure		Y			Y	Y	
xxiii	Testing reports and log books				Y	Y	Y	
xxiv	Special test equipment/ tool requirement for maintenance				Y	Y	Y	
xxv	Catalogues including technical information				Y	Y	Y	
xxvi	System configuration/ programming				Y	Y	Y	

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			Approval	Revie w	Information			
	manuals							
xxvii	Installation manual				Y	Y	Y	
xxviii	Operation & maintenance manual				Y	Y	Y	
xxxi	Document & drawing schedule			Y		Y	Y	
xxxii	Power supply Distribution			Y		Y	Y	
40	<b>Analyzer</b>							
i	Analyzer Shelter/ Cabinet layout (as applicable)		Y	Y		Y	Y	
ii	Bill of material				Y	Y	Y	
iii	Installation and wiring diagram			Y		Y	Y	
iv	Dimensional outline of all items				Y	Y	Y	
v	Utility connection details				Y	Y	Y	
vi	Electrically heated cables, air conditioner details				Y	Y	Y	
vii	Training manual				Y	Y	Y	
viii	Installation, operational and maintenance manuals of all items				Y	Y	Y	
ix	Details of probe and sample handling			Y		Y	Y	



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Sr. No.	Documents/Drawings	Document s required with bid	For Consultant/ Owner's consideration during detail engineering phase			Constructi on phase	Final Doc phase for information	Remarks
			Approval	Revie w	Information			
	system							
41	<b>Fire &amp; Gas Detection System</b>					<b>Y</b>	<b>Y</b>	
i	System Architecture		<b>Y</b>			<b>Y</b>	<b>Y</b>	
ii	Test Certificates				<b>Y</b>	<b>Y</b>	<b>Y</b>	Note -6
iii	Calibration Report of Gas Detectors				<b>Y</b>	<b>Y</b>	<b>Y</b>	
iv	Gas Detector Layout/Location Plan		<b>Y</b>	<b>Y</b>		<b>Y</b>	<b>Y</b>	
v	Factory acceptance test procedure		<b>Y</b>				<b>Y</b>	
vi	Site acceptance test procedure		<b>Y</b>			<b>Y</b>	<b>Y</b>	
vii	Operating and maintenance manual with Catalogue of all type of Gas Detectors				<b>Y</b>	<b>Y</b>	<b>Y</b>	
42	Site Handover Procedure		<b>Y</b>		<b>Y</b>	<b>Y</b>	<b>Y</b>	
43	Licensor Specified Special Items			<b>Y</b>		<b>Y</b>	<b>Y</b>	
44	Procedure for Site Work		<b>Y</b>		<b>Y</b>	<b>Y</b>	<b>Y</b>	

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**NOTES:**

- Only critical documents as identified by CONSULTANT from EPC Contractor's drawing schedule shall be reviewed.
- Documents other than those identified for review by CONSULTANT/ Owner shall be submitted for information.
- Review shall be done by CONSULTANT/Owner for automated systems like DCS, Package PLCs, online critical items like Control Valves, On-off Valves, Coriolis Mass Flow Meters, Electromagnetic Flow Meters, Ultrasonic Mass Flow Meters, Vortex Flow Meters etc., Analysers and Tank Gauging Instruments as per agreed MR/Drawing Schedule of EPC Contractor. Only Enquiry Specifications for instrumentation items involved in quality aspects like Analysers etc. shall be reviewed by Licensors.
- Review shall be done for DCS, Package PLC and all Analyser Systems.
- Complex loops include loops with cascade control, ratio control, split range loops and loops with mathematical or logical functions.
- Test certificates of all the calibration gases and portable calibrators shall be furnished.
- Inspection Test Plans for instrumentation items of all FIMs shall be approved by CONSULTANT/Owner. However,
- for respective EPC packages, Inspection Test Plans only for critical items as indicated in note 3 above
- shall be Approved by CONSULTANT/Owner. Inspection Test Plans for items other than those indicated in note 3
- shall be submitted to CONSULTANT/Owner for information/records.
- Deliverables listed above shall be first reviewed/approved by respective EPC contractors. Documents and drawings shall be furnished to CONSULTANT/Owner for Review/Approval only after the same is Reviewed/Approved by EPC contractor with duly stamped and signed.
- In case any deliverable furnished by EPC contractor is not getting cleared(i.e. reviewed/approved) by CONSULTANT/Owner within two submission cycles due to non-compliance of CONSULTANT/Owner's comments by EPC contractor (or its sub-vendors), then EPC contractor(along with his sub-vendor, as applicable) shall visit CONSULTANT's office and shall resolve all such pending issues across the table. Alternatively, video conference discussion shall be suitably arranged by respective EPC contractor with CONSULTANT/Owner to resolve such issues. It's EPC contractor's responsibility to ensure that document/drawing review schedule is being strictly followed.
- EPC Contractor shall prepare & submit the as built drawings / documents after commissioning. All the drawings/documents listed shall be converted into "As Built" after commissioning of Project. "As Built" shall include documents generated by EPC Contractor & documents generated/submitted by various Sub-vendors.
- All instrument documents/drawings shall be submitted after issue of P&IDs. The submission of document / drawing shall be sequenced in such a way that submitted document /drawing is neither dependant nor changed due to drawing/document yet to be submitted. Document/drawing submission schedule shall be made accordingly.
- All the above documents, as applicable, are also required for the package units sub ordered by the EPC Contractor.
- Approval, Review and Information as marked has to be strictly followed.
- Any other document/drawing not listed above (including the package vendor's item sub-ordered by the EPC Contractor) but required to carryout the engineering and for integration of other packages sub-ordered by EPC Contractor shall also be prepared and furnished to Owner/CONSULTANT.
- The drawings/ documents requirement as identified by licensor shall also be supplied even if the same drawings/ documents are not covered in the above table.
- Only typical shall be reviewed, rest will be retained for information only.

Plant 1.0 MTPA ALUMINA REFINERY STREAM-5	Client NALCO	Contract Code NAL	Document ID 6695-PIP-552-AB-0001	Contract No. 66-6695		
 thyssenkrupp	Document Matrix			नालको  NALCO नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.		
				Rev	01	Page

20. To be reviewed by Owner's Process Engineers.
21. Sub-vendor deliverables other than those indicated in Sr. No. 37 above shall not be reviewed/approved by CONSULTANT.
22. Modifications/changes incorporated in any document or drawing with respect to the previous submission of the same shall be clearly indicated with Revision Triangles and Revision numbers.

## 2.8 CIVIL, STRUCTURAL AND ARCHITECTURAL:

Sr. No.	Documents/Drawings	Documents required with bid	For Consultant/ Owner's consideration during detail engineering phase			Construction phase	Final Doc phase for information
			Approval	Review	Information		
1	Concept Notes / Design Specifications / Technical Specifications for Construction Works		Y				Y
2	Architectural Layout Drawings	Y	Y				Y
3	Foundation / Piling Layout			Y			Y
4	Building / Structure Floor Layouts			Y			Y
5	RCC Detail Drawings				Y		Y
6	Structural Steel Detail Drawings				Y		Y
1	7 Fabrication drawings				Y		Y
8	Layout of Roads and Storm Water Drains		Y				Y
9	Fire proofing Drawings				Y		Y
10	Chemical Resistant Lining Drawings				Y		Y
11	Calculation Notes				Y		Y
1	12 Reinforcement bar bending schedule				Y		Y