BHARAT HEAVY ELECTRICALS LIMITED

BAP – Ranipet, 632406

MM – PURCHASE Department (FGD)

NIT

Date: 03-09-2022

RFQ towards BHEL Ranipet Enq for.: Underslung crane

Sub: Requirement for "Design, Manufacture, Pre-dispatch inspection (AIA-TPI), Packing, Forwarding, dispatch, transportation, Supply, Supervision for "installation, Erection, inspection, Testing, commissioning, & Trial run" of Under Slung crane (USC)" for BHEL Site as tabulated below by BHEL-Ranipet.

Scope of supply: As subjected above in confirmation with Quality plan and tech Spec. The various packages consists as below

Package : Under Slung crane, delivery at NALCO, Damanjodi, Orrissa					
As per Spec FGD:USLCRANE:Rev 00, for oxidation blower and RC pump					
Sl	**Material code**	**DESCRIPTION**	**Qty Set**	**Delivery req**	**Quoted/ Not quoted**
1	RFW21758 0001	Under slung Electric Crane capacity 5 T, LT runway track Bottom EL (+) 11.10 m, floor level at EL (+) 0.0 m, travel length 12.5 m, LT span 6 m	1	24-12-2022	
2	RFW21758 0002	Supervision for Erection and installation of above supplied crane at project site as per approved drawings and tech spec.	1	24-08-2023	
3	RFW21758 0003	Supervision for Commissioning, inspection and performance testing of supplied crane as per Approved drawing and tech spec.	1	24-02-2024	

Destination: BHEL Site, Nalco, Damanjodi, Orrisa

***Delivery required date**:*

For main equipment supply: As per above table or within 5 months from the date of manufacturing clearance, whichever is later. Bidder to quote the best possible delivery from the date of manufacturing clearance. Abnormal quoted delivery, liable for rejection of offer.

Supervision for erection and installation shall be as per above table or within 8 months from the date of supply, whichever is later.

Supervision of commissioning, testing, trial run and PG test shall be as per above table or within 8 months from the date of completion of installation and erection whichever is later.

BHARAT HEAVY ELECTRICALS LIMITED

BAP – Ranipet, 632406

MM – PURCHASE Department (FGD)

Technical Pre-Qualification requirement (PQR):

SL	Pre-Qualification Requirement (PQR)	Bidder's Reply with Supportive documents
1	Vendor should be a manufacturer of Crane / Hoist. Pls submit the relevant documentary evidences.	
2	List of customer to whom Underslung Cranes / EOT Cranes / Cranes of same capacity or higher supplied to silo/bunker application, FGD application, Coal fired Power plant, Industrial application, Nuclear power plant. Proof of such experience have to be submitted along with the bid in form of relevant documentary evidence.	
3	Minimum one number of Previous inspection and test report to be furnished for the same capacity or higher Capacity along with Previous purchase order of same item. No need to submit too many POs. Pls attach the full set as PO copy and inspection reports.	
4	Approval by Nalco Damanjodi: - Procurement will be preferred from the Nalco approved vendors. For those, who are not approved by NALCO, requested to provide the following additional documents, for submission to NALCO by BHEL towards vendor approval a. Infrastructure and manufacturing capacity b. Product portfolio and range c. Previous 3 year balance sheet	

Technical requirement

(a). Manufacturing: Document Submission-Drawing, Data sheet and quality plan shall be submitted upon ordering for approval by BHEL. **Manufacturing clearance** will be provided upon approval of drawing with data sheet and QAP. Manufacturing shall be as per attached technical specification in the bid, Approved drawing, Quality plan and Data sheet. **Inspection**: as per Cl (b) below stated. **Dispatch Clearance**: Upon submission of inspection reports along with test certificates in original and Packing list dispatch clearance will be provided by BHEL.

(b). Inspection: Inspection (call to be raise by supplier at BHEL CQIR portal) before despatch at supplier's works (as per Quality terms and Quality plan) by BHEL/authorised inspection agency (TPI-Third Party Inspection) ~~and~~ ~~**customer NTPC (joint inspection shall be applicable**~~), for indigenous supplies at BHEL cost. **Inspection includes for painting and packing** also, as applicable. All the Test and inspection reports shall be sent to BHEL-Ranipet for review and dispatch clearance. Packing list and weighment details shall be sent for release of GMS by Engineering-BAP. Base on release of GMS, CoC No shall be issued by QC-BHEL. On receipt of CoC, and packing list, request letter from commercial-BAP to be submitted to QC-BHEL for issue of MDCC.

(c). Packing requirement: Packing shall be waterproof as per tender technical specification, and the material code with description & Supplier name shall be marked on the packing**.**

(d). Documents: Accepted IR copy along with relevant test certificates (in original) before despatch to be given to BHEL. This is required for Dispatch clearance.

(e). Reverse Auction shall be conducted, Overall package basis L1 shall be taken for Ordering.

(f). Delivery Location: FOR destination (BHEL Site), as per bid

(g). Supervision for Installation, E&C, Trial run, Testing and performance test: Bidder to quote of overall cost basis including travel, boarding, lodging, local conveyance, tools and tackles etc. No payment will be given other than the quoted cost. **Detailed list of facilities (labours, technicians, Material handling equipment, General tools) required for supervision for E&C, to complete the activity as per vendor plan shall be submitted along with drawing approval after ordering.**
Note: For each crane separate 2 visit shall be planned, even though for same site location. For example, 3 crane is required at location A, then 6 separate visit shall be planned. All the visit as per BHEL call only. All the pre-requisite shall be shared on post supply phase. Bidders are requested to quote accordingly.

(h). CEBG : Not Applicable

(i). PBG for 10% of supply value valid for agreed guarantee period. In case of not submitted, equivalent values shall be with hold for 36 months, and will be released with supplementary invoice.

List of documents to be attached (filled in signed stamped copy**):**

1. NIT/ GeM bid copy
2. Tender Tech spec (BHEL) for each project package. Relevant annexures (Data sheet, Paint Scheme etc) and drawings shall also be submitted
3. Filled in QAP (Sample attached) along with CQR and annex Q.
4. Filled-in Make in India declaration on Letter head (format attached)
5. PBG format
6. Udyam portal registration copy if MSE bidder
7. PQR-Technical documents
8. Pls submit financial documents (Balance sheet for profit and loss statements for previous 3 years)
9. Additional documents for vendor approval

Buyer Additional terms:

1. Quote shall be in INR only inclusive of Taxes (GST).
2. MSE firm shall upload the UDYAM portal registration certificate
3. Documentary evidences shall be uploaded for PQR
4. Bidder shall submit the filled-in signed stamped copy of documents as listed above
5. PBG for 10% of material value to be submitted shall be valid for 24 months from the date of supply plus 3 months for claim period. BG shall be as per format attached and from the list of consortium of bank as attached.
6. Non Submission of any of required documents as listed above, attracts for offer rejection.
7. Overall Package basis evaluation methodology shall be adopted
8. Payment: For supply, 90% payment through NEFT within 90 days (45 days for MSE and 60 days for Medium category for MSME quote and UDYAM registration certificate submission) after receipt and acceptance of material based on site delivery acknowledgement slip along with BG at BHEL Ranipet. Balance 10% of supply and 100% of supervision for E&C shall be paid within 90 days (45 days for MSE and 60 days for Medium category for MSME quote and UDYAM registration certificate submission) after completion of Supervision for E&C, based on site acknowledgement.
9. Jurisdiction at Ranipet, Tamilnadu shall be applicable.

For any query: Kindly provide the "Underslung Crane-NALCO" in the subject of mail.

mail: ckbharti@bhel.in; jecashish@bhel.in
Ph: 9488 58 9287 / 7010 75 1675

You may raise the query through GeM also.

TECHNICAL PRE-QUALIFICATION REQUIREMENT (PQR) FOR UNDER SLUNG CRANE (IN CASE OF OPEN TENDER)

SL NO	Technical Pre-Qualification Requirement (PQR) for FOR UNDER SLUNG CRANE	Bidder's Reply with Supportive documents
1	Vendor should be a manufacturer of Crane / Hoist.	
	List of customer to whom Underslung Cranes / EOT Cranes / Cranes of same capacity or higher supplied to silo/bunker application, FGD application, Coal fired Power plant, Industrial application, Nuclear power plant.	
	Minimum one number of Previous inspection and test report to be furnished for the same capacity or higher Capacity along with Previous purchase order of same item.	

Bidder's Seal & signed

	Bharat Heavy Electricals Ltd ***Boiler Auxiliaries Plant*** Ranipet-632 406	**FLUE GAS DESULPHURISATION** **TECHNICAL SPECIFICATION**

SPECIFICATION NO: FGD:USLCRANE01	**REV:00**

TECHNICAL SPECIFICATION OF UNDER SLUNG ELECTRIC CRANE

REF: FGD: USLCRANE01 REV: 00

00	10-08-20202	Fresh Release	Pradeep Kumar Behera (AE-I/EDC-FGD)	Jyotish Kumar Patel (DM/EDC-FGD)	Kesavan V (SDGM/EDC-FGD)
REV	**DATE**	**DESCRIPTION**	**PREPARED**	**CHECKED**	**APPROVED**

	Boiler Auxiliaries Plant, **Bharat Heavy Electricals Limited,** Ranipet - 632406, Tamilnadu, INDIA.	Enquiry No. & Dt.:	
		Due Date :	
		Supplier's Ref.:	
		Date :	

Specification cum Compliance Certificate for UNDER SLUNG ELECTRIC CRANES

Note:-

1. The 'Offered' Column and where applicable, the 'Deviations' & 'Remarks' Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous or unsustainable information against any of the clauses of the specifications / requirements shall be treated as non-compliance.

2. The offer and all documents enclosed with offer should be in English language only.

3.A Single or Double travelling Bridge / Grider (As per vendor design) Underslung Electric Crane shall be running on the lower flange of two runway Track or Beam for Long Travel.

Name & Address of the supplier:	
Telephone No.	
Fax No.	
e-mail :	

Scope: Supply,Testing,Installation, Supervision of Erection & Commissioning of UNDER SLUNG ELECTRIC CRANE complying with the following specification

