





Plant 1.0 MTPA ALUMINA REFINERY STREAM-5	Client NALCO	Contract Code NAL	Document ID 6695-EQM-552-CA-0013	Contract No. 66-6695		
 thyssenkrupp	Scope of Work Rotating Equipments			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.		
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This specification was earlier issued with Document ID – 6695-EQM-G00-CA-0013.



tkIS India / Vendor		tkIS India / Owner / Client	
Category Codes (Submission Purpose)	<input type="checkbox"/> 1 For Approval <input type="checkbox"/> 2 For Review / Comments <input type="checkbox"/> 3 For Information <input checked="" 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	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	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
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 : _____	

00	IFD	Revised as per NALCO's comments and Issued for engineering	03/04/18	ATB	03/04/18	CSP	03/04/18	CSP	-
Rev.	Status	Description	Date	Prepared	Date	Checked	Date	Approved	AC
			Barcode						Category Code: -
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1.0 Rotating Equipment



- 1.1 CONTRACTOR shall refer the Licensor basic engineering documents (enclosed elsewhere in the tender documents) besides technical specifications and project engineering specifications.
- 1.2 CONTRACTOR'S scope of work shall include residual basic engineering (if any), detailed engineering, procurement, shop inspection and testing, complete supply, transportation to site, receipt and handling at site, storage & preservation, erection, alignment, site testing, pre-commissioning and commissioning as described further.
- 1.3 CONTRACTOR shall procure all Rotating Equipment including auxiliaries from Approved Suppliers only listed and attached with the tender Documents.
- 1.4 CONTRACTOR shall follow the specifications including, but not limited to, Licensor Basic engineering documents, Engineering Design Basis, Technical Specifications and Project Engineering Specifications and shall carry out the detail engineering.
- 1.5 CONTRACTOR shall refer and comply with Project Engineering Specifications for Electrical, Instrumentation, Static Equipment, Piping and Quality Assurance as applicable to various rotating equipment. These specifications are included discipline wise in the tender documents.
- 1.6 In case of conflicts between various requirements, more stringent requirements shall be followed by CONTRACTOR and such discrepancies shall be notified to Owner / Consultant for resolution.
- 1.7 CONTRACTOR shall carry out the following activities as a minimum but not limited to for procurement of Rotating Equipment:
 - 1.0.7.1 CONTRACTOR shall prepare the enquiry specifications / documents for Rotating equipment to be purchased including commissioning spare parts.
 - 1.0.7.2 Heat load of Owner's equipment to be addressed for HVAC sizing by the CONTRACTOR.
 - 1.0.7.3 CONTRACTOR shall follow the project spare philosophy document attached with tender for Rotating equipment while purchasing the spare parts or two years, mandatory spares etc.
 - 1.0.7.4 CONTRACTOR shall follow the project spare philosophy document attached with tender for Instrument and Electrical items while purchasing the spare parts or two years, mandatory spares etc for the items which are supplied with Rotating equipment.
- 1.8 The enquiry documents for procurement of Rotating Equipment shall be inclusive of following minimum content:
 - Technical Specifications that describe special requirements/features of the Equipment such as brief description of the system, process requirements, operating philosophy, start-up and shutdown condition, site conditions and utilities available during normal operation, start-up, normal and emergency shutdown, special controls and safety requirements, lubrication and sealing systems, supplier's battery limits etc. (as applicable).
 - Technical Bid Evaluation/Analysis (TBE / TBA) and technical recommendations for each requisition.
 - Mechanical Data Sheets of Driver, Driven equipment, Accessories and Auxiliaries etc. Indicating operating parameters, performance requirements, construction features, instrumentation and controls, inspection and testing etc.
 - Scope of supply / work of equipment supplier
 - Supplier data requirements which shall be in line with the supplier data specified in applicable codes and standards and tender documents
 - Supplier's Experience Record (Proven Track Record)
 - Spares Parts requirement
 - P&IDs of the Equipment Process and Auxiliary systems
 - Applicable specifications, codes and standards
 - Requirement of supplier's services during equipment installation, instrument hook-up, pre-commissioning and commissioning activities
 - Requirements for special tools and tackles
- 1.9 CONTRACTOR to note each equipment data sheet shall reflect all requirements as specified in licensor BEP documents / datasheets, Engineering Design Basis, Project Engineering Specifications