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
A	**TECHNICAL DETAILS:**				
0.0	The requirement (s) specified under different sections of this specification shall be considered while quoting for this tender. **In case of variance between sections, the requirement of CUSTOMER TECHNICAL SPECIFICATION & DATA SHEET shall prevail. Customer contract specification & data Sheet of cranes provided as Annexure I to the specification & shall be referred strictly.**	Vendor to confirm			
1.0	**APPLICATION:**				
1.1	The subject crane is meant for the purpose of handling small to medium components (Recirculation Pump & Oxidation Blower) during maintanence	Vendor to note			
1.2	The Recirculation Pump house & Oxidation Blower room environment will be dust prone, humid, and ambient temperature going up to 45 to 50 º C.	Vendor to note			
2.0	**SCOPE OF SUPPLY:**				
2.1	Design, manufacture, supply, Supervision of erection & commissioning of Single Girder Underslung Cranes with Festooning type arrangement of feeding power to trolley assembly, shrouded DSL for long travel with mountings and suitable current collector system.	Vendor to confirm			
3.0	**QUANTITY REQUIRED:**	As per Enquiry			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
3.1	**Under Slung Electric cranes as per Enquiry**	Vendor to confirm			
3.2	The Vendor shall Offer suitable Festooning type & shrouded typr DSL System	Vendor to confirm			
4.0	**MAIN FEATURES (Crane Operational Features):**				
4.1	**Speed System: CUSTOMER TECHNICAL SPECIFICATION - Annexure I**	Vendor to confirm			
4.2	**End Clearance:** End clearance to be fixed to suit the workshop building clearances as per the enclosed tender **ANNEXURE IV.**	Vendor to submit the clearance drawing .			
5.0	**CONTROL: CUSTOMER TECHNICAL SPECIFICATION - Annexure I**	Vendor to confirm			
5.1	**Type of Control / Operation:**	Vendor to confirm			
5.2	**Control Voltage: CUSTOMER TECHNICAL SPECIFICATION - Annexure I**	Vendor to confirm			
5.3	**Input Power Supply:** CUSTOMER TECHNICAL SPECIFICATION - Annexure I	Vendor to confirm			
5.4	**Duty Class: Class –** CUSTOMER TECHNICAL SPECIFICATION - Annexure I	Vendor to confirm			
5.5	**Mechanism Group Classification :** CUSTOMER TECHNICAL SPECIFICATION - Annexure I	Vendor to confirm			
5.6	**DESIGN STANDARD OF CRANE** : CUSTOMER TECHNICAL SPECIFICATION - Annexure I	Vendor to confirm			
5.7	**WIRE ROPE HOIST:** CUSTOMER TECHNICAL SPECIFICATION - Annexure I	Vendor to confirm			
6.0	**STRUCTURAL FABRICATION *(Constructional Details):***				
6.1	**Bridge/Girder: Under slung Electric crane for capacity as per Enquiry.**	Vendor to confirm			
6.2	The following shall be carried for Girders, end carriage, crab, gear box and rope drum	Vendor to confirm			
6.3	The Plates of thickness 25mm and above shall be ultrasonically tested.	Vendor to confirm			
6.4	NDT requirements on weldments shall be as follows : a) Butt weld in tensions : 100% RT and 100% DPT b) Butt weld in compression : 10 % RT and 100 % DPT c) Butt welds in rope drum : 100 % RT and 100 % DPT d) Fillets Welds : Random 10 % DPT	Vendor to confirm			
6.5	**Raw Material: S**teel plates confirming to IS 2062 tested and certified for quality by reputed inspection authorities, shall be used.	Vendor to confirm and produce certificates.			
6.6	**Welded Joints *(To be followed for Girder fabrication)*:**				
6.7	Welding Electrodes for all ***Horizontal Welding E 7018*** Electrode only should be used.	Vendor to confirm			
6.8	Welding Electrodes for all ***Vertical Welding E 7048*** Electrode only should be used.	Vendor to confirm			
6.9	**Welded Joint Testing:** All Butt Welded Joints (both compression/ tension and flanges / web joints) shall be subjected to 100% X-Ray Testing and X-Ray Films to be produced for BHEL evaluation and form part of the documentation.	Vendor to confirm			
6.10	**Splice Joints:** No splice joint is allowed in Girder Fabrication. ***[Girder shall be of single piece only].***	Vendor to confirm			
6.11	**Wheel Assembly:**				
6.12	The Wheel Assemblies of Cross Travel (CT) and Long Travel (LT) shall be of ***Live Axle System*** with L-Type Bearings only. Details to be submitted by the vendors.	Vendor to submit details			
6.13	**Heat Treatment & NDT Examination:**				
6.14	The Trolleys shall be stress relieved, if necessary, by thermal heat-treatment process after welding & NDT. All welding shall be tested by NDT means [MPI, LPI & RT] after stress relieving operation.	Vendor to confirm and produce necessary certificates			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
6.15	**Machining Operation:**				
6.16	All mechanical mating surfaces and wheel seating areas are to be machined to the required finish and protected.	Vendor to confirm			
7.0	**Painting Instructions:**				
7.1	**As per ANNEXURE III**	Vendor to confirm			
8.0	**MECHANICAL ELEMENTS:**				
8.1	**Gears:** Gears in all the Stages shall be helical in design and to be of machined, lapped and hardened	Vendor to confirm			
8.2	**Gear Box Casing:** Shall be of fabricated type and stress relieved by thermal heat-treatment process, prior to machining.	Vendor to confirm			
8.3	Reduction gear shall be tested for reduction ratio, backlash & contact pattern. Gear box shall be subjected to no load run test, to check for oil leakage, temperature raise, noise and vibration.	Vendor to confirm			
8.4	**Rope Drum:** The hoist mechanism shall consist of a grooved rope drum driven by electric motor through gears. Rope Drum Shall be of fabricated type and stress relieved. The circumferential weld joints shall be tested by 100 % X-Ray quality. Each end of the rope shall be anchored to the drum in such a way as the anchorage is readily available for maintenance. Each rope shall have two (2) full turns of the drum when the hook is at its lowest position and one (1) spare groove when the hook is at its highest position. The leading rope taken by the drum should not slope sideways when slack and it should not be caught between the gear wheel.	Vendor to confirm			
8.5	**BOTTOM BLOCK** The bottom block shall be of enclosed type and shall have guard against rope jamming in normal use. It shall have standard forged swivel shank hook fitted on antifriction thrust bearing. Lock to prevent hook from rotation and locking arrangement to prevent accidental unlocking shall be provided. Pulley of the bottom block shall be provided with antifriction bearings	Vendor to confirm			
8.6	**ROPE GUIDE**: Rope guides shall have wear resistant property. It shall prevent slack rope and retain wire rope in the barrel grooves.	Vendor to confirm			
8.7	**Type of Coupling:** Only Geared Couplings to be used for ***a) Between Electric Motor and Gear Box, b) Between Gear Box and Rope Drum and c) Between Gear Box and Trolley Wheels.***	Vendor to confirm			
8.8	**Wheels:** Shall be of forged and Wheel Tread hardened to **300-350 BHN**. Wheels shall be fitted with L-Type Bearings	Vendor to confirm			
8.9	**Wheels:** Shall be of forged and Wheel Tread hardened to **300-350 BHN**. Wheels shall be fitted with L-Type Bearings	Vendor to confirm			
8.10	**Mechanical Joints:** Fit Bolts (as per IS 3640 –1982) for all joints coming in main members.	Vendor to confirm			
8.11	**Pulley Dimension:** Rope Pulley diameter shall be 23 times that of Rope diameter.	Vendor to confirm			
8.12	**Lifting Hook:** Hooks shall be of C-type as per IS 15560 & with antifriction bearing and provided with latches.	Vendor to confirm			
8.13	All test including proof load test as per relevent IS standard shall be carried out.Certificate shall be submitted to BHEL for review.	Vendor to confirm			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
8.14	MPI/DPT shall be carried out after proff load test	Vendor to confirm			
8.15	**Lubrication:**				
8.16	Suitable lubrication system shall be provided for gear box, all rotating parts wherever applicable. One number grease gun shall be supplied per project.	Vendor to furnish			
8.17	Bidder's scope shall also include supply and filling of all chemicals, reagents, resins, lubricants, grease, filters and consumable items for operation up to COD including top up requirements at the time of issuance of PAC/declaration of COD. All lubricants proposed for the plant operation shall be suitable for all operating and environmental conditions that will be met on site consistent with good maintenance procedures as instructed in the maintenance manuals.	Vendor to furnish			
8.18	**Bumpers (End Stoppers):**				
8.19	Bumpers of adequate size shall be provided both in CT & LT to stop the crane in the event of an overshoot by the operation.	Vendor to provide			
8.20	**Guards:** Suitable guards shall be provided for all rotating parts like couplings, wheels etc..	Vendor to provide			
8.21	**FORGINGS(**wheel,gears,pinions,axle,hooks&hook trunion) **a)** All forgings greater than or equal to 50mm diameter or thickness shall be subjected to **ultrasonic** test **.b)** DPT/MPI shall be done after hardfacing and machining	Vendor to provide			
8.22	**WIRE ROPE:**				
8.23	Wire rope shall be of pre-formed type, hemp cored, regular lay 6/36 construction and Braking loads for the hoist rope shall not be less than six times the calculated load in the ropes at the drum, based on rated load on hook plus the weight of the bottom block plus the weight of the rope. The rope shall be of sufficient length so that two full wraps shall remain on the drum at the extreme low position of the hook. Minimum number of falls of rope shall be four (4).Hoisting rope shall confirm to IS 2266.The rope shall be hot dip galvanised. The rope shall be free from kinks and shall be continuous.	Vendor to confirm			
9.0	**ELECTRICAL ELEMENTS:**				
9.1	Electrical system comprises of 63A Fuse or to Suit Switch Unit/MCB, Control panel,Pendent Push Button Station, DSL, Pendent cable, Hoist, Long travel & Cross travel motors with brake, other electrcal item etc., to make the system complete. All these items are included in the scope of supply of the vendor.	Vendor to confirm			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
9.2	**Motors:** The motors shall meet IS 325 or equivalent international standards.The motor shall be designed for frequent reversal, braking and acceleration similar to crane duty. The motor shall be rated for S4 duty 40% cyclic duration factor. Maximum continuousrating shall have at least 10% margin over maximum load demand including voltage and frequency variations, temperature rise and other variations. The body shall have two earthing points on opposite sides. The motor shall be provided with an enclosure fully meeting the requirements of IP 55 as per IS 4691 meant for outdoor service. In addition rain-hood shall be provided for the motors. The motor shall be Totally Enclosed Fan Cooled (TEFC) type or Totally Enclosed Surface Cooled (TESC) type. Motors shall have minimum class "F" type insulation with temperature rise limited to class “B”. The winding shall be suitable for successful operation in hot, humid, & tropical climate with the ambient temperature of 50 degree centigrade. The temperature rise shall be limited to 70 degree C (by resistance method) over an ambient of 50 degree C. The insulation shall be given fungicidal and tropical treatment as per IS 3202. The frame shall be cast and rigid. The motors shall be designed for both directions of rotation. The terminal box shall be weather and water tight and suitable for outdoor service, having a degree of protection of IP 55. It shall be provided with removable front cover for making connections. Neoprene gaskets at cover joints shall be provided. The terminal box shall be suitable to withstand 31 MVA for 0.25 seconds without damaging the box with fuse protection. Nickel-plated brass doublecompression cables glands and ATC lugs shall be provided to receive the power cables. If the hoist motor is placed inside the rope drum, then the motor lead wires can also be taken out without necessity of a terminal box.The motor vibration and noise shall be within the limitsspecified in IS 12065 and IS 12075. **The noise level shall be limited to 85dB.**	Vendor to confirm			
9.3	**SWITCHES:** Heavy-duty power switches with quick make and brake mechanism meeting relevant IS requirements shall be provided. The switches shall be adequately rated to get complete protection even under abnormal operating conditions.	Vendor to confirm			
9.4	**PUSH BUTTONS:** The Pendant Push Button station shall have the following Push Buttons: a) Hoist, b) Lower, c) Forward, d) Reverse & e) Emergency Stop. The Emergency stops Push Button shall be Lockable type. The Pendant Push Button station shall have the following LED clustered type indicating lamps: a)SUPPLY ON, b)HOIST MOTOR Raise/Lower, c)CT MOTOR Forward/Reverse, d)HOIST MOTOR TRIP and e)CT MOTOR TRIP.The Pendant Push Button station shall be supported from the Control Panel with hot dip galvanized Link Chain. The Pendant Push Button Station shall be connected to the Control Panel using multi -core copper flexible control cable of 10 m length. The Enclosure of Pendant Push button station shall be designed for IP 55 degree of protection. Push buttons shall be spring return type with 2NO+2NC self-reset contacts rated for 5A at 415volts AC. The push buttons for different operations like “HOIST/ LOWER, FORWARD / REVERSE”, “STOP” shall have different colours. All Push buttons shall be as per relevant IS. The Push buttons shall be properly shrouded so as to prevent water & dust entry.	Vendor to confirm			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
9.5	**CONTACTOR:** All Contactors shall be suitable for DOL application with coils suitable for the control voltage provided by the supplier. Contactor construction shall be rugged.For control purpose, only auxiliary contactors shall be used. Relays are not acceptable in place of Auxiliary Contactors. The power contactors shall have Mechanical interlocking in addition to Electrical interlocking so that at any point of time only any one of the two Power contactors (either up or Down, Left or Right) will be energized.The contactor shall be AC4 duty for inching operation.	Vendor to confirm			
9.6	**THERMAL OVER LOAD RELAYS:** Thermal over load relays wherever provided shall be ambient temperature compensated with suitable setting ranges. The relay shall be auto reset type. The relay shall be provided with a door mounted hand reset push button. The O/L relay shall have inbuilt single phasing protection as built-in feature.	Vendor to confirm			
9.7	**FUSES** Only HRC fuses of plug-in type with Class-4 AC duty shall be provided. Fuse base shall be rugged. Adequate shrouding shall be provided for live accessible parts and it shall be possible to replace any fuse without damages of contacts when the circuit is alive.	Vendor to confirm			
9.8	**INDICATING LAMPS:** LED clustered type indicating lamps of low watt consumption with suitable built-in series resistor shall be used. LED and lenses shall be inter-changeable and easily replaceable from the front. The indication lamps shall be properly shrouded so as to prevent the dust and water entry. Indicating lamp shall be provided for “HOIST MOTOR ON”,”CT MOTOR ON”, ”HOIST MOTOR TRIP”, “CT MOTOR TRIP”,“SUPPLY ON” ETC.	Vendor to confirm			
9.9	**WIRING:** The control panel wiring shall be complete in all respects and ready for connection of external power for terminating external cables. Necessary double compression Nickel plated Brass cable glands along with suitable terminal blocks and lugs to receive trailing cable and pendent push button cable shall be provided.The cable glands, lugs and terminal blocks shall not be supplied loose. Point to point wiring shall be adopted. Not more than two wires shall be terminated at each terminal. Wiring shall be neatly laid out and bunched together suitably. The wiring shall be done with minimum 2.5 sq.mm multi stranded copper, PVC insulated 1100V wires. Crab wiring: Junction box shall be avoided for wiring of crab and in bridge end.	Vendor to confirm			
9.10	**TERMINATION** All power and control wires shall be terminated on terminal block/component using crimping type Annealed Tinned Copper lugs/connectors. CLIP-ON type terminal block shall be used. The terminal blocks shall be used for control wiring. The terminal blocks shall be complete with insulated barriers, terminal studs, washers, nuts, lock nuts and identification strips with terminal numbering.	Vendor to confirm			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
9.11	**CONTROL PANEL** Control panel shall be provided to house the electrical components like fuses/MCB, contactors, relays, isolators, switches, and control supply transformers etc along with necessary wiring. The components shall be clearly identified by labels. The panel shall be made of sheet steel of minimum 2mm thick and shall be dust and vermin proof, suitable for outdoor condition. Adequate number of DOUBLE COMPRESSION type cable glands (heavy duty) of brass with nickel plating and Annealed Tinned Lugs shall be provided for incoming and outgoing power and control cables. The cable glands shall be provided with dummy plugs. The door, removable cover plates, and metal-to-metal joints shall be fully neoprene gasketted. The control panel shall be designed for IP 55 degree of protection.	Vendor to confirm			
9.12	**PAINTING OF CONTROL PANELS: (The below details areTentataive, Final details will be given in during drawing approval stage)** 1) Surface treatment with minimum seven tank process 2) Panel 2 coats of synthetic Enamel paint. 3) Shade- Siemens Grey 4) The minimum coating thickness of power coated surfaces shall be minimum of 80 microns. Paoint Shade shall be as per **ANNEXURE-VI.**	Vendor to confirm			
9.13	**CONTROL SUPPLY TRANSFORMER:** Dry type, step down control supply transformer 415V / 110V AC shall be provided to derive control supply for starter operation & indication. The transformer shall have minimum class 'B' insulation. The rating of the transformer shall be decided based on maximum power consumption plus 25% margin. The transformer shall meet IS 12021.	Vendor to confirm			
9.14	**FUSE SWITCH UNIT/MCB:** Metal enclosed, FOUR POLE fuse switch unit (TPN)/MCB of 63A, 415V, 3 phase 4 wire AC, rating suitable for outdoor location shall be provided to receive purchaser's supply. The enclosure shall be suitable for IP 55 degree of protection. Suitable Nickel-Chromium plated brass DOUBLE COMPRESSION glands and crimp type ATC lugs to receive purchaser's 4C-16 sq. mm Al armoured/ unarmoured FRLS cable & vendor's 4C-4 sqmm copper un-armoured cable shall be provided. Cable glands and lugs shall also be provided for the flexible trailing cable. The FSU/MCB shall be provided with 2 No's of earthing terminals with M12 screws, nuts and washers. The FSU/MCB shall be located at a fixed location about 5 m away from the start position of the hoist.The Fuse Switch unit/ MCB shall be wall mounted.	Vendor to confirm			
9.15	**CABLE: AS PER ANNEXURE-VI**	Vendor to confirm			
9.16	**Crane Operation: CUSTOMER TECHNICAL SPECIFICATION - Annexure I**	Vendor to confirm			
9.17	**The Crane Control Voltage shall be 110 V AC**	Vendor to confirm			
9.18	**Type of Brakes:**				
9.19	**Hoist Brakes:** CUSTOMER TECHNICAL SPECIFICATION - Annexure I	Vendor to confirm			
9.20	**CT & LT Brakes:** CUSTOMER TECHNICAL SPECIFICATION - Annexure I	Vendor to confirm			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
9.21	**BRAKES:** The brakes shall apply when either the motor starter or the main power switch is in OFF position or in the event of "power failure". The braking capacity of the brakes shall be 150% of the rating of the hoist.	Vendor to confirm			
9.22	**Protection:** All Panels, Limit-Switches and Motors shall have IP 54 protection.	Vendor to confirm			
9.23	**Electric Contactors:** All Panels shall have SIEMENS/L&T/GE contactors suitable for Crane operations.	Vendor to confirm			
9.24	**Contactors Rating:** The rating of all Contactors shall be at least 50% higher than the respective electric motor full load current, at the specified duty cycle.	Vendor to confirm			
9.25	**Long Travel Motion:** A Dual Drive Mechanism shall be provided for LT (Long Travel) Motion.	Vendor to confirm			
9.26	**Illumination:**				
9.27	2 Nos. of 400 Watts HPMV Lamps & fittings shall be provided under the Bridge and 1 No. shall be provided under CT Trolley. Fittings shall be of non-integral type. (Total lights 3 Nos.)	Vendor to confirm			
9.28	All Electric Panels shall be provided with suitable illumination for visibility and trouble shooting.	Vendor to confirm			
9.29	**Drives : CUSTOMER TECHNICAL SPECIFICATION - Annexure I** a) Main Hoist, c) Long Travel and d) Cross Travel.	Vendor to confirm			
9.30	**Limits:** Each hoist shall be provided with both rotary and counter weight limits. Limit switches shall be provided for both CT & LT. The limit switches shall have enclosures designed for IP 55 degree of protection. Proximity switches are not acceptable in place of Limit Switches.	Vendor to confirm			
9.31	**DSL & Current Collector System: CUSTOMER TECHNICAL SPECIFICATION - Annexure I**				
9.32	Supervision of Erection of DSL and supply of fixing elements are vendor's scope.	Vendor to confirm			
9.33	Current collection system suitable for the above cranes shall be offered along with the crane.	Vendor to confirm			
9.34	**PENDANT PUSH BUTTON STATION** The Pendant Push Button station shall have the following Push Buttons. Hoist, Lower, Forward, Reverse & Emergency Stop. The Emergency Pus Button shall be Lockable type.The Pendant Push Button station shall have the following LED type Indicating lamps.SUPPLY ON, HOIST MOTOR ON, CT MOTOR ON, HOIST MOTOR TRIP, CT MOTOR TRIP.The Pendant Push Button station shall be supported from the Control Panel with hot dip galvanized Link Chain. The Pendant Push Button Station shall be connected to the Control Panel using multi-core copper flexible control cable of 10m length. The Enclosure of Pendant Push button station shall be designed for IP 55 degree of protection. Push button shall be spring return type with 2NO+2NC self reset contacts rated for 5A at 415 volts AC. The push buttons for different operations like “HOIST/LOWER,FORWARD/REVERSE”, “STOP” shall have different colours. All push buttons shall be as per relevant IS.The Push button shall be properly shrouded so as to prevent water & dust entry.	Vendor to confirm			
9.35	**EARTHING:** The structure, motor frames and enclosures of electrical equipment shall be effectively connected to earth complying with Indian Electricity Rules and IS 3043. The earthing materials from hoist to FSU/MCB shall be in supplier’s scope.	Vendor to confirm			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
9.36	**WARRANTY:** The warranty period shall be twenty four (24) months from the date of Supply or eighteen (18) months from the date of commissioning, whichever earlier.	Vendor to confirm			
10.0	**START UP & COMMISSIONING SPARES:** Start-up & Commissioning Spares shall be part of the main supply of the EOH. Start-up & commissioning spares are those spares, which may be required during the start-up, and commissioning of the equipment/system. Bidder shall provide an adequate stock of such start up and commissioning spares to be brought by him to the site for the equipment erection and commissioning. The spares must be available at site before the equipments are energized	Vendor to confirm			
10.1	**FIRST FILL OF CONSUMABLES:** Bidder's scope shall also include supply and filling of all chemicals, reagents, resins, lubricants, grease, filters and consumable items for operation up to COD including top up requirements at the time of issuance of PAC/declaration of COD. All lubricants proposed for the plant operation shall be suitable for all operating and environmental conditions that will be met on site consistent with good maintenance procedures as instructed in the maintenance manuals. First fill of consumable shall be part of the main supply.	Vendor to confirm			
10.2	The vendor shall offer electrical/ electronic / mechanical spares for **2 years** trouble free operation of the crane. ***(Unit Price along with quantity of each item of spare shall be offered in the price bid)***	Vendor to offer			
10.3	**SPECIAL TOOLS & TACKLES:** Any special tools & tackles required for the entire equipment to disassemble, assemble or maintain the units, they shall be included in the quotation and furnished as part of the initial supply of the machine. List of special tools & tackles shall be decided by bidder as per his proven practice. When special tools are provided, they shall be packaged in separate, boxes with lugs and marked as "Special Tools for (tag / item number)." Each tool shall be stamped or tagged to indicate its intended usage. Levers and eye bolts for the removal of parts to be serviced shall be submitted with special tools.	Vendor to offer			
11.0	**MAKES OF BOUGHT OUT ITEMS:** Vendor to incoporate their BOI Makes in their QAP.	Vendor to confirm			
	NOTE: Make of various components for projects are subject to End CUSTOMER approval. No additional delivery or price implication is acceptable due to CUSTOMER comment on make of components. Mix up of make for same item is not acceptable.	Vendor to confirm			
12.0	**DOCUMENTS/DETAILS for APPROVAL:** The following documents / details shall be submitted to BHEL for Approval within *20 days of PO placement* , prior to taking up the manufacture of the crane.	Vendor to confirm			
13.0	**Drawings / Documents:**				
13.1	GA Drawing of the Crane.	Vendor to submit			
13.2	GA Drawing of Crab with Trolley.	Vendor to submit			
13.3	GA Drawing of Individual Mechanisms.	Vendor to submit			
13.4	Sub-Assembly Drawing for Wheels, Hook Blocks, Gear Boxes & Hoist Drums.	Vendor to submit			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
13.5	Calculations for Selection of Electric Motors, Gear Reducers, Brakes, Couplings, etc.	Vendor to submit			
13.6	Calculations for Bridge Girder, Crab, End - Carriage and their connections.	Vendor to submit			
13.7	Calculations for Steel wire rope selection	Vendor to submit			
13.8	Wiring Diagram with Logic Circuits.	Vendor to submit			
13.9	Cable Selection based on current rating.	Vendor to submit			
14.0	**Technical Details:**				
14.1	Total Weight of the Crane including all Electrical Equipments.	Vendor to specify			
14.2	Total Weight of Trolley including all Electrical Equipments.	Vendor to specify			
14.3	Weight of each Bridge assembled and ready for erection with and without Mechanical and Electrical Equipment.	Vendor to specify			
14.4	Weight of each End - Carriage: In assembled and ready for erection condition.	Vendor to specify			
14.5	Total Weight of Structural, Mechanical and Electrical Equipments. (To be indicated separately)	Vendor to specify			
15.0	**INSPECTION:** The following Schedule of Stage Inspections shall be strictly adhered prior to dispatch from the Supplier's Works.	Vendor to confirm			
16.0	**STAGE-I Inspection:**				
16.1	Verification of Test Certificate for Raw Materials used for Girders, Trolleys, Gear Box Casings, etc.	Vendor to confirm			
16.2	Verification of X-Ray Report of Butt-Joints coming in the Girders and Random Testing on the Welds, by physical examination.	Vendor to confirm			
16.3	Trolley Frame Fabrication before setting the Mechanisms.	Vendor to confirm			
16.4	**Steel Casting**				
16.5	DPT and machined surface shall be carriedout	Vendor to confirm			
17.0	**STAGE- II Inspection:**				
17.1	Inspection of Bridges and End – Carriages with Wheel Assembly and Alignment checking	Vendor to confirm			
17.2	Verification of Span & Diagonal Dimensions, Checking of Wheel Alignment, Mechanical Assemblies and Total Alignment as per IS-3177	Vendor to confirm			
17.3	Free running of the all the Mechanisms.	Vendor to confirm			
18.0	**STAGE- III (Final Inspection):**				
18.1	Measurement of CAMBER in the Bridges.	Vendor to confirm			
18.2	Full / Rated Load Test and Deflection Test.	Vendor to confirm			
18.3	Deflection and Permanent Set Measurement.	Vendor to confirm			
18.4	25% OVER-LOAD Lifting Ability Check.	Vendor to confirm			
18.5	Electric Hoist shall be tested as per IS 3938				
19.0	**SUPERVISION OF CRANE ERECTION & COMMISSIONING:**				

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
19.1	**Supervision of Crane Erection & Commissioning:** Supervision for Crane Erection & Commissioning of the Crane and Performance Prove –Out for 100% of Crane's Capacity , 125% lifting/ holding test and Smooth Functioning of the Crane (at BHEL site / Customer site) shall also be the RESPONSIBILITY of the supplier.	Vendor to confirm			
19.2	**Crane Erection & Cabling:**Supervision for Complete crane erection/installation, wiring/cabling of the various components at BHEL shall be the scope of the supplier.	Vendor to confirm			
19.3	**Supervision for DSL current collector fixing** and cabling from current collector to crane main switch also shall be the scope of the supplier. Current collector and its holding brackets, Cable is crane supplier scope.	Vendor to confirm			
19.4	All safety equipments like safety boot, safety belt, helmet, gloves, goggles etc. required for erection personnel shall be brought by the vendor.	Vendor to confirm			
19.5	Erection of Cranes and its accessories will be done by owner as per vendor's Erection Manual and check List. The bidder has to send their supervision for two numbers of visit for erection & commissiong, testing for each crane - 1ST visit for the supervision of erection & 2ND Visit for pre-commissioning & post- commissioning check-up, start-up, testing and trial runs of all the items covered under the scope of supply for each Crane. Vendor shall quotes charges for complete work for **supervision** for erection & commissiong, testing for each Under slung cranes. Travel charges (visa/passport, all the to/fro travel charges to the site), TA/DA, boarding and lodging shall be borne by the bidder and shall be inclusive in above supervision charges portion for complete work for supervision for erection & commissiong, testing for each Under slung cranes. **The charges quoted for the supervision will be considered for L1 evaluation.** However, BHEL reserves the right to engage the services of the bidder for supervision of E&C.	Vendor to confirm			
20.0	**O & M MANUALS: 10 Copies** of Erection, Operation & Maintenance Manual, containing the following technical drawings & details shall be submitted.	Vendor to confirm			
21.0	**Drawings & Details:**				
21.1	Crane GA Drawing	Vendor to confirm			
21.2	Crab Assembly Drawing	Vendor to confirm			
21.3	Total Crane Wiring Schematics	Vendor to confirm			
21.4	Detailed Wiring Diagrams for Sub-Systems / Panels	Vendor to confirm			
21.5	Wheel Assembly Drawings	Vendor to confirm			
21.6	Bottom Block Assembly Drawing	Vendor to confirm			
21.7	Gear Box Assembly Drawings	Vendor to confirm			
21.8	Coupling Drawing and Details	Vendor to confirm			

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
21.9	Specifications/Ratings of All Bought-Out-Items	Vendor to confirm			
21.10	Warranty / Guarantee Card for all Bought-Out-Items.	Vendor to confirm			
21.11	Trouble Shooting Chart for Main and all Sub-Systems	Vendor to confirm			
22.0	**PERFORMANCE GUARANTEE:**				
221.	The Performance of the Total Crane and / or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a minimum period of 24 months from the date of acceptance of the crane at CUSTOMER site.	Vendor to confirm			
23.0	**PACKING & FORWARDING**				
23.1	The Under slung cranes and accessories shall be properly packed so as to avoid damage during transit &storage. Wooden crate shall be covered with GI sheet of minimum 1mm thickness and same shall be used for packing various equipment / items as per shipping list. Lining with plastic sheet (water Proof) shall be provided inside the crate to avoid water entry during transit / storage. Two sets of manual (hard copies) with drawing & data sheet shall be sent along with the packing box. Each packing shall be accompanied with packing slip & all relevant drawings.	Vendor to confirm			
23.2	Each package or shipping units shall be clearly marked or stenciled on at least two sides - END CUSTOMER SITE (ADDRESS AS PER ENQUIRY). In addition, each package or shipping unit shall have the symbol painted in red on at least two sides of the package, covering one fourth of the area of the side.	Vendor to confirm			
24.00	ANNEXURE I - **CUSTOMER TECHNICAL SCECIFICATION** & DATA SHEET OF CRANE	Vendor to confirm			
25.00	ANNEXURE II - DEAILS OF CRANES	Vendor to confirm			
26.00	ANNEXURE-III - PAINTING SCHEME FOR MATERIAL HANDLING EQUIPMENTS	Vendor to confirm			
27.00	ANNEXURE-IV- RC PUMP & OXIDATION BLOWER UNDER SLUNF CRANE SHED GA	Vendor to confirm			
29.00	ANNEXURE-V- TYPICAL GA OF UNDER SLUNG ELECTRIC CRANES	Vendor to confirm			

SECTION-V

CRANES AND HOISTS

1.0 GENERAL

1.1 This section covers the design, engineering, manufacture, assembly, testing, packing, supply at site, storage at site, site handling, inspection, erection, testing and commissioning, carrying out performance guarantee tests and handling over of cranes and hoists for Boiler, Turbo generator and auxiliaries.

2.0 SCOPE OF WORK OF SUCCESSFUL TENDERER

The scope of work of the successful Tenderer with respect to cranes and hoists shall be generally in accordance with the relevant clauses of this section. The materials, equipment and services to be provided for the cranes and hoists shall include, but not be limited to the following:

2.1 Procurement of materials, manufacture/fabrication and supply of all equipment as specified in clauses 3.0 & 4.0 of this section.

2.2 All structural work complete with bridge girders, end carriage, crab frame as well as miscellaneous structures such as ladders, platforms, foot walks etc.

2.3 All mechanical equipment complete with hook, sheaves, rope drums, wire ropes, gear boxes, couplings, wheels etc.

2.4 All electrical equipment complete with motors, controls, VSD Panels, resistors, brakes, limit switches, isolator, etc. Complete cabling, lighting and earthing of all the electrical equipment with accessories etc.

2.5 Erection, testing and commissioning of crane, Hoists and crane power feeding system (DSL conductors).This includes the extension of DSL system in existing TG building and vice-versa.

2.6 Submission of As-built drawings (hard copies & soft copy), Operation & Maintenance Manuals, annual requirement of consumables and operating supplies such as grease, lubrication oil etc., along with brand names.

2.7 Supply of spares for 2 years' normal operation and maintenance of the crane.

2.8 Submission of GA drawing of crane, hoist block with cross travel trolley, bridge girder selection/stress calculation, power & control circuit diagram and any other drawings/documents required by the Purchaser as indicated in Clause 10 of this section.

2.9 Supply of tools and tackles.

2.10 Makes of all bought- out items shall as per the Annexure-2.

3.0 REQUIREMENT OF EOT CRANES

3.1 One (1) No. Double Girder EOT Crane of 35/5 T capacity adequate to handle Turbo generator and its auxiliaries, during erection and subsequent maintenance, shall be required to be provided in the Turbo generator building of Power Plant. The crane span shall be so selected that the crane fits in the TG building and the crane hooks are accessible to all auxiliaries of TG to be handled. The crane shall have main and auxiliary hooks for lifting heavy loads at slow speed and light loads at higher speeds respectively. The technical parameters furnished below related to the above described Double Girder EOT crane.

Sl. No.	Description		
1.	Type	:	Double Girder EOT crane
2.	TG Building span, m	:	15.0
3.	Crane span, m	:	13.0
4.	Bay length of TG building, m	:	40.0
5.	Duty classification	:	M5, Indoor as per IS:3177, IS:807 & IS:800
6.	Purpose & Location	:	Maintenance of Turbo-generator and its auxiliaries in TG building (AB Bay)
7.	Gantry Rail level top, m	:	17.8
8.	Height of lift for MH, m	:	16.0

9.	Height of lift for AH, m	:	16.5
10.	Gantry Rail size	:	Tenderer to specify
11.	Operating speeds		
	- Main Hoist, m/min	:	1 & 0.1
	- Auxiliary Hoist, m/min	:	8 & 0.8
	- Cross Travel, m/min	:	15 & 1.5
	- Long Travel, m/min	:	30 & 3.0
12.	Lifting hooks		
	- Main Hoist	:	Standard single point Trapezoidal shank hook
	- Auxiliary Hoist	:	Standard single point Trapezoidal shank hook
13.	Ambient temp, Deg. C	:	50
14.	Operation from	:	Through Pendant push button station travelling on separate track and Radio Remote Control.
15.	Operating floor level, m	:	+0.00
16.	Any other crane operating in the same bay	:	Yes

❖ **Note:**

1. The parameters furnished above are indicative only. Tenderer to decide on the parameters, based on the arrangement proposed by him.

3.2 Tenderer has to study the existing TG building facility for design of DG EOT crane before taking up manufacture. Tenderer has to consider the extension of DSL up to existing TG building for a distance of about 52m. Tenderer has to include anti-collision device in his scope of supply. Tenderer has to study existing GA of Crane in TG building and consider provision and extension of Crane Power Conductors i.e. Down shop leads for about 40 m bay length in proposed TG building.

Other Requirements

1. The controls for Main Hoist, Auxiliary Hoist, Long and Cross Travel shall be with Variable speed drive/panels with squirrel cage motors. For all motions speed range of 10% to 100% of rated speed shall be obtained through control from pendant push button station.

2. Control for the Crane shall be from pendant push button and Radio Remote control.

3. Crane shall be provided with Group lubrication system.

4. The derating of all equipment shall be done for an ambient temperature of 50^0C.

5. Hoist motor shall have six numbers thermisters, two numbers per phase, embedded in the stator winding to protect the same from over heating. Thermister connections shall be provided in a separate terminal box of motor. Thermister protection relay shall be provided in the respective hoist control panel, which will trip the motor power contactor at the critical stator temperature.

6. All motors shall be of S4 duty, TEFC, suitable for 40% CDF and 150 starts/hr.

7. Audio and Visual Alarms shall be provided for warning during starting of the crane.

8. Emergency switches shall be provided at four corners of the bridge to cut-off the power supply by tripping the main circuit breaker.

9. Safety guards, covers, electrical safety items etc., shall be provided for all rotating drive machinery and controls.

10. The crane shall be provided with one (1) set of synthetic webbing slings made of polyester and one (1) set of wire rope slings. Elongation of webbing slings shall not be more than 3%.

3.3 One (1) No. each Single Girder under slung EOT Crane shall be provided for pump bay of TG building, mill bay and chilled water plant during erection and subsequent maintenance. The technical parameters furnished below related to the above described Single Girder EOT cranes.

Section-V- Cranes & Hoists (cont'd)

Sl. No.	Description				
1.	Type	:	Single Girder U/S EOT crane	Single Girder U/S EOT crane	Single Girder U/S EOT crane
2.	Capacity & Qty		7.5T & One (1) No.	15T & One (1) No.	5T & One (1) No.
3.	Building span, m	:	11.0	10.5	12.0
4.	Crane span, m	:	9.0	7.0	10.0
5.	Bay length, m	:	37.5	40.0	20.0
6.	Duty classification	:	M5, indoor as per IS:3177, IS:807 & IS:800	M5, indoor as per IS:3177, IS:807 & IS:800	M5, indoor as per IS:3177, IS:807 & IS:800
7.	Purpose & Location	:	Maintenance of mills in Mill bay	Maintenance of boiler feed pump in BC bay	Maintenance of chiller equipment in Chilled water plant
8.	Bottom of monorail, m	:	12.0	7.5	8.65
9.	Height of lift for MH, m	:	10.5	6.0	6.5
10.	Monorail size	:	Tenderer to specify	Tenderer to specify	Tenderer to specify
11.	Operating speeds				
	- Main Hoist, m/min	:	8.0	8.0	8.0
	- Cross Travel, m/min	:	10.0	10.0	10.0
	- Long Travel, m/min	:	30.0	30.0	30.0

Sl. No.	Description			
12.	Lifting hooks			
	- Main Hoist :	Standard single point Trapezoidal shank hook	Standard single point Trapezoidal shank hook	Standard single point Trapezoidal shank hook
13.	Operation through :	Movable Pendant push button station	Movable Pendant push button station	Movable Pendant push button station
14.	Operating floor level, m :	+0.0	+0.0	+0.0
15.	Any other crane operating in the same bay :	No	No	No

❖ Note:

1. The capacity of crane and other parameters furnished above are indicative only. Tenderer to decide on the parameters, based on the requirement proposed by him.

4.0 REQUIREMENT OF ELECTRICAL AND MECHANICAL HOISTS

Handling facilities namely Electrical/Mechanical hoists at all strategic locations mentioned below shall be provided in accordance with design requirement to meet the purposes intended.

1.	Type	:	Electric wire rope hoist	Electric wire rope hoist	Electric wire rope hoist	Electric wire rope hoist	Electric wire rope hoist	Mechanical hoist	Mech-anical hoist
2.	Location/ Unit	:	Boiler area	Boiler area	Boiler area	Boiler area	Chiller building and ESP control room	Transfer house, bucker elevator drive/ Limestone handling system	Screen and crusher house/ Limestone handling system

Section-V- Cranes & Hoists (cont'd)

3.	Capacity & Qty	:	3.0T & Two(2) No's	6.0T & One (1) No	4.0T & One(1) No	10.0T & One(1) No	3.0T & One(1) No	Tenderer to indicate& Two(2) No's	Tenderer to indicate& Three (3) No's
4.	Purpose	:	Mainten ance of ESP transfor mer	Maintena nce of PA fan	Maintena nce of FD fan	Mainten ance of ID fan	Mainten ance of trans-former	Maintenance of conveyor drive motor and bucket elevator drive motor	Mainten-ance of conveyor drive motor, screen and crusher
5.	Travel length & path, m	:	50.0, Straight & curved	30.0, straight	30.0, straight	30.0, straight	Tenderer to specify	Tenderer to specify	Tenderer to specify
6.	Duty classificatio n	:	Class 2, IS:3938	Class 2, IS:3938	Class 2, IS:3938	Class 2, IS:3938	Class 2, IS:3938	Class 2, IS: 3832	Class 2, IS: 3832
7.	Height of lift, m	:	+30.0	+12.0	+12.0	+12.0	+20.0	Tenderer to specify	Tenderer to specify
8.	Operating floor level, m	:	+0.0	+0.0	+0.0	+0.0	+13.50	Tenderer to specify	Tenderer to specify
9.	speeds								
	- Hoistin g, m/min	:	8	8	8	8	8	NA	NA
	- Travel, m/min	:	12	12	12	12	12	NA	NA
10.	Ambient temp, Deg C	:	50	50	50	50	50	50	50
11.	Operation through	:	Pendant push button unit	Pendant push button unit	Pendant push button unit	Pendant push button unit	Pendant push button unit	NA	NA
12.	Special require-ment, if any	:	Nil	Nil	Nil	Nil	Nil	Nil	Nil

In addition to the above, electric/mechanical hoists at other locations/areas, wherever, required shall be considered and the same shall be provided by the successful Tenderer.

5.0 DESIGN BASIS FOR EOT CRANES

5.1 All the cranes shall be designed, manufactured and tested in accordance with the latest edition of IS: 800 (General Construction in Steel - Code of Practice), IS: 807 (Design, Erection and Testing {Structural Portion}) of Cranes and Hoists-Code of practice), IS: 3177 (Code of Practice for Electric Overhead Travelling Cranes and Gantry Cranes other than Steel Works Cranes), taking due note of various requirements laid down in this section. Detailed instructions on the aspects not indicated in this specification shall be as per the standards mentioned above.

5.2 Selection, design and manufacture of the cranes shall be suitable in every way for the service intended and shall be oriented towards maximising interchangeability of components and minimising maintenance. Cranes shall be complete in all respects including all accessories, safety features essential for proper installation, operation and maintenance irrespective whether such items are specifically mentioned in the Technical Specification or not.

5.3 The design aspects, basic dimensions, hook approaches and clearances with the building and location of various devices on the cranes such as motors, gearboxes, wheels, rope drum, control panel etc. shall be properly coordinated. The cranes shall be designed so as to provide access for easy maintenance and replacement of components wherever required.

5.4 Standardisation and unification shall be carried out to the maximum extent for various sub–assembly constituting the mechanism of various motions. Cranes sub-assemblies shall be designed such that they can be dismantled quickly without disturbing the installation of the neighboring units with which they are connected. Cranes sub-assemblies, as a whole, like wheel assembly, gearbox, brake, brake drum, coupling rope drum assembly, snatch block etc. shall be replaceable and interchangeable with other identical units. In design, care shall be taken so that the inventory is kept low and the down time becomes minimum. Sizes for all equipment viz. LT and CT wheels, brake drum, sheaves, couplings, rope drums shall be selected from preferred number services.

5.5 Electric power for the cranes and hoists will be available at 415 V, 3 phase, 50 Hz, AC. The following standard voltage shall be adopted for cranes, and equipment shall be suitable for operation on +10%, -15%, & $\pm$5% anticipated voltage and frequency variation respectively. Necessary step down transformers and converters shall be provided on the cranes and hoists:

i)	415V 3–phase, 50 Hz, AC	:	For motor and electro-hydraulic thrustors.
ii)	110V 1–phase, 50 Hz, AC	:	For control circuit of pendant operated crane.
iii)	24V 1–phase, 50 Hz, AC	:	For hand lamp socket outlet and indicating lamps.
iv)	220V DC	:	For brakes wherever specified.