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and other applicable codes and standards. Further following guidelines shall be followed while preparation of each equipment data sheet:

- CONTRACTOR shall use technical specifications and equipment data sheet formats to prepare new data sheets. (The datasheet formats shall be shared to successful bidder)
- CONTRACTOR to develop an Instrumentation and Control Data Sheet for all equipment / packages which shall reflect instrumentation and controls included in Equipment Supplier's Scope. These data sheets shall reflect all requirements as covered in mechanical data sheets, P&IDs, Licenser Specifications, Project Engineering Specifications, standards and other attached or referred specifications (as applicable).
- CONTRACTOR shall develop Project Quality Plan which shall reflect all inspection requirements as covered in Inspection Test Plan requirement for rotating equipment, mechanical data sheets, Licenser data sheets, Project Engineering Specifications, standards and other attached specifications (as applicable). This document shall be approved by Owner / Consultant. Based on this document supplier shall prepare their Quality Assurance Plan.

- 1.10 Supplier's Experience Record shall elicit information on operating conditions and construction features of the supplier's past supply in sufficient detail so as to prove offered equipment's proven track record for intended service and supplier's competency in design, manufacture and service of offered equipment. It shall be the responsibility of CONTRACTOR to see that experience record for the offered equipment meet the acceptance criterion as mentioned in this document and in Project Engineering Specifications. It is to be noted that reference equipment shall have to be manufactured from the proposed manufacturing facility of supplier.
- 1.11 CONTRACTOR shall prepare the Technical Bid Evaluation / Analysis (TBE/TBA), Technical Recommendation for each Rotating Equipment and furnish the same for Owner / Consultant review as per "Documents matrix".
- 1.12 CONTRACTOR shall prepare the detailed Purchase Requisition (Order Specifications) for each Rotating Equipment and furnish the same for Owner / Consultant review as per "Documents matrix".
- 1.13 CONTRACTOR shall carry out the detailed review, checking and approval of supplier engineering / fabrication drawings and documents for equipment to ensure adequacy and consistency with the design, safety and operability requirements.
- 1.14 CONTRACTOR shall submit all engineering drawings / documents/ data as specified in the "Documents matrix" attached in the tender documents after carrying out the checks as detailed above for review / approval / records of Owner / Consultant.
- 1.15 CONTRACTOR shall ensure that, all inspection and tests are conducted for all equipment at Supplier's shops/site as specified in approved project quality plan, supplier's QAP & project Codes and Standards etc.
- 1.16 CONTRACTOR shall submit suppliers' / seal supplier's recommendation of appropriate seal codes & flushing plans indicated against respective pumps, which shall be approved by Owner / Consultant.
- 1.17 CONTRACTOR shall procure the pre commissioning / commissioning spares from the equipment suppliers and make it available well before commissioning of Plant /Equipment. In case, any additional spares are consumed during commissioning the same to be supplied by the CONTRACTOR at no additional cost to the Owner / Consultant.
- 1.18 For all Equipment / Packages supplier shall furnish a list of special tools / tackles required for assembly and maintenance. Such tools / tackles (1 set per tag) shall be supplied by the supplier and shall form part of supply by CONTRACTOR to Owner.
- 1.19 For all rotating equipment mandatory spares have been listed out separately in the tender document. CONTRACTOR to ensure the mandatory spares are considered as per project spare philosophy.
- 1.20 Besides mandatory spares, CONTRACTOR shall ensure that the spare parts for two year normal operation if and as ordered by the Owner shall be procured from equipment supplier and the same shall be handed over to the Owner.
- 1.21 CONTRACTOR shall carry out a review of all rotating equipment and attempt to select minimum number of models those meet majority requirements to maximize interchangeability. Equipment Suppliers shall be consulted on this exercise. CONTRACTOR shall also furnish the spare part interchangeability records.
- 1.22 Equipment which is transported by sea shall have sea-worthy packing.
- 1.23 CONTRACTOR shall thoroughly check the equipment (including all the auxiliaries) and spares etc. upon receipt at site for any damage in transit / short supply and intimate the supplier immediately.