5.6 The bridge shall consist of main girder which shall be of steel section and with an auxiliary structure where necessary. Girders shall be sufficiently strong and rigid to withstand the most severe combination of loads that may develop under different working conditions. The end carriages shall be made from rolled structural steels which shall be joined with main girder by turn fitted bolts. The end carriage shall be provided with substantial safety devices to prevent crane from falling more than 25 mm in event of breakage of a track wheel or axle. Suitable jacking pad shall be provided on each end carriage. Full length MS chequered plate platform shall be provided along the bridge girder for mounting control panel, long travel drive assembly, current collectors etc.

5.7 The crane wheels shall be of double flanged straight tread type for rail mounted cranes and single flanged tapered tread type for under slung cranes. For rail mounted cranes, the wheels shall be fitted to the end carriage with 'L' type bearing housing in a manner that will permit easy replacement. Minimum diameter of LT wheel shall be 320 mm for rail mounted crane. Long travel drive shall be consist of two AC squirrel cage motors mounted on the driving girder platform at either end of end carriages and suitable gear reducer unit. Gear reducers shall be oil lubricated. Worm gear reducer shall not be used. Output shaft of the gear reducer shall be connected to the long travel wheel assemblies through flexible gear couplings.

5.8 LT motors shall be squirrel cage totally enclosed fan cooled crane duty, foot mounted in IEC frame sizes with IP55 enclosure and shall conform to latest edition of IS: 9628. Motors shall be rated at 40% ED, duty type S4. Minimum pullout torque of the motors shall be 225% of the motor torque based on 40% ED rating. For long travel drive, AC electro hydraulic thrustor brakes shall be used for individual motors. LT motions shall be provided with suitable lever operated limit switches.

5.9 The hoisting and cross travel drives shall be obtained from trolley hoist block which shall be generally as per details given. Suitable stops shall be provided for stopping the trolley motion such that required hook approaches are obtained.

5.10 Control equipment for all drives consisting of contactors, relays, fuses etc shall be enclosed in a dust tight cubicle mounted on one end of the driving girder platform. The enclosure shall generally conform to IP54 as per IEC. Pendant control unit consisting of push buttons for individual drives shall be suspended from the bridge girder as per requirement of the shop.

5.11 Power supply to the crane shall be through MS conductor/ shrouded bus bar system/trailing cable arrangement. The power supply to the crane at 415V AC 3-phase, 4-wire, 50 Hz shall be through Down Shop Lead (DSL) conductors. The size of conductors shall be so selected for maintaining a voltage drop within $\pm$3%. Provision of incoming feeder and termination of DSL cable to the incoming feeder shall be part of the Tenderer's scope of work.

5.12 Cranes shall be provided with safety devices such as limit switches, spring loaded case buffers, platform with hand rails, toe guards and guards over rotating parts, emergency switches, red warning lights etc.

5.13 Cranes shall be provided with necessary service and back-up limit switches for hoists, limit switches for long travel and cross traverse motions.

5.14 Cranes shall be provided with group grease lubrication system.

5.15 The derating of the equipment shall be done for an ambient of 50^{0}C.

5.16 Electrical Equipment

5.16.1 All items of the electrical equipment starting from the local isolator of the crane shall be included in the offer. The crane electrics shall include power disconnecting switch immediately after the main collecting gear, emergency switches at four corners of the crane, protective switchgear, motors, motor control panels, VFD drive panels, resistors, DCEM shunt brakes, limit switches, power and control cables, socket outlets, lighting distribution panel and lighting fixtures with lamps, bridge current collector system, indication lamps, pendant push-button, equipment for radio remote control system and equipment earthing materials. All sundry erection materials required for laying and fixing accessories shall also be included in the scope of supply. For each

motion separate control panel including one (1) no. protective panel shall be provided. All control panels shall be mounted on the crane bridge walkway platform with anti vibration rubber mats.

5.16.2 **Motors**

5.16.2.1 General

The motors shall be totally enclosed squirrel cage induction type with anti-friction bearings. The motors shall be designed for speed control of 10 to 100% with Variable Speed Drive, heavy duty reversible crane service, fan cooled depending on the manufacturer's standard and fully conforming to latest Indian Standard.

The Degree of protection of motors shall be minimum IP-55 as per IS/IEC 60034-5.

5.16.2.2 Duty cycle

All the motors offered shall be suitable for heavy duty reversible crane service having duty cycle rating not less than S4, 40% CDF, 150 starts/hour unless otherwise specified.

5.16.2.3 Motor ratings

5.16.2.3.1 The motor rating shall be computed as per IS: 3177 such that they meet the duty cycle requirements specified. The ambient temperature derating and slip factor shall be considered while selecting hoist and travel motors.

Calculation for the selection of the crane motor ratings shall be submitted along with wheel skidding calculation, where required.

5.16.2.4 Torque

The starting torque of the motor shall be 2.25 times the full load torque of the motors.

The pullout torque of the motors at rated voltage and frequency shall be minimum 225% of the rated torque.

5.16.2.5 Class of insulation

The squirrel cage motors shall have minimum Class "H" insulation with temperature rise of the motor limited to Class "B" insulation. Insulation of the motor shall be 64 VPI process.

Proper de-rating shall be provided, where specified, for motors operating in higher ambient temperature and also for inverter control application.

5.16.2.6 Speed selection

Synchronous speed of motors shall be limited to a maximum of 1000 rpm. The selection of motor speeds shall be generally as follows:

Hoist : 750 rpm

Cross traverse / Long travel : 1000 rpm

All motors shall be selected for a safe running speed of at least two times the synchronous speed or 2000 revolutions per minute whichever is lower.

5.16.2.7 Other features

5.16.2.7.1 The motors shall be continuously rated and amply dimensioned to withstand frequently repeated current surges.

5.16.2.7.2 All motors will be provided with top terminal box and will be suitable for 360 degree rotation in horizontal plane. The terminal boxes shall be properly insulated and of adequate size for terminating aluminium conductor cables. The terminals shall be easily accessible when the motor is installed on the crane trolley and preferably be located on the top.

5.16.2.7.3 All brakes shall have a separate brake drum and coupling face shall not be used as a brake drum. Brakes shall be mounted on the load side of the drive.

5.16.2.7.4 All motors shall be adequately braced to withstand the repetitive starting /stopping and accelerating forces.

5.16.2.7.5 Motors will be suitable for inverter duty and will be selected as per recommendation of drive supplier.

5.16.3 **Controls**

5.16.3.1 The crane shall be controlled through pendant push button station depending upon site requirement from different floors. Also the crane shall be controlled from radio remote system. Control scheme shall be designed to meet the above condition avoiding simultaneous operation of both. A suitable selector switch shall be provided for selection of either pendant control or radio remote control. Separate buttons shall be considered for each and every control action operating through pendant control and radio remote control. No common buttons shall be used for various control action from pendant control and radio remote control operation.

5.16.3.2 Pendant Control Push button Station

5.16.3.2.1 Push button station, metal enclosed, dust-tight and oil proof (IP 65) construction and robust design with `start', `stop', hoisting and lowering, with `forward' and `reverse' for travel motions. Stop buttons shall be lockable type. An emergency push button with mushroom head shall be provided for cutting of power supply under emergency conditions. The push button station shall be at a convenient height for operation from floor level and the multi-core control cables used for the push button station shall have suitable tough sheathing of PCP or equivalent materials. The pendant cable shall have two (2) Nos. spare cores and two (2) Nos. separate cores for two distinct earthing. The weight of pendant push button station shall be supported independent of the electric cable by means of a chain or wire rope. The pendant shall have lighting switch, indication lamps for CONTROL `ON' & POWER `ON'.

5.16.3.3 Control panels

5.16.3.3.1 Individual control panels shall be provided for each motion of the crane. The panels shall be of fabricated cubicle type made of 2 mm thick sheet. The panels shall be completely dust and vermin-proof by having rubber gaskets at all joints and openings including the panel doors. Ventilation openings where provided shall have screen protection. All power and auxiliary contactors, magnetic overload relays, time delay relays etc. shall be housed in the cubicles in which time delay relays shall be electronic or digital timers only. HRC fuses in the power circuit are not preferred. For each mechanism, all the accessories shall be accommodated in separate cubicles. The degree of protection of panel enclosure shall be IP-54 as per IS/IEC 60947-1.

5.16.3.3.2 All panels shall have a lockable type front hinged door which can be lifted and removed to have an easy access for maintenance whenever necessary.

5.16.3.3.3 The terminations which are going to the hinged door such as signaling lamp etc., shall be provided with separate terminal block so that when the door is lifted these can be opened.

5.16.3.3.4 The panels shall have door interlocking switch connected with the control circuit to ensure positive isolation of the power to the panel for the safety of maintenance personnel. For control panels comprising more than one cubicle for each mechanism, the doors of each cubicle shall be provided with suitable interlocking switch such

that power to the panel is cut-off if any of the cubicle door is opened. With interlocked front doors, means shall be provided for defeating interlocks for testing the circuit with doors open during maintenance.

5.16.3.3.5 Arrangement of contactors, terminal blocks etc. inside the panels shall be in an approved manner with due consideration to the vibration encountered in the operation of the crane. The terminals shall be so located that chances of flashovers between live terminals are minimized due to falling and accumulation of conducting dust on the terminal blocks.

5.16.3.3.6 Contactors shall be selected based on operational current indicated by the manufacturer for different utilisation categories. Operational current shall be higher than the full load current of motor. The minimum operational current of the contactor shall be 25A for motors and 16A for brake unless otherwise specified in the specification. Auxiliary contactors less than 6A shall not be used.

5.16.3.3.7 Power and control contactors shall not be located together inside the panel.

5.16.3.3.8 All contactors shall be provided with two (2) spare "NO" and two (2) spare "NC" auxiliary contacts whether auxiliary contacts are used in the circuit or not.

5.16.3.3.9 Open type terminals or bus bar with insulator arrangement shall be provided to terminate outgoing power cables. There shall be provision of at least four spare terminals in the terminal blocks. Power and control cables shall be segregated. All the equipment and power/control terminals shall have proper identification labels in accordance with the circuit diagram. The power/control cables shall have white interlocked type ferrules having black engraved numbers for easy identification at the time of replacement and maintenance. Open type terminals shall be used for power and control termination with suitable transparent shrouding arrangement.

5.16.3.3.10 The electrical clearance between all live parts of different polarity and voltages and between live parts and earth shall be minimum 75 mm.

5.16.3.3.11 All plates, springs washers, bolts, etc. used in the panels shall be galvanised for protection against corrosion.

5.16.3.3.12 Control panels shall be well braced to the crane structure leaving at least 350 mm clearance at the bottom and shall be provided with adequate lifting lugs. Anti-vibration pads shall be provided for control panels and resistor boxes.

5.16.3.3.13 Electric insulating mats shall be provided in front of the control panels. Insulating mat will be provided as per IS: 15652.

5.16.3.3.14 Hand gloves – 1 lot , Danger/caution notice boards/shock treatment charts in English, Hindi and Local Language shall be provided.

5.16.3.3.15 Only one make of devices shall be used for all control panels such as isolators, fuses, contactors, overload relays, auxiliary contactors, actuating devices etc. Where one-make devices cannot be used because of reasons beyond the control of control panel supplier, necessary test certificate shall be furnished to ensure type "2" co-ordination as per IS/IEC 60947-4.

5.16.3.3.16 The electrical panels shall be located on the walkway preferably on girder side.

5.16.3.3.17 Radio Remote Control (RRC) shall be proven design with highly functional and user friendly. Radio Remote Control shall be for all the three motions viz., Hoists, Cross Travel and Long Travel. The RRC unit shall generally be comprises of Terminal unit, Rechargeable battery, Battery Charger, Base unit, Transmitter, Radio and all other associated accessories as required for completeness of the system for operation. Different operating speeds in all the motions shall be achievable through RRC. Suitable status LEDs and emergency stop shall be provided. Recommended spares for radio remote control system shall be included in the tenderer's scope of supply.

5.16.3.4 *Hoist, Long and Cross travel controls*

5.16.3.4.1 For hoist and lowering motions, long and cross travel motions speed control shall be achieved by Variable Speed Drive panels.

5.16.3.5 *Variable speed Controls*

The Variable Speed Drive controls shall have the following basic features:

i) The drive controls shall be of pulse width modulation (PWM) type with vector control for closed loop speed control without tacho feed back.

ii) The unit shall comprise incoming load break isolator, line fuses, input choke, three phase diode bridge rectifier acting as the line converter and three phase inverter as the load converter interconnected through

DC link reactor and capacitor unit. This unit shall have overload capacity of 150% of rated load for a period of 60 sec.

iii) The PWM inverter shall have fully digital microprocessor based regulation and control system with suitable interfaces for communication with higher level automation system, as well as field level instruments and signals. The microprocessors shall carry out all the functions required from the unit including triggering, protection, self-diagnostic and operator interface. Suitable dynamic harmonic filters shall also be included in each drive panel so that no harmonics of the inverter shall be supplied to the system.

iv) Variable speed drive for hoist motions shall be suitable for hoisting, lowering and regenerative braking conditions.

5.16.3.5.1 For all the motions, the brakes provided shall come into operation immediately in the event of tripping of main contactor.

5.16.4 **Contactors**

The current rating of all the contactors shall be at least 25% higher than the respective computed motor mechanical kW full load current at the specified duty cycle but not lower than the current rating for electrical kW. While computing the rating of the contactors, proper allowance shall be made for high currents that may be encountered on account of single phase dynamic braking, as per the control scheme chosen. The duty of contactors shall be as per IS/IEC 60947-4. Contactors for stator and rotor offered shall have adequate rating to meet the duty requirements of the equipment.

5.16.5 **Brakes**

5.16.5.1 Hoist motions shall be provided with double shoe DC electromagnetic shunt brakes as per the requirement and travel motions shall be provided with AC electro hydraulic thrustor brakes unless otherwise specified. All the brakes shall be of dust-tight construction. All brakes shall have a separate brake drum and couplings shall not be used as brake drum.

5.16.5.2 The design of brakes shall be such that braking action in the OFF position and release with current are provided. The hoist brakes shall be designed for minimum of 150% static moment

considering that the full load can be held safely. The hoist brake shall be capable of arresting the rated load while lowering, within a distance of not more than 1/150 of the hoist speed in m/min.

5.16.5.2.1 Brakes for long travel and cross travel motions shall be designed based on the following considerations:

a) Braking against travelling shall be capable of arresting the motion within a distance in metres equal to 10% of the speed in m/min. when travelling with rated load at rated speed.

b) The retardation due to braking shall not exceed the values given below to avoid skidding of wheels.

Working Condition of the Crane	**Retardation in m/sec² according to Percentage of Driving Wheels**		
	100%	**50%**	**25%**
Indoor	1.5	0.75	0.40

5.16.5.2.2 The brake shoes shall be of hinged type. Brake levers shall be forged or fabricated or of cast steel. Hinge pins shall be of hardened alloy steel and shall be lubricated. The hinged pins shall be provided with steel bushes at bearing points. Brake drums shall be of forged or cast steel and completely machined and dynamically balanced. The rubbing surfaces of brakes shall be smooth and free from defects. The temperature attained by the rubbing surfaces under service conditions shall be such that their operation is not impaired. The temperature of rubbing surfaces of all brakes shall not exceed 100°C for fabric lining and 200°C for asbestos or metal lining. All brakes shall be provided with a simple and accessible means of adjustment to compensate for wear and removal of brake lining. The width of the brake drum shall be 5 to 10 mm more than the width of the brake shoes.

5.16.6 **Limit Switches**

5.16.6.1 All hoist motions shall be provided with heavy duty limit switches to prevent the crane hook from over hoisting and over lowering. The limit switch shall be screw type with self-resetting feature and be incorporated in the control circuit of the respective drive motor. Apart from this, one counter weight operated back-up limit switch shall also be provided in the under voltage release circuit of the incoming air circuit breaker.

5.16.6.2 Limit switches for travel motions shall prevent over-running in either direction. These limit switches shall be so provided as to prevent excess travel. The degree of protection of limit switches shall be IP-54 as per IS/IEC 60947. Each travel motion shall be provided with 2 Nos. one way lever/roller type limit switches.

5.16.7 **Circuit Protection**

5.16.7.1 One main metal-clad triple-pole load break isolating switch shall be provided as close as possible to the main current collectors. This load-break switch shall be in addition to the circuit-breaker provided in the protective panel.

5.16.7.2 Four emergency switches shall be provided in a totally enclosed metal enclosure with an operating lever outside at the four corners of the bridge, to cut-off the power supply under emergency condition by tripping the main circuit breaker. The degree of protection for the enclosures for the isolators, emergency switches etc. shall be IP-54 as per IS/IEC 60947-1.

5.16.7.3 Main protective panel

A central protective panel, which shall be of totally enclosed type shall be mounted in a convenient position on the crane walk way platform. This protective panel shall be provided to control the main incoming power to the crane and shall be capable of quick removal of the power to all the drives of the crane over a single emergency control pushbutton provided in the pendant station. The protective panel shall be provided with all necessary control devices including the following:

i) Triple-pole automatic air circuit-breaker complete with instantaneous magnetic over-current release and shall have a minimum short-circuit capacity of 50 kA. The rating of the magnetic over-current release shall be adjustable and shall have a minimum rating equal to 2.5 times the rated full load current of the two largest motors for two motions. The breaker shall be manually operated with the handle protruding out of the panel. The breaker shall be designed for operation in a vibrating service and the supplier shall guarantee that the mechanism is specially designed for trouble-free operation on moving crane. One under-voltage release shall also be incorporated in the breaker. The breaker shall not be used for normal switching off. Suitably rated main contactor shall be used for this duty.

ii) One double-pole isolating switch with two HRC fuses shall be provided for primary supply to the control transformer.

iii) One (1) 415/110V-control transformer shall be provided with ±5 per cent and ±10% taps on the primary side. The control transformer capacity shall be so selected that voltage drop due to simultaneous closing of the magnetic contactors of multiple drives shall be maintained to the minimum. The anticipated voltage drop on the basis of which the control transformer is selected shall be indicated.

iv) One multiple contact auxiliary contactor shall be provided for feeding control supply to the different motor control panels.

v) Single-pole grip type HRC fuses shall be provided in each control circuit in series with the contact of the auxiliary contactor specified above for control circuit protection to the individual motor panels.

vi) One pilot indicating lamps shall be provided on the panel door to indicate the availability of power to the protective panel. The pilot lamp shall have grip type fuse.

vii) One double-pole 25A switch with fuses shall be provided for control of the crane lighting.

viii) Protection shall be provided against closing of circuit-breaker in case of power contactors getting welded.

5.16.7.4 Individual control panels

The equipment shall be generally as described above and each motor drive shall have VVF drive panels having all necessary devices including the following:

i) Hoist Control

The equipment for the Hoist Control shall be variable speed drive with comprehensive motor protection complete with dynamic braking switch and DB resistor. VVF drive selected shall be suitable for hoisting/lowering application.

One - Triple-pole load-break heavy duty main circuit isolating switch.

One	-	Double-pole quick break control switch with two adequately rated HRC control fuses
One	-	Circuit contactors
One	-	Triple-pole brake control relay.
Two	-	Triple-pole directional contactors.
One	-	Triple-pole brake control relay.
One	-	Triple-pole magnetic overload relay for each motion with their trip contacts in motor circuit.

ii) Long Travel Control

The equipment for the Long Travel control shall generally be similar to those specified above for the hoist control.

iii) Cross Traverse Control

The equipment for the Cross Traverse control shall generally be similar to those specified above for the hoist control

5.16.8 **Crane Lighting System**

5.16.8.1 The crane lighting system shall consist of the following:

i) One 415/240 V lighting transformer which shall be designed for a minimum continuous rating of 2.5 KVA. The secondary of the lighting transformer shall have centre tap for earthing.

ii) One metal-clad lighting distribution board with one double-pole load break incoming switch-fuse unit and contactor control for controlling four (4) 250 W - LED lamp under slung light fittings.

iii) Four (4) 250 W under slung LED lighting fittings shall be provided complete with reflector, lamps and shock absorbing anti-swing suspension device.

iv) Four (4) red warning lights shall be installed at the four corners of the crane to indicate that the crane is down and undergoing repairs.

v) Four (4) 24 V and three 240 V two-pole and earth metal-clad plug and sockets shall be provided, for hand lamp and hand tools and the rest distributed on the crane bridge for taking power to portable hand lamps and hand tools respectively.

vi) One (1) No. hand lamp with 10 m long tough rubber sheathed cable.

vii) Four (4) Nos. 70 W LED integral well glass fittings for crane bridge lights.

5.16.9 **Disposition of Electrical Equipment**

5.16.9.1 The electrical panels shall be located as follows:

i) For box girder crane - on the walkway

ii) Where the panels are located, the entire walkway shall have a minimum space of 750 mm when the doors of the panels are open.

The same is applicable from the edge cover of the resistors installed.

5.16.10 **Current Collection**

5.16.10.1 Bridge travel

5.16.10.1.1 The supply and erection of main down shop lead conductors consisting of 3-phase and earth bus for the crane bridge travel shall be within the scope of the crane supplier. The offer shall also include the main current collectors to suit the requirements. Shrouded type DSL system shall be provided.

5.16.10.1.2 The location, size and type of crane power conductors (Down Shop Leads) shall be as indicated for the crane under clause 3.0. Selection of collectors shall suit these requirements.

5.16.10.1.3 The power conductor sizes shall be checked to ensure suitability of the total current requirements of EOT crane keeping the voltage drop along the conductors within 3% of the declared voltage as well as future cranes, if any.

5.16.10.1.4 The crane power conductors (Down Shop Leads) for power collector system for the bridge travel of EOT crane shall be of shrouded / insulated galvanized iron conductors.

5.16.10.1.5 The power conductors for the crane provided in the plant shall generally comprise three (3) insulated conductors for carrying 3-phase power and one (1) insulated conductors of equal

section mounted directly on bracket to be used as fourth conductor for crane earthing. The top most conductor shall be used for earthing. The crane power conductors shall not be used for feeding other power consumers.

5.16.10.1.6 The maximum continuous length of power conductor section shall not exceed 30 M without an expansion joint.

The power conductor shall be made from standard rolling length. The joints of standard length shall be by 100% butt welding and top surface finished smooth by grinding to provide free movement of the collectors.

5.16.10.1.7 To provide electrical continuity across the expansion joint the power conductors on both sides of the joint shall be connected suitably by flexible copper conductors as per manufacturer's standard.

5.16.10.1.8 The support assembly shall be capable of withstanding high impact and shocks resulting from crane movements. The support assembly shall also have adequate tension and compression strength to withstand the weight of the crane power collector system during the crane movement.

5.16.10.1.9 The crane power conductor supporting brackets shall be of rigid construction and shall be welded with the stiffeners in the gantry girder or welded on inserts provided in the building concrete girders.

The brackets shall generally be fixed at intervals as per manufacturer's standard along the entire length of the crane girder except at the places where expansion joints are provided or where power conductors are sectionalised. At these places special sectionalising assembly shall be used as per manufacturer's recommendations.

5.16.10.1.10For each section of the power conductors the bracket at the middle shall have arrangement to hold the conductor rigidly. The other brackets of that section shall have arrangement to hold the conductor in such a way as to permit free movement of the conductor during expansion or contraction.

5.16.10.1.11 The termination of incoming DSL power supply aluminium cables and aluminium expansion joint jumpers at crane power conductors shall be by means of suitable metallic strap recommended by the DSL supplier. One (1) No. 415V feeder will be made

available at one point in the shop by the Purchaser. Supply erection and termination of incoming DSL power supply cable along with the load break isolator from the feeder is in the scope of the tenderer.

5.16.10.1.12 Warning light shall be provided for crane power conductor system to indicate presence of power in the section. Warning lights shall be provided at both ends of the conductors.

5.16.10.1.13 The warning light unit shall be of industrial heavy-duty type for indoor locations. The unit shall comprise three lamps for three phases with red glass lens and reflectors. The lamp shall be provided with dropper resistance connected in series with the lamp.

5.16.10.2 Collector Shoes

The main current collector shall be of compatible to the DSL system offered. Double collector shoes with adequate current carrying capacity shall be provided for all the three phases and single shoe for the earthed conductor. The collector shoes shall be suitably designed to avoid jamming at the hinge point due to accumulation of dust or corrosion. The width of the shoe shall be sufficient to cover the permissible lateral movement of the crane.

5.16.10.3 Collector Shunts

Current carrying copper braided shunts on all the collectors shall be so designed that there is no danger of contact with adjacent collectors. The shunts shall be easily replaceable.

5.16.10.4 Mounting

All the collectors shall be mounted on rigid steel brackets and suitably insulated. Collectors shall be designed and mounted so that these are readily accessible for maintenance. Minimum clearance between live parts of adjacent shoes per conductors shall be 100 mm.

5.16.11 **Trolley travel**

For trolley conductors, PCP sheathed butyl rubber insulated copper flexible cables shall be provided. The flexible trailing cable shall be of multi-strand copper conductors with permanent terminations on the bridge and the trolley. The cable shall have ample length and shall be supported by properly designed movable clamps which shall be fitted with rollers mounted on bearings and shall run freely on a guide rail allowing relative movement of bridge and trolley without undue stress or wear on the suspended cables. The cables supported on moving trolleys shall be so mounted on the crane bridge that the trolleys are easily accessible for maintenance and convenient for replacement from the bridge platform / trolley. The cables shall be protected from heat and

flames. Two (2) spare clamps shall be provided on cable trolley for future requirement. The design of clamp shall be suitable for individual clamping of cables. Drag chain shall be provided in between cable trolleys to avoid stress on the cables while moving from one side to extreme side.

6.0 DESIGN BASIS FOR ELECTRIC HOISTS

6.1 Electric hoists shall be designed, manufactured and tested in accordance with the latest edition of IS: 3938 taking due note of various requirements laid down in this specification. The hoist shall be complete with drive motor, brake, limit switch, rope drum, gearbox, hoisting rope, rope guide, sheaves, hook block etc. The rope drum shall be deep grooved type and shall have adequate provision to prevent the rope coming off the drum. Trolley wheels shall be of forged/rolled/cast steel, single flanged tapered type with minimum hardness of 250 BHN. The trolley shall be provided with built-in type jacking device for jacking up the trolley in case of wheel removal. Opposite wheels of the trolley shall be positively driven. Gearboxes shall be oil lubricated and shall not be vertically split. Hoist block shall be provided with 4/2 rope fall arrangement. Power supply to the hoist block shall be through trailing cable system. Trailing cable system complete with guide beam, brackets, cable trolleys, cable etc.

6.2 The duty class of the electric hoist shall be Class-2 and the hoist shall be designed, manufactured and tested in accordance with the latest edition of IS: 3938. Both hoist and travel motions shall be operated from the operating floor level through push

button station suspended from the hoist block. The geared trolley shall be suitable for moving on a straight or curved travel path of monorail depending upon the handling/operational requirement. The lifting capacity and lifting height shall be adequate for the purpose intended. All bearings shall be of anti-friction ball/roller bearings. No needle bearings and cast iron parts shall be used in the construction of hoists.

6.3 All motors shall be squirrel cage totally enclosed fan cooled, crane duty in IEC frame sizes with IP55 enclosure and shall conform to latest edition of IS: 9628. Motors shall be rated at 40% ED, duty type S4. Minimum pullout torque of the motors shall be 225% of the motor torque based on 40% ED rating. Hoist motor shall be foot mounted type with 6–pole construction and travel motor shall be flange mounted type. Travel motor may be of 4–pole construction.

6.4 All motions shall be provided with brakes. Hoist brake shall be DCEM shoe type and CT brake shall be DC Disc type. Hoist motion shall be provided with one number rotary and one number gravity operated limit switch. CT and LT motions shall also be provided with two (2) no.s one way lever operated limit switches.

6.5 All control switchgears consisting of contactors, relays, fuses etc shall be enclosed in a dust tight cubicle mounted on the body of the hoist/operating platform. The enclosure shall generally conform to IP54 as per IEC.

6.6 The hoists shall be operated from pendant control units mounted on hoist body. Individual push buttons shall be provided for each direction of all motions and these shall be sufficiently shrouded to avoid inadvertent operation. Push button shall be metal enclosed of dust tight construction with 'START', 'STOP', 'HOIST' and 'LOWER" for hoist motion, with 'FORWARD' and 'REVERSE' for travel motion. Stop push buttons shall be lockable type.

6.7 Electricals

6.7.1 **Motors**

6.7.1.1 The motor shall be of totally enclosed fan cooled (TEFC) type for hoist and traverse and shall be suitable for operating on 415 V, 3-phase, 50 Hz AC power supply and shall conform to latest Indian Standard. All motors shall have anti-friction bearings. The motors shall be suitable for cranes duty, having a duty cycle rating of not less than 40% ED. They shall be class 'F' insulation with temperature rise limited to class 'B' insulation. Minimum pull-out torque of the motor at the rated voltage and frequency shall be at least 225% of the rated torque based on 40% ED rating. The motor shall be designed to withstand a safe running speed of at least 2 times synchronous speed. The hoist motor shall be designed for high starting

torque and frequent reversals. All motors shall have minimum six poles. Electric Hoist shall include 415V LT motors, 1.1kV grade cables, cabling accessories, pending push button station, earthing of all electrical equipment including earthing stations, lighting for all equipment covered under tenderer's scope of supply.

6.7.2 **Brakes**

The hoist shall be equipped with DC electromagnetic brakes both for hoisting and traversing drives. The hoist brake shall be so selected as to arrest and hold any load up to and including the test load (125% of the rated hoisting capacity) at any position of the lift, when the power supply to the motor is cut off or fails.

6.7.3 **Limit switches**

One shunt limit switch to prevent over-hoisting and over-lowering shall be provided, in addition to one gravity operated limit switch for over-hoisting. The limit switch shall reset automatically by lowering of hoist by push button control.

Trolley shall also be provided with suitable limit switches. Limit switches shall be of heavy duty type.

6.7.4 **Controls**

6.7.4.1 The controls shall consist of moulded case (miniature) circuit breaker, heavy duty contactors, protective relays, fuses etc. in dust tight enclosures mounted on the body of the hoist and shall be easily accessible for repair and maintenance. All cables shall be brought to a terminal box and shall be clearly marked for identification.

6.7.4.2 The motor and controls shall be adequately protected and shall be so rated that the temperature rise above an ambient of 50^0C does not exceed the limits specified in the relevant Indian Standard Specifications.

6.7.4.3 All contactors shall be heavy duty type and shall be adequately rated to carry the rated current of the motors used for each of the drive. Directional contactors shall be interlocked electrically and mechanically. One suitably rated main line contactor with circuit breaker shall be provided for controlling the power supply to the hoist block. Power contactor shall be minimum 16 A (AC-3) rating.

6.7.4.4 Control circuit shall be designed for 110V AC conforming to IS: 3938. Duplicate transformers with manual change-over switch shall be provided. Necessary step-down transformer for reduced control voltage shall be provided.

6.7.4.5 Push-button station, metal enclosed, dust-tight construction and robust design with 'Start', 'Stop', 'Hoist' and 'Lower' buttons for the hoist motion and with 'Forward' and 'Reverse' buttons for the traverse motion shall be supplied. Stop push-button shall be lockable type. An emergency push-button with mush room type head shall also be provided for cutting power supply under emergency condition. An indicating lamp for 'Main Contactor ON' shall be provided. The push-button station shall be at a convenient height for operation from floor level and the multi-core control cables used for the push-button station shall be butyl rubber insulated with sheathing of PCP. The weight of pendant push-button station shall be supported independent of the electric cable by means of a chain or wire rope.

6.7.5 **Cabling**

6.7.5.1 All the fixed wiring for power, control etc., shall be carried out with 1.1kV grade heavy duty PVC insulated and PVC sheathed armoured copper cables laid on open racks and adequately clamped. If un-armoured cables are used, these shall be laid inside the cable troughs or shall run through conduits. Each motor feeder cable shall be laid in separate conduit.

6.7.5.2 Power supply to the hoist shall be through butyl rubber insulated PCP sheathed extra flexible trailing multi-core copper cable supported on rollers moving on a beam running parallel to the monorail on which the hoist will traverse. The trailing cable system shall be complete with guide beam, cable trolley, cable clamp, link chain, cable etc. A continuous earthing conductor shall be provided for the purpose of earthing. Electrical conductors of section smaller than 2.5 sq.mm copper shall not be used for power supply to the hoist or its motors. For wiring of hoist only copper cable of stranded construction shall be used.

6.7.5.3 Degree of protection of all electrical equipment enclosures shall be IP54.

7.0 DESIGN BASIS - MECHANICAL HOIST

All the mechanical hoists shall be designed, manufactured and tested in accordance with the latest edition of IS:3832 (Hand Operated Chain Pulley Block). The mechanical hoists shall be of a mono block type consisting of chain pulley block permanently suspended from a geared trolley suitable for moving on a straight or curved travel path of monorail depending upon the handling/operational requirement. Both hoist and travel motions shall be affected through pulling of hand chain over hand wheels. The lifting capacity and lifting height shall be adequate for the purpose intended. No cast iron parts shall be used in the construction of mechanical hoists. The cross travel trolley shall be fitted with wheels mounted on life lubricated antifriction bearings.

8.0 CABLING

All wiring for power, control, lighting etc. shall be carried out with 1.1 kV grade XLPE armoured cables except flexible cables where armouring shall not be provided. All power cables 10 sq. mm and above shall be of stranded aluminium conductor and size 6 sq. mm and below shall be of stranded copper conductor. Control cables shall be minimum 2.5 sq. mm copper. Cable cores shall be of stranded construction. All cables shall be laid on suitable size of GI cable trays.

Cable selection and routing on the crane shall form part of the crane design. Cable trays shall not be routed behind the panels as far as possible. Terminal connectors used shall be approved by the Purchaser. Cable selection shall take into consideration the ambient temperature specified, grouping factor, duty factor of the drive. The voltage drop on the crane shall not exceed 3% with the largest motor starting and the second largest running. Conduits and conduit fittings, if used on crane, shall be of standard design and shall be supplied with all accessories. Each motor shall be wired through separate conduits. Only 50% of the conduit inside space shall be occupied by the cables. All cables remaining live in open position of the isolator shall be shrouded separately. Cables carrying AC and DC power of different voltages shall be laid in different conduits. Power and control cables shall be laid separately and terminated in separate terminal boxes. For all flexible copper cables for cross conductor, double compression cable glands will be used.

9.0 EARTHING

The crane structure, motor frames and metal frames of all electrical equipment including metal conduits, cable trays etc. shall be effectively connected to the earth by independent earthing strips to conform to the requirements of the Central Electricity Authority (CEA) and Indian Electricity Rules. Equipment fed by flexible cables shall be earthed by means of spare core provided within the flexible cable. The earthing of the crane shall be effected through the fourth collector of the down shop leads. 50 X 6 mm GI strip have to be run throughout the walkway, repair cage, and for individual mechanism, motors, panels, resistor boxes, switches, junction boxes and all other electrical equipment have to be earthed with other GI strip/wire of adequate sizes. GI wires used shall be of stranded construction. The sizes of the GI strips selected for local earthing shall be approved by the Purchaser. Associated civil works related to earthing shall be included in Tenderer scope of work.

10.0 DRAWINGS AND DOCUMENTS

10.1 The Tenderer shall include in his offer for supply of all necessary drawings and other documents. The Tenderer shall specifically submit all the GA drawings/design & power calculations etc., for approval/information before taking manufacture of crane. The following drawings shall be submitted after the award of contract:

1. The detailed general arrangement drawing of EOT cranes (Double Girder & Single Girder), Electric wire rope hoists and Mechanical hoists with trolley containing all basic dimensions and all technical particulars of the equipment.
2. Crab assembly for DG EOT crane.
3. Structural Calculation for DG EOT Crane (Girder, End Carriage, Crab).
4. For EOT crane - Basis of selection of motor kW and brake selection, wire rope selection, sheaves, rope drum [Dia, length & shell], max & min LT wheel loads.
5. For Electric hoists - Sizing calculations includes motor selection, brake selection, wire rope selection.
6. Speed, torque characteristics curves for each drive/motion of crane.
7. Power & control circuit diagram for Crane.
8. Panel layout for Crane.
9. GA of crane DSL.
10. External wiring connection diagram for Crane.