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- Reports shall be prepared by CONTRACTOR in such cases. CONTRACTOR shall be responsible for early resolution and shall take necessary action to make good the damaged/short supplied items.
- 1.24 The CONTRACTOR shall develop detailed storage and preservation procedure based on their proven experience and supplier's standard procedures suitable for the site conditions. CONTRACTOR shall strictly follow these storage and preservation procedures for all rotating equipment and packages. CONTRACTOR shall be responsible for any damage to any equipment due to non-adherence of storage & preservation procedure and any such damage to any part/ equipment shall be made good/replaced by new part/equipment without any time and/or cost implication to Owner / Consultant.
 - 1.25 CONTRACTOR shall carry out erection of all rotating equipment at the specified location on the properly designed and cast foundation.
 - 1.26 CONTRACTOR shall carry out the inter-connections at all interface points such as main process, utility connections, electrical, instrumentation connections etc.
 - 1.27 CONTRACTOR shall note that consumables, lubricants etc. required during erection, flushing, commissioning and guarantee test run of Rotating Equipment shall be CONTRACTOR'S scope.
 - 1.28 A consolidated list for all rotating equipment shall be provided indicating type of lubricant, grease, oil etc. giving specifications, quantities, brand name. CONTRACTOR shall give a recommendation for inventory of lubricants that should be held in stock by Owner for 2 years normal operation.
 - 1.29 CONTRACTOR shall supply & install all maintenance facilities sized for handling the heaviest single piece of equipment for maintenance. The maintenance facilities like EOT/HOT cranes, hoists, chain pulley blocks and monorails for all units covered in the package shall be provided. CONTRACTOR shall ensure that layout of equipment shall be in such a way that sufficient space shall be available around the equipment for dismantling, maintenance (including platforms for maintenance) and space for access to cranes.
 - 1.30 All the equipment / packages wherein regular performance monitoring and approach of maintenance / operation crew is expected must have platform around the equipment.
 - 1.31 CONTRACTOR shall ensure presence of equipment manufacturer on site for supervision of erection, pre-commissioning and commissioning for all critical Rotating Equipment. CONTRACTOR shall also ensure that equipment manufacturer checks the correctness of erection of all critical rotating equipment prior to pre-commissioning / commissioning activities.
 - 1.32 Environmental Protection measures
 - CONTRACTOR shall prepare a list of all emission sources along with their normal and peak values. Adequate measures are to be incorporated in the design and engineering for control / mitigation to meet the local and national environmental regulations based on the emission data.
 - All noise data shall be provided by the CONTRACTOR and subsequently included in the overall noise calculation report CONTRACTOR shall carry out noise mapping of the entire unit / facility. CONTRACTOR shall submit noise mapping report along with noise plot (output from noise mapping software) for review of Owner / Consultant. Maximum allowable noise pressure level shall be as specified in Basic Engineering Design Data. Adequate safeguards including acoustic insulations on piping wherever necessary shall be incorporated by CONTRACTOR to meet the local and National noise regulation standards.
- CONTRACTOR shall implement the noise mitigation philosophy for the project across all applicable disciplines, including but not limited to the following activities:
- Preparation of equipment noise data sheets for all relevant items of equipment or equipment trains and incorporates the same into equipment requisitions.
 - Ensure supplier compliance with noise requirements.
 - Ensuring that the supplier conducts all applicable noise acceptance tests.
 - Preparation of procedure and implement necessary action for acoustic control