11.0 TOLERANCES

The crane shall be manufactured as per the tolerance specified below.

a)	Span over LT wheels	:	± 6mm upto 40 Metres ± 7.5 mm above 40 Metres
b)	Diagonal on wheels	:	±5 mm
c)	Trolley track gauge	:	±3 mm
d)	Long travel wheel alignment (Horizontal and Vertical)	:	± 0.5 mm
e)	Tilt of wheels or balance axle	:	± 0.25 mm

f) Difference in height between trolley rails (H) in relation to the trolley track gauge (S) shall have the following tolerances:

S (mm)	H (mm)
Upto 2,500	4
2,500 to 4,500	6
Above 4,500	8

g) Speeds at full notch with rated load, voltage and frequency:

Hoist	:	± 10%
Lowering	:	+20%, -10%
Traversing	:	± 10%
Travelling	:	± 10%

h) Wheel load : ± 3% of the calculated value

	DATA SHEET (VENDOR TO SUBMIT FILLED COPY ALONGWITH THEIR OFFER)	
	NALCO FGD PROJECT	
	DETAILS OF UNDER SLUNG EOT CRANES FOR OXIDATION BLOWER AND RECIRCULATION PUMP HANDLING	
	PROJECT NAME: NALCO PROJECT	
1.0	**Capacity: UNDER SLUNG ELECTRIC CRANES**	As per Enquiry
2.0	**Quantity**	As per Enquiry
3.0	Main Hoist (minimum)	As per Enquiry
4.0	**SPAN (Wheel Centre to Wheel Centre Dimension):**	
4.1	Long Travel Span for Recirculation Pump Area	Please Refer the Attached ANNEXURE IV
4.2	CT Span	Vendor to submit
5.0	**Height of Lift:**	
5.1	Hoist height for Oxidation blower & Recirculation Pump Area	Please Refer the Attached ANNEXURE IV
6.0	**Bay Length:**	
6.1	Oxidation blower & Recirculation Pump Area	Please Refer the Attached ANNEXURE IV
7.0	**DUTY CYCLE:** (Related to Drive Motor & Mechanisms)	
7.1	Hoists	40 % CDF
7.2	Long Travel	40 % CDF
7.3	Cross Travel	40 % CDF
8.0	**SPEED:** (Operating)	
8.1	Main Hoist	**As per attached Customer Specification**
8.2	Cross Travel (CT)	**As per attached Customer Specification**
8.3	Long Travel (LT)	**As per attached Customer Specification**
9.0	**MOTOR DETAILS:** Vendor to provide details like capacity of motor, Frame size, make, type and No. of poles etc.	Vendor to confirm & submit details
9.1	Main Hoist	Vendor to submit
9.2	Cross Travel (CT)	Vendor to submit
9.3	Long Travel (LT)	Vendor to submit
10.0	**GEAR BOX SIZES:**	
10.1	Main Hoist	Vendor to specify
10.2	Cross Travel (CT)	Vendor to specify
10.3	Long Travel (LT)	Vendor to specify
11.0	**Acceleration:**	
11.1	Cross Travel (CT)	Vendor to specify
11.2	Long Travel (LT)	Vendor to specify
12.0	**Hoist Rope Details: (Size & Number of Falls)**	
12.1	Main Hoist rope Size	Vendor to specify
12.2	Falls	Vendor to specify
13.0	**CONTROL (Remote control)**	
13.1	Through pendent type control	Vendor to confirm
13.2	**Control Voltage:** Shall be 110V AC	Vendor to note
13.3	**Input Power Supply:** Shall be 415 ± 10% Volts , 50 ± 3% Hz, 3 Phase- AC.	Vendor to note
13.4	**Duty Class:**	Vendor to confirm
13.5	**Mechanism Group Classification:**	**As per attached Customer Specification**
13.5	**Design Standard:** The crane design standard as per IS – 807 & 3177 / 1999.	Vendor to confirm
13.6	**WIRE ROPE HOIST:** The electric hoist shall be designed and constructed in accordance with the latest revision of IS:3938 and shall be suitable for duty class 2.	Vendor to confirm
14.0	**Wheel Sizes:**	
14.1	Cross Travel (CT)	Vendor to specify
14.2	Long Travel (LT) -	Vendor to specify
15.0	**Brake Drum Sizes:**	
15.1	Main Hoist	Vendor to specify
15.2	Cross Travel (CT)	Vendor to specify
15.3	Long Travel (LT)	Vendor to specify

(VENDOR TO SUBMIT FILLED COPY OF ABOVE DATA SHEET ALONGWITH THEIR OFFER)

ANNEXURE - II

Details of Under slung Electric Crane for RC pumps and Blower Handling — PROJECT : NALCO FGD

SL NO	AREA	TYPE OF CRANE	CAPACITY OF CRANE	LONG TRAVEL RUNWAY TRACK OR BEAM FLANGE BOTTOM ELEVATION (LT RUNWAY TRACK OR BEAM in BHEL SCOPE)	FLOOR LEVEL	TRAVEL LENGTH (METER)	LONG TRAVEL SPAN	DISTANCE BETWEEN RUNWAY TRACK OR BEAM FLANGE CENTER TO SHED COLUMN CENTRE ON BOTH SIDE	LONG TRAVEL RUNWAY TRACK OR BEAM (IN BHEL Scope)	MAXIMUM HEIGHT OF BOTTOM OF RUNWAY TRACK OR BEAM FLANGE LOWER TO HOIST HOOK	ACTUAL HEIGHT OF BOTTOM OF RUNWAY TRACK OR BEAM FLANGE LOWER TO CRANE HOOK - VENDOR TO SPECIFY IN THEIR OFFER	TOTAL QNTY
			TON	(EL (+) METER)	EL (+) METER	(METER)	(METER)	(MM)	(NPB /ISMC)	(MM)	(MM) VENDOR TO SPECIFY	(SET)
1	RC pumps & Oxidation Blower Shed	UNDER SLUNG ELECTRIC CRANE	5	EL (+) 11.1	EL (+) 0.00	12.5	16	1000	NPB 600X220X122.4 + CAPPING ISMC400	3000	_____ MM	As per Enquiry

A Single or Double travelling Bridge / Grider (As per vendor design) Underslung Electric Crane shall be running on the lower flange of two runway Track or Beam for Long Travel.
Please refer above tabulation for Long travel Runway Track detail.

NOTE : 1) Depending upon actual crane head room , the actual height of list for Crane shall be arrived.
Special Note: The respective Speed of Hoist /LT /CT for above 5T Crane shall be as specified in ANNEXURE -I - CUSTOMER TECHNICAL SCECIFICATION & DATA SHEET OF CRANE.

Bidder Signed with seal

ANNEXURE-III- PAINTING SCHEME NALCO - HOIST

Sl No	Description	Surface preparation	Primer/ DFT in µm	Intermediate DFT	Finish DFT	Total DFT
	ABSORBER MISCELLANEOUS;FW322 ABSORBER SYSTEM-CASING INTERM; FW328 W/D INTERFACE (CARBON STEEL); FW380ELEVAIOR,COLURNN';FW381ELEVATOR BEAM AND BRACING; FW385 ELEVATOR M/C ROOM & GUIDE ; FW386 INTER-CONNECTING PLTF TO ABS; FW612 GALLARIES AND RAILINGS FOR DAM;FW613 GALLARIES AND RAILINGS FOR DUC;FW701 SLURRY PUMPS & ACCESSORIES;FW702 WATER PUMPS & ACCESSORIES;FW709 TRENCH COVER PLATE;FW710 MONORAIL FOR HOIST & CRANES;FW711 SHIM PLATE FOR PIPE RACK;FW713 CHAIN PULLEYS;FW714 HOISTS;FW717 MAN HOLE DOOR;FW761 STRUCTURE FOR PIPERACKS;FW765 STR FOR SUB PIPE RACK;FW766 PLATFORM FOR PIPE RACK;FW767 PLATFORM SUB PIPE RACK;FW768 TRESTLE FOR MAIN PIPE RACK;FW769 TRESTLE-SUB PIPE RACK; FW789 TEMPLATE-MISC;FW798 AIR RECEIVERS;FW815 RC PUMP INLT & OUTLT VALVE;FW816 MANL BTRFLY VALV-UTLTY;FW817 MOTOR BTRFL VALV-UTLTY;FW818 PNEM BTRFLY VALV-UTLTY; FW819 MAN BTRFLY VALV-LS SLRY; FW820 MOTOR BTRFLY VALV-LS SLRY; FW821 PNEUM BTRFLY VALV-LS SLRY; FW822 MAN BTRFLY VALV-GYP SLRY; FW823 MOTOR BTRFLY VALV -GYP SLRY;	Power tool cleaning	Two coats of Red oxide Zinc phosphate primer as per IS 12744 DFT 2x30 =60 µm	NIL	Two coats synthetic enamel as per IS 2932 smoke grey shade 692 of IS 5. DFT 2x30=60µm	120 µm (min)

Sl No	Description	Surface preparation	Primer/ DFT in µm	Intermediate DFT	Finish DFT	Total DFT

Revision No	Date	Record of Revision
00	21/12/2020	Original Issue
01	08/04/2021	Revised Issue to include new PGMA released by BHEL Ranipet Engineering.

Notes

1. Painting of commissioning spares and Mandatory spares shall be as per respective items as above.
2. No painting for SS, Aluminium, non ferrous, stainless steel and Galvanized items.
3. In sub-assy, wherever the plates / sheets of thickness less than or equal to 5mm and rods are used, Power tool cleaning or Hand tool cleaning to SSPC- SP3/ SP2 shall be followed. Painting scheme for Sl no 2 of APH can be used in that case.
4. All components covered under different SL no. are to be painted. Incase any component is left out, the same shall be deemed to be included under the relevant section.
5. Painting of damaged surfaces will be same as the painting scheme in this specification with power tool cleaning.

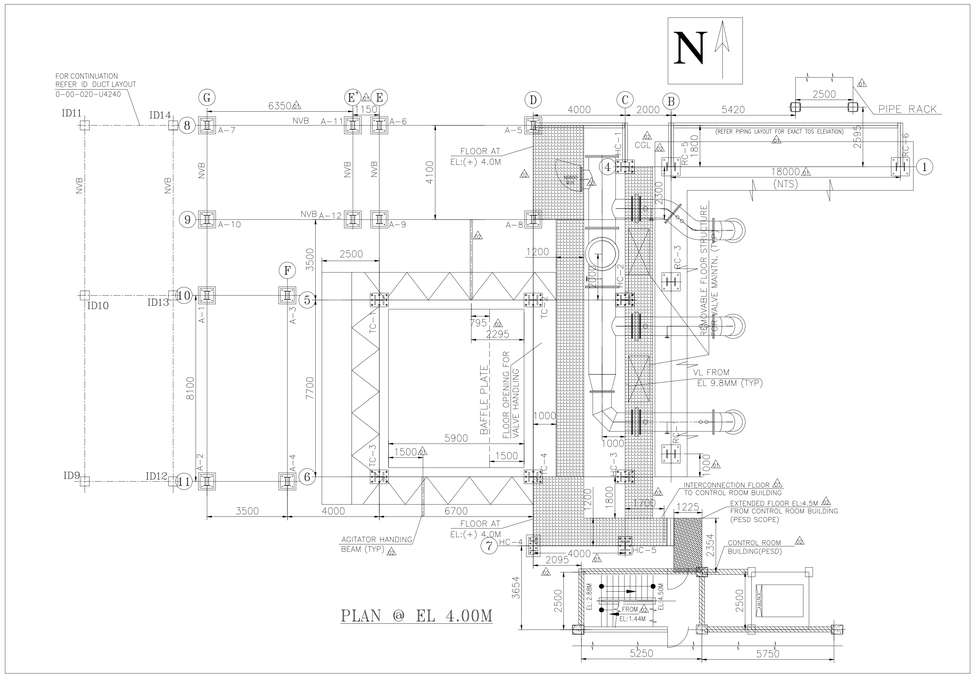
Prepared by	Reviewed by	Approved by
8/4/2021	08/04/2021	8/4/2021
Abdul Ghani Senior Engineer/QA	K Renjith Manager/QA	R.Arunachalam DGM/QA(Mech)

REVIEWED FOR REFERENCE
SIGNATURE: K. Renjith
LETTER REF.: 28812-MD-PWR03-0077A
DATE: 15.04.2021
M. N. DASTUR & COMPANY (P) LTD
KOLKATA

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

SH. 01 OF 04 DRG. NO. 0-FW-000-03574



NOTES:

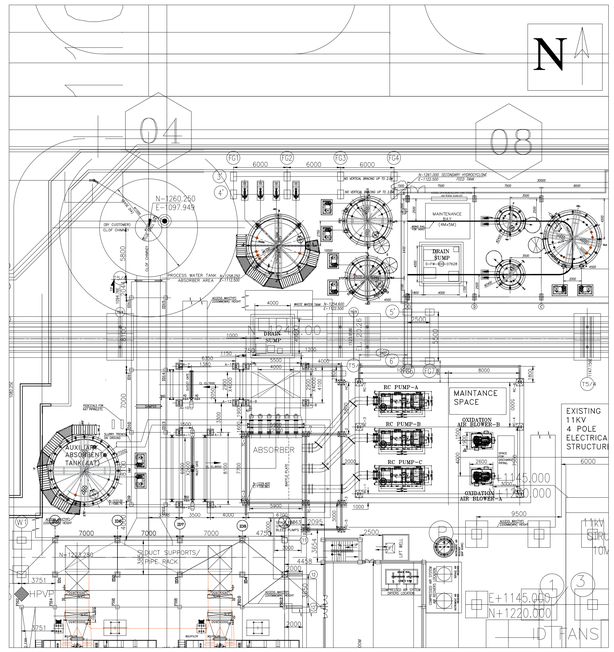
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. EL(+)0.0M WHICH IS FINISHED FLOOR(FFL) OF STG BUILDING, CORRESPONDS TO RL (+)900.3M.
3. FINISHED GROUND/GRADE LEVEL NEAR ABSORBER AREA SHALL BE RL(+)899.80M i.e. EL(-)0.50M.
4. PIPING INDICATED FOR REFERENCE ONLY,PIPING LAYOUT TO BE REFEREED FOR EXACT DETAILS OF PIPING.
5. INDICATED ORIENTATION OF COLUMNS,COLUMN,BEAM SIZES ARE SUGGESTIVE ONY,FOR EXACT ORIENTATION REFER STRUCTURAL DRAWINGS.
6. REFER STANDARD DRAWINGS NO:EGF-Q052-433 & EGF-Q052-434 FOR DETAIL DIMENSIONS OF JAS NOZZLES.
7. 150MM LOCAL DEPRESSION OF SIZE 800MM X 600MM AS SHOWN IN "PLAN @ GRADE LEVEL" TO BE PROVIDED ON ABSORBER BASE.
8. REFER STANDARD DRAWING NO EGF-Q052-411 FOR DETAILS OF EMERGENCY QUENCHING SPRAY PIPE DETAILS.
9. REFER STANDARD DRAWING NO EGF-Q052-413 FOR DETAILS OF W/D INTERFACE WASHING PIPE DETAILS.
10. REFER STANDARD DRAWING NO:EGF-Q052-421 & EGF-Q052-422 FOR DETAILS OF DCFS SPRAY PIPES.
11. ABSORBER DIMENSIONS INDICATED IN "PLAN @ GRADE/FLOOR LEVEL" VIEW ARE ABSORBER CASING OUTSIDE DIMENSIONS.
12. PIPES CUM CABLE ROUTING SHOWN IS INDICATIVE,CORRESPONDING PIPING/CABLE TRAY ROUTING LAYOUT TO BE REFERRED FOR EXACT DETAILS.
13. MARKED DUCT PORTION TO BE ERECTED AFTER INSERTION OF SPRAY PIPES INTO THE ABSORBER CASING. NO VERTICAL BRACINGS(IN THE MARKED AREA) ALONG EAST-WEST DIRECTION SHALL BE PLANNED BETWEEN THE DUCT SUPPORT COLUMNS TO FACILITATE INSERTION OF SPRAY PIPES IN TO THE ABSORBER CASING.
14. COLUMN HC-3 ALONE IS RAISED TO EL:+27.09M FOR INTERCONNECTION PLATFORM PURPOSE,WHERE AS COLUMNS HC-1& HC-2 ARE RAISED UP TO EL:+9.8M ONLY.
15. ELEVATIONS MARKED FOR VARIOUS NOZZLES(IN SHEET-04) ARE NOZZLE CENTER ELEVATIONS.
16. REFER APPROVED DRAWING NO4-FW-000-01205 "SELECTION OF MATERIAL FOR FGD SYSTEM" FOR MATERIAL DETAILS.
17. PLATFORM STRUCTURE IF FOULING WITH NEARBY ID DUCT SUPPORT STRUCTURE,TO BE MODIFIED TO SUIT AT SITE.

LEGEND:-

FFL	:	FINISHED FLOOR LEVEL
FGL	:	FINISHED GROUND LEVEL
BOB	:	BOTTOM OF BASE PLATE LEVEL
D	:	DOOR 1.2M WIDE
RS	:	ROLLING SHUTTER 4M X4M
TOPF	:	TOP OF PLATFORM
PL	:	PAVED LEVEL
TOG	:	TOP OF GRATING
TOC	:	TOP OF CONCRETE
VL	:	VERTICAL LADDER
CGL	:	CAGE LADDER
NVB	:	NO VERTICAL BRACING ALLOWED
AD	:	ACCESS DOOR
MH	:	MAN HOLE

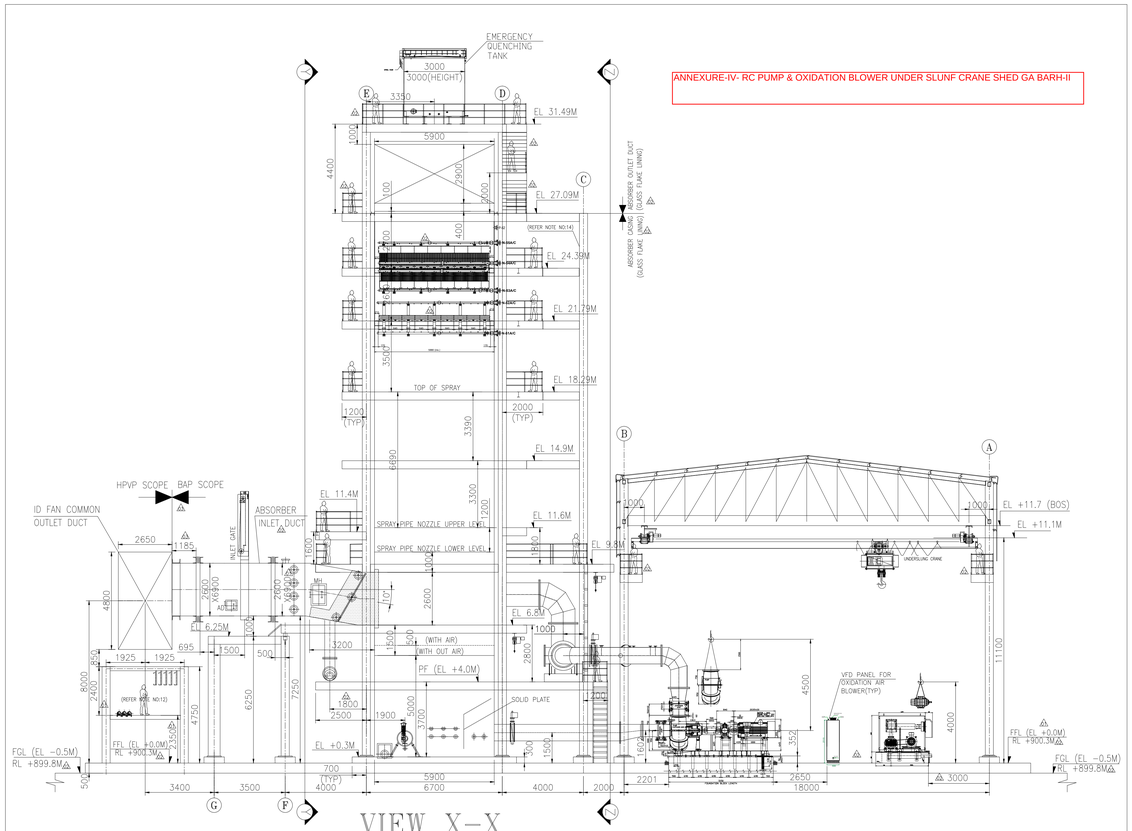
REF. DWGS

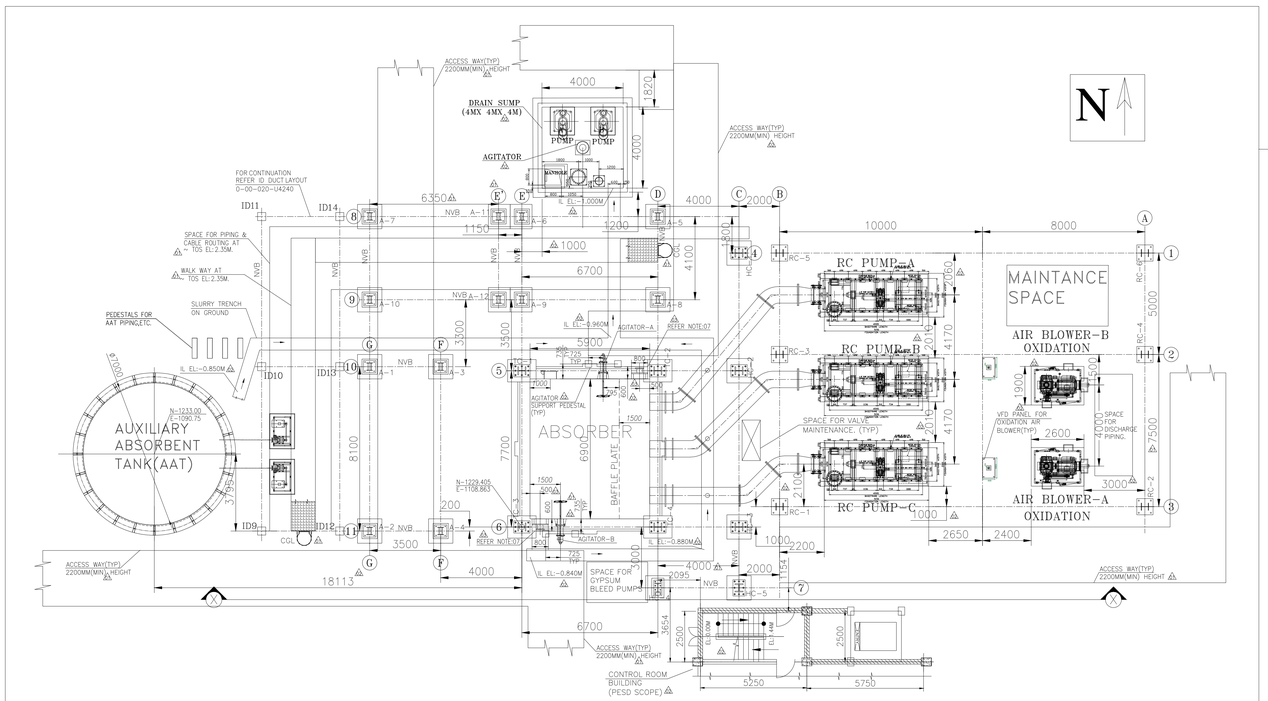
1. PY-LQ-0-M166-2001-01 : PLOT PLAN
2. 0-FW-000-03573 : GENERAL LAYOUT OF FGD DUCTING.
3. 3-FW-000-04141 : P&ID - Absorber ,Oxidation Blower, Gypsum Bleed Pump & Mist Eliminator.



KEY-PLAN

ANNEXURE-IV- RC PUMP & OXIDATION BLOWER UNDER SLUNF CRANE SHED GA BARH-II





PLAN @ GRADE/FLOOR LEVEL

BAP CUSTOMER NO: R182.

CLIENT	NALCO	NATIONAL ALUMINIUM COMPANY LIMITED BHUBANESWAR, ODISHA
CONSULTANT	DASTUR	M. N. DASTUR & COMPANY (P) LTD CONSULTING ENGINEERS, KOLKATA
PROJECT		INSTALLATION OF STEAM AND POWER PLANT FOR 5th STREAM ALUMINA REFINERY EXPANSION AT DAMANJODI, ODISHA UNDER PHASE-3 EXPANSION OF M&R COMPLEX
	BHEL	BHARAT HEAVY ELECTRICALS LTD. UNIT: BOILER AUXILIARIES PLANT, RANIPET-632 406.

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	ILAN/SUKUMAR	-ref-	06-03-2023	
CHD.	K.KUMAR	-ref-	06-03-2023	
APPD.	V.V.SUNDAR	-ref-	06-03-2023	

DEPT.	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
UNTOL. DIMS. OR CODE.	N.T.S	-N.A.-	-N.A.-	-N.A.-	-N.A.-

TITLE: GA DRAWING OF ABSORBER (PLAN & ELEVATIONS)

BHEL DRG NO.: 0-FW-000-03574 REV. 03

CARD CODE: N.A. SHT. No 01 NO. OF SHT. 04

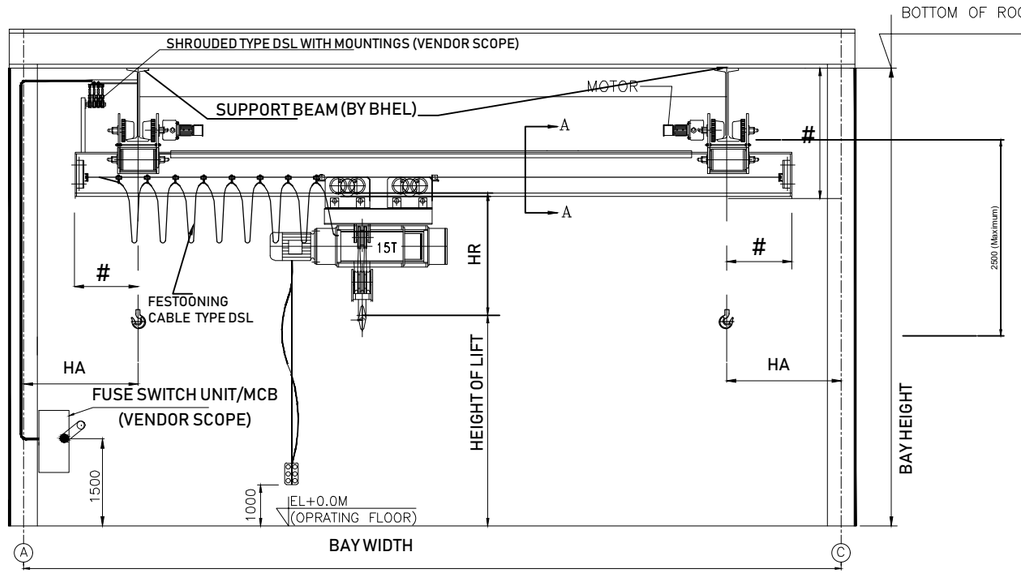
SIZE A0

REV.	DATE	ALTERED	CHD/APPD
03	20.07.22	BAP/HPVP TERMINAL POINT UPDATED AS PER REVISED INPUT FROM HPVP EMAIL DTD:05.03.22. ABSORBER OUTLET DUCT DIMENSION UPDATED IN VIEW-Y&Z AS PER PLAN VIEWS.NOTCH ON ABSORBER BASE FOR BOTTOM DRAIN NOZZLES UPDATED.NOTE:07 UPDATED. LATEST RC PUMP DETAILS UPDATED.	SUKUMAR CHD/APPD. KUMAR/SUNDAR
02	17.02.22	AAT LOCATION DETAILS UPDATED AS PER PLOT PLAN. OUTLET GATE LOCATION,MEJ UPDATED.NOZZLE LOCATION OF ABSORBER CASING UPDATED. ABSORBER CASING SUMP POSITION,PLATFORM AT EL:4.0M,EL:9.8M,EL:27.09M & EL:31.49M UPDATED.SUGGESTIVE STAIR CASE DETAILS UPDATED.NOZZLE LOCATIONS UPDATED PER PIPING. ABSORBER CASING/OUTLET DUCT & BAFFLE UPDATED. WELDBOMER/PUMP,AGITATOR DATA & RC PIPING UPDATED.	SUKUMAR CHD/APPD. KUMAR/SUNDAR
01	19.05.21	INTERCONNECTION PLATFORM WITH CONTROL ROOM BUILDING INDICATED. NOZZLE LOCATIONS UPDATED IN SHEET-04. ALL REVISIONS ARE INDICATED AS△	SUKUMAR CHD/APPD. KUMAR/SUNDAR

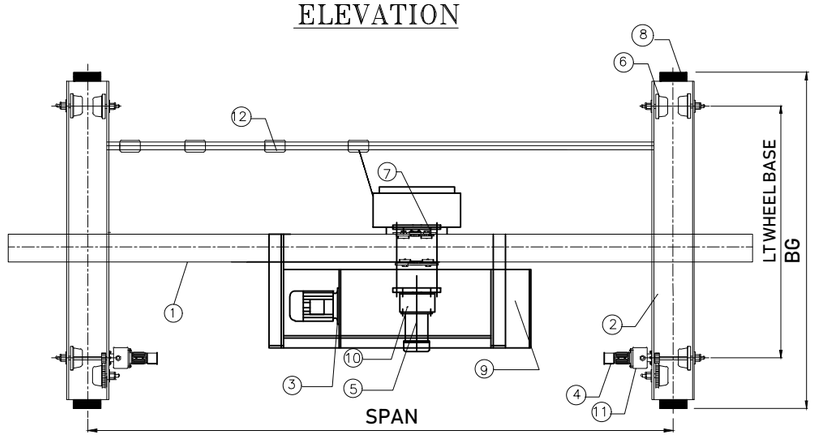
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

SIGN. AND DATE | REF. DRG. NO. | COMPUTER FILE NAME | INVENTORY NO

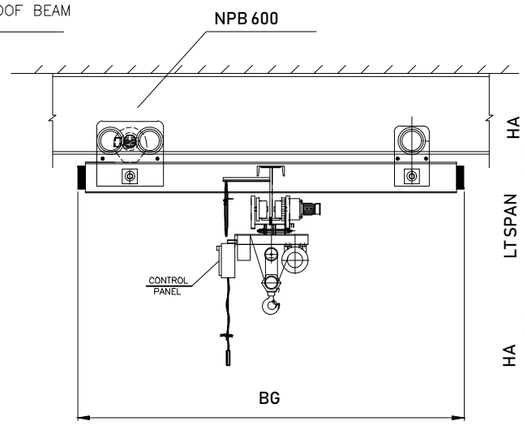
ANNEXURE-V- TYPICAL GA OF UNDER SLUNG ELECTRIC CRANES



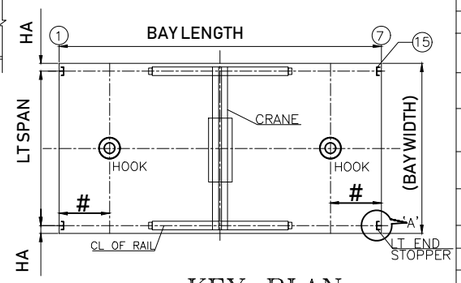
ELEVATION



PLAN



SIDE VIEW

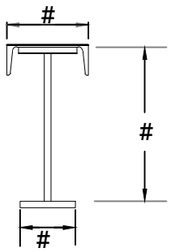


KEY PLAN

CRANE GIRDER

DETAIL AT SECTION AA

(GIRDER SIZE + CAPPING SIZE : AS PER VENDOR DESIGN)



19	CT/LT GEAR BOX HOUSING	VENDOR TO SPECIFY
18	HOIST GEAR BOX. HOUSING	VENDOR TO SPECIFY
17	PULLEY	VENDOR TO SPECIFY
16	ROPE DRUM	VENDOR TO SPECIFY
15	LT END STOPER	VENDOR TO SPECIFY
14	CT END STOPER	VENDOR TO SPECIFY
13	HOOK	VENDOR TO SPECIFY
12	CT DSL	VENDOR TO SPECIFY
11	LT GEAR	VENDOR TO SPECIFY
10	CTGEAR	VENDOR TO SPECIFY
9	MH GEAR	VENDOR TO SPECIFY
8	BUFFER	VENDOR TO SPECIFY
7	CT WHEEL	VENDOR TO SPECIFY
6	LT WHEEL	VENDOR TO SPECIFY
5	CT MOTOR	VENDOR TO SPECIFY
4	LT MOTOR	VENDOR TO SPECIFY
3	MH MOTOR	VENDOR TO SPECIFY
2	LT END CARRAIGE/BEAM	VENDOR TO SPECIFY
1	GIRDER/TROLLEY PLATE	VENDOR TO SPECIFY
DENOT.	ITEMS DISCRIPTION.	VENDOR TO SPECIFY

BOM

CRANE CAPACITY/LIFT	CRANE CAPACITY/LIFT : AS PER SPEC.						
LOCATION	OXIDATION BLOWER AND RC PUMP						
WEIGHT OF CRANE	VENDOR TO SPECIFY						
MAX. LT WHEEL LOAD	VENDOR TO SPECIFY						
CONTROL SUPPLY	110 V						
POWER SUPPLY	415 V±10%, 3 PH., 50HZ.						
BEARING	VENDOR TO SPECIFY						
CONTROL	PENDANT PUSH BUTTON FROM FLOOR LEVEL.						
GEAR BOX	MOTION	REDUCTION	MATL. OF GEAR & PINION	HARDNESS	LUBRICATION		
	HOIST	VENDOR TO SPECIFY	VENDOR TO SPECIFY	VENDOR TO SPECIFY	VENDOR TO SPECIFY		
	CT	VENDOR TO SPECIFY	VENDOR TO SPECIFY	VENDOR TO SPECIFY			
	LT	VENDOR TO SPECIFY	VENDOR TO SPECIFY	VENDOR TO SPECIFY			
SPEED	HOIST	AS PER SPEC.					
	CT	AS PER SPEC.					
	LT	AS PER SPEC.					
MOTORS	HOIST	VENDOR TO SPECIFY					
	CT	VENDOR TO SPECIFY					
	LT	VENDOR TO SPECIFY					
BRAKE	MOTION	SIZE	RATING	TYPE	LIMIT SWITCH	TYPE	QTY.
	HOIST	#	VENDOR TO SPECIFY		HOIST	VENDOR TO SPECIFY	#
	CT	#	VENDOR TO SPECIFY	VENDOR TO SPECIFY	TROLLEY	VENDOR TO SPECIFY	#
	LT	#	VENDOR TO SPECIFY		CRANE	VENDOR TO SPECIFY	#
WIRE ROPE/FALLS/SPEC.	VENDOR TO SPECIFY						
CLASS OF DUTY	VENDOR TO SPECIFY						
BAY LENGHTH	AS PER SPEC.			LT WH. DIA./QTY.	VENDOR TO SPECIFY		
HEIGHT OF LIFT	AS PER SPEC.			CT WH. DIA./QTY.	VENDOR TO SPECIFY		
SPAN	AS PER SPEC.			SHEAVE DIA	VENDOR TO SPECIFY		
CAPACITY	AS PER SPEC.			DRUM DIA/LENGHT	VENDOR TO SPECIFY		

TECHNICAL SPECIFICATION

		VENDORS TO INFORM
HR	HEAD ROOM	
HA	HOOK APPROACH	
BG	BOGIE LENGTH	
HL	HEIGHT OF LIFT	
WB	LT WHEEL BASE	

NOTES:–

1. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE SPECIFIED.
2. # - VENDOR TO SPECIFY
3. **A Single or Double travelling Bridge / Grider (As per vendor design , To Suit) Underslung Electric Crane shall be running on the lower flange of two runway Track or Beam for Long Travel.**

PAINTING OF CONTROL PANELS:

(A) SURFACE TREATMENT WITH MINIMUM SEVEN TANK PROCESS.
(B) PANEL 2 COATS OF SYNTHETIC ENAMEL PAINT.
(C) SHADE–SIEMENS GREY
(D) THE MINIMUM COATING THICKNESS OF POWDER COATED SURFACES SHALL BE MIN OF 80 MICRONS.

Painting:

Primers:
Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats) of Min DFT 70 microns.

Final:
Synthetic Enamel to IS 2932 Shade: Grey white RAL 9002 (Two coats) of Min. DFT 60 microns.

Total DFT: 130 microns.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	NTPC PROJECT					
BHARAT HEAVY ELECTRICALS LTD. UNIT: BOILER AUXILIARIES PLANT. RANIPET-632 406	DRN	NAME	SIGN	DATE	NO.OF VAR.	
	CHD					
	APPD					
DEPT AQCS	GRADE OF UNTOL.DIM		SCALE N.T.S	WEIGHT (KG)	REF. TO ASSY/OLD DRG.	ITEM NO. / NO.OF ITEMS
CODE 862						
TITTLE: TYPICAL GA OF UNDER SLUNG CRANE	CODE	CARD U 01	DRAWING NO. 3-FW-0-00001	REV 00		

Annexure to Enquiry no:	Date	
Sl.No	**BHEL / Customer Requirement**	##Specific confirmations by the manufacture
1	**Quality Plan Requirement:**	
1a	MQP (Manuafcutering Quality Plan) shall be submitted in attached format for BHEL/Customer review & approval. Typical MQP is attached for indicative purposes for guidance & use.	
1b	MQP shall invaribly cover w.r.t Inward inspection including on Raw materail Procurement, In process and Final inspection in elaborated way/details.	
1c	Bidder shall also to give specific confirmation that on need basis, their competent officials shall visit to BHEL/customer for finalization of Quality plan including test procedure/methodology during preaward / post award approval / detailed engineering in the event of an order.	
1d	No deviation on BHEL/Customer approved MQP is acceptable.	
1e	Bidder shall agree to submit all cross referred documents other than codes/standrads to BHEL/Customer/Consultant.	
2	**Important Notes shall be included in MQP :** (a) Latest revision of Standard s & Specification shall apply. Only International Standards are applicable. Indian & Chinese Standards are not applicable. (b) Materials shall be procured in compliance to Functional Technical Specification. (c) Inspection shall be in compliance with Approved Quality Control Procedure for the Product. (d) NDT shall be carried out by Qualified Personnel with compliance to Approved NDT Procedures and Acceptance Norms, as per ASME Section V. (e) Gauges and measuring Instruments, with valid calibration only shall be used. (f) Cleaning and Painting of products shall be carried out as per Approved Painting Schedule. (g) Finished Products shall be packed to comply with Approved Packing Schedule. (h) Welding shall be carried out by Qualified Personnel with compliance to Approved NDT Procedures and Acceptance Norms, as per ASME Section V.	
3	**Domestic / Inland Inspection** will be carried out by BHEL/BHEL apointed Third Party Inspection Agency (TPIA) / Customer/Customer Apointed Inspection Agency/Consulatnat. This is applicable for all Stage inspection and Final Inspection identified as "W" - Witness or "CHP" - Customer Hold Point as per customer approved Quality Plan/ Technical specification / Approved Drawing/ Approved Data sheet / Scheme / PID / PFD / SLD (Process Instrumentaion Diagram / Process Flow Diagram / Single Line Diagram) etc (As applicable). **"The inspection charges at actuals incurred by BHEL will be loaded to compare with foreign suppliers".**	
4	**Inspection Agency for Foreign Bidders and also for Indian Bidder but importing from Forgign Sources**: (1) Any one of the fllowing Third Party Inspection Agency (TPIA) shall be appointed by the bidder and same shall be furnished by the bidder in techno commercial bid itself. (2) The details of TPIA with contact details like Name of the official, Phone no, Email id shall also to be submitted during pre/post award. However **cost for such inspection agency shall be borne by the bidder only. Inspection charges for such inspection agency shall be indicated separately so that if BHEL/Customer is undertaking the inspection by on their own , then these charges non claimable by the bidder.** **List of TPIA** (1). M/s Bureau Veritas, (2). M/s TUV-Nord, (3). M/s TUV-SUD, (4). M/s TUV Rheinland, (5). M/s Lloyds Register, (6). M/s SGS, (7). M/s Germanischer Lloyds, (8). M/s QUEST, (9). M/s Certification Engineers International, (10). M/s Intertek, (11). M/s IR Class Systems and Solutions, (12). M/s DNV, (13). M/s Fichtner, (14). M/s ABS Inspection Services.	
5	**Stage Inspection during manufacturing Process :** Stage Inspection during manufacturing shall be carried out as per approved quality plan and all necessary documents shall be provided for review,verification and clearanace for further processing. This inspection call shall be given well in advance (atleast 2 weeks before) to TPI/Bidder's own inspection agency to avoid delay in the manufacturing processes.	
6	**Inspection before despatch for domestic supplier :** Inspection before despatch at supplier's works shall be carried out by BHEL/BHEL appointed Inspection agency. Inspection shall be done as per approved Quality plan/ Technical specification/ Approved Drawing/ Approved Data sheet .	

Sl.No	BHEL / Customer Requirement	##Specific confirmations by the manufacture
7	**Inspection at Forign Source/Supplier:** (a) As in sl no: 3. shall be ensured without fail, (b) No materail / items shall be despatched without getting the written communication from BHEL / Customer inspection carried out by BHEL/BHEL apointed Third Party Inspection Agency (TPIA) / Customer/Customer Apointed Inspection Agency/Consulatnat. This is applicable for all Stage inspection and Final Inspection identified as "W" - Witness or "CHP" - Customer Hold Point as per customer approved Quality Plan/ Technical specification / Approved Drawing/ Approved Data sheet / Scheme / PID / PFD / SLD (Process Instrumentaion Diagram / Process Flow Diagram / Single Line Diagram) etc (As applicable). (c) Inspection before despatch at supplier's works shall be carried out by bidder appointed inspection agencies having international presence at vendors and or vendor's sub vendor works. Inspection shall be done as per approved Quality plan/ Technical specification/ Approved Drawing/ Approved Data sheet by TPIA mentioned in Sl no: 03 at supplier's cost.	
8	**Painting** shall be done strictely as per BHEL/Customer approved painting schedule / scheme only. Paint Thickness / Paint shade shall be ensured as per BHEL / Customer approved painting schedule / specification / data sheet etc. No deviation is acceptable unless otherwise accepted by BHEL/Customer in writing. Any conflict if any among BHEL / Customer approved painting schedule / Spec / data sheet etc shall be brought to the notice to BHEL well in adavnce before proceding including the BOI being procured for assy / skid like motors etc	
9	Specific conformation for document package in the event of an order (2 Hard copies & soft copy in PDF file) is to be given containing the following with proper linkages (i) Index Sheet, (ii) MQP/RQP/Endorsemment Sheet (As applicable), (iii) TCs identfied by BHEL/ Customer for record for "CHP" / "W" and Verification portion ("V") as given in approved QP, (iv) Final inspection report + TC including Chemical + Mechnaical + HT + NDT etc, (v) Third party Inspection report + TC, (vi) Customer CHP/ MDCC, (vii) Type test / Performance Test reports conducted, (viii) Type test / Performance Test approval/ clearance obtained from BHEL/Customer, (ix) BOM with As Build Drgs with actual make / rating used with BHEL/customer approved drawings.	
10	**Packing / Seaworthy Packing** shall be as per BHEL Packing schedule / approved drg / sketch. This shall be ensured to take care tarnsit / handling / transhipment in Road / Sea / Air. Photographs are to be submitted for BHEL review before despatching the material as per contract conditions.	
10	**Packing** shall be as per BHEL Packing schedule / approved drg / sketch. This shall be ensured to take care tarnsit / handling / transhipment in Road / Sea / Air. Photographs are to be submitted for BHEL review before despatching the material as per contract conditions.	
11	**Outsourcing of test facilities:** Bidder shall ensure all the testing facilities in house. However If any of the test facilities are not available with successful bidder, then bidder shall ensure the same at NABL accreadted third party lab / Govt / Govt Lab for major testing such as NDT, Electrical & Mechanical testing.	
12	**Important Note:** No deviation on the above requirement 01 to 11 is acceptable w.r.t Quality Requirement and those offers not meeting these specific customer requirement is liable for rejection and hence the bidder shall submit all the required documentary evidances in the offer itself.	
13	## Necessorily to be filled up by the bidder at the time of offer itself otherwise the offer may not be considered w.r.t Quality Requirement being customer specific requirement.	

CONTRACT QUALITY REQUIREMENTS (CQR) for UNDERSLUNG CRANES

PROJECT: **NALCO Damanjodi 1 x 18.5 MW** **(BHEL W.O no: R182)** **PACKAGE: FGD PACKAGE** **MAIN CONTRACTOR:** **BHEL - RANIPET** **SUB CONTRACTOR (OEM) & ADDRESS:** **(To be filled by OEM VENDOR)**	**CONTRACT QUALITY REQUIREMENTS (CQR) for UNDERSLUNG CRANES** **NALCO Damanjodi 1 x 18.5 MW** **(BHEL W.O no:R182)**	**DOC.NO:** **BAP/QR/R182/NALCO Damanjodi/Cranes: 001** **Rev NO.: 00** **PAGE : Page 1 of 2** **DATE: 20.08.2022**	**##Enquiry No:** **## OEM Supplier Name & Address:** **##Offer reference:** **##Date:** **Contact Official Name:** **Mobile no:** **Email id:**

Sl. NO.	DESCRIPTION	BHEL and Ultimate Customer - NALCO Quality Requirements	##Specific confirmations by the vendor
		ITEM: Underslung Cranes	
01	**Quality Plan Requirement**	**1.** MQP is applicable for these and accordingly Actual Underslung Crane Manufacturer and OEM shall submit the MQP for BHEL and ultimate customer NALCO and its consultant M.N Dastur approval. **2.** If any of Underslung Crane manufacturer is having, ultimate customer NALCO and its consultant M.N Dastur approved MQP (Manufacturing Quality Plan) / NTPC approved RQP (Reference Quality Plan) and having validity, the same is applicable for these Underslung Crane for inspection subject to obtaining ultimate customer NALCO and its consultant M.N Dastur formal approval in the event of an order. **3.** If Underslung Crane Manufacture / OEM vendor does not have MQP/RQP, they should submit a fresh MQP to BHEL/NALCO (in BHEL format) for review & approval in line with the NALCO/M.N Dastur requirements and indicative MQP(copy attached).	
02	**BHEL / Ultimate Customer – NALCO approved vendors**	BOIs including LT Motors are to be procured only from Ultimate Customer - NALCO approved vendors and no deviation on this specific customer requirement is acceptable.	
03	**Inspection Methodology to be adopted at Actual Underslung Crane Manufacture works by OEM vendor**	BHEL/ BHEL AIA (BHEL authorized inspection Agency) to witness / perform inspection Supplier works and submit all the inspection documents test reports as per approved MQP & approved data sheet / drg / spec / as per relevant BIS (Bureau of Indian Standard).	
		No material shall be dispatched without BHEL / BHEL AIA and Ultimate Customer – NALCO Inspection and dispatch clearance.	
04	**Painting Requirements**	Painting requirement like paint shade and painting thickness including no of coats if any are to be ensured by the OEM vendor as per BHEL/ Ultimate Customer - NALCO and its consultant M N Dastur approved data sheet/drg/spec (As applicable).	
05	**Packing**	Packing shall be as per Specification / Drg. / Data sheet to avoid any transit & handling damages.	
06	**For Inspection call**	Inspection call by Vendor for inspection at Manufacture works to be raised for BHEL/BHEL AIA inspection / Ultimate Customer – NALCO including for type test witnessing to be ensured / addressed to Mr MS Aditya Chakravarthy.,Manager (QC-Proc)., Mobile no: +91 9443006303., Email id: msachakravarthy@bhel.in and Mr Zeeshan Ali., Sr.Engineer (QC-Proc)., Mobile no: +91 9443149691., Email id: zeeshan@bhel.in including for inspection related activities for immediate response / resolution.	

CONTRACT QUALITY REQUIREMENTS (CQR) for UNDERSLUNG CRANES

PROJECT: **NALCO Damanjodi 1 x 18.5 MW** **(BHEL W.O no: R182)** **PACKAGE: FGD PACKAGE** **MAIN CONTRACTOR:** **BHEL - RANIPET** **SUB CONTRACTOR (OEM) & ADDRESS:** **(To be filled by OEM VENDOR)**	**CONTRACT QUALITY REQUIREMENTS (CQR) for UNDERSLUNG CRANES** **NALCO Damanjodi 1 x 18.5 MW** **(BHEL W.O no:R182)**	**DOC.NO:** **BAP/QR/R182/NALCO Damanjodi/Cranes: 001** **Rev NO.: 00** **PAGE : Page 2 of 2** **DATE: 20.08.2022**	**##Enquiry No:** **## OEM Supplier Name & Address:** **##Offer reference:** **##Date:** **Contact Official Name:** **Mobile no:** **Email id:**

Sl. NO.	DESCRIPTION	BHEL and Ultimate Customer - NALCO Quality Requirements	##Specific confirmations by the vendor
		ITEM: Underslung Cranes	
07	**Document Package / Dossier**	Specific confirmation for Document Package in the event of an order (3 hard copies + soft copies in PDF file) is to be given containing the following with proper linkages (.) (i) Index Sheet (ii) MQP/RQP (iii) TCs identified by BHEL/NALCO for record for "CHP" (Customer Hold Point) Verification & Witness "W" portion as given in MQP / RQP / MQP (as applicable). (iv) Final Inspection Report + TC (v) BHEL AIA (BHEL Appointed Inspection Agency) / BHEL report + TC (vi) Ultimate customer NALCO CHP (Customer Hold Point) / MDCC (Material Dispatch Clearance Certificate)	

OEM Supplier signature with seal

 # Necessarily to be filled up & submitted by the OEM vendor at the time of offer itself otherwise the offer may not be considered w.r.t Quality Requirements against Underslung Cranes being BHEL/ ultimate customer – NALCO specific requirements.

Ultimate Customer NALCO/Consultant MN Dastur
Inspection requirements for Cranes, Hoists

INSPECTION PROCEDURE (IP) FOR MECHANICAL EQUIPMENT & STRUCTURES AT MANUFACTURERS' WORKS

Project : 18.5 MW Co-Generation Power Plant, NALCO Damanjodi
Contractor's Name : BHEL, Ranipet
Package Description : BTG Package for steam and Power Plant for 5th stream Alumina Refinery expansion Project of M & R Complex at NALCO Damanjodi

Contract/P.O. No. / L.O.A. No. : NBC/MMXP/SPP/STRM5/BTG/09 DT. 19.11.2020
Contract Specification Reference : NALCO CGPP-3CA01-PWR-01
IP No. & Rev. : IP-28812-M-06 (CHN) Rev.2 **Date** 03.06.2021

Status : Approved

List-A - Test & Test Certificate Codes (Add additional Codes , if required)

Code	Tests & Test Certificates	Code	Tests & Test Certificates	Code	Tests & Test Certificates
1	Visual Inspection	15	Spark test for Rubber Lining	27	Manufacturer's Test Certificates
2	Dimensional Checks	16	Adhesion Test		for Bought Out Items
3	Fitment & Alignment	17	Performance Test	28	Painting/Galvanization Test/ Rust Preventive oil coating
4	Control Assembly Check		(with Characteristic Curve)	29	Strip test
5	Raw material -Physical test.	18	Mechanical Run Test (MRT)/No Load/Free Run Test	30	Shaft runout test
6	Raw material-Chemical test.	19	Measurement of speed	31	Routine Test
7	Ultrasonic test	20	Vibration,Noise & Temperature	32	Tensile, Elongation & Full thickness breaking
8	Magnetic Particle Test		Rise Measurement	33	Fire, Electrical resistance, Drum friction test
9	Radiography Test	21	Pressure Test	34	Abrasion loss & Troughability
10	Dye Penetration Test	22	Leakage Test	35	Free Air Delivery
11	Hardness Test	23	Load/Overload Test	36	Natural Frequency Test
12	Water & Dust Ingress Test	24	Static Balancing Test	37	Spectroscopic Test
13	Friction factor test	25	Dynamic Balancing Test	38	Run out Test
14	Heat treatment/Stress Releiving	26	Operational & Functional Test	39	Centrifuging (Overspeed Test)
				40	Clearance Check & Assembly Inspection
				41	Tube Expansion Check

List-B-Documents (Add additional Codes, if required)

Code	Documents	Code	Documents
B1	Approved GA drawing	B10	Painting Certificate
B2	Information and other Reference drawings duly approved	B11	Conformity certificate
B3	Fabrication drawings duly approved	B12	Match marking of site joints
B4	Data Sheet	B13	IBR/Other Statutory Agency Certificate
B5	Bill of Materials		
B6	Manufacturer's Catalogue	B15	Unpriced P.O. Copy
B7	Approved Billing Schedule	B16	List of Valve
B8	Welding Procedure Specification (WPS), Procedure Qualification Record (PQR).	B 17	BHEL Drawing
	Welding Operator Performance Qualification (WPQ)	B 18	BHEL Standard Procedure
B9	Calibration Certificate of all measuring Instruments and Gauges from NABL Lab or Traceable to National / International Standards.		

General Note :-

1) Three sets of test certificates (2 sets hard & 1 set soft) duly verified and signed by the main Contractor shall be furnished.
2) IP number and revision status to be indicated by M.N.Dastur & Co. (P) Ltd.
3) Drawing approval authority shall be as per contract.
4) If quantity is in lot, substantial quantity shall be offered for economy of inspection.
5) For Structural items average quantity shall be offered in 100 MT lot.
6) Attempt shall be exercised to furnishIP for all the items if the package in single lot.
7) Painting to be done after inspection as per approved Painting Specification. Shop Painting Certificate as per format FM VIA shall be submitted; Unless otherwise specified, Painting Shall be as per Manufacturer Standard.
8) Vendor approved detail drawing shall be made available during inspection as required corelated with Dasturco approved GA drawing
9) All measuring instruments used for our inspection and testing shall have valid calibration certificate from NABL laboratory or traceable to national/international standards.
10) Pumps, Fans, Blowers and Compressors Performance test shall be conducted for one per type/model/capacity and remaining quantities shall be Mechanical Run Tested.
11) All manual, pneumatic, electrical operated valves upto and 100 NB size shall be cleared based on review of documents and valve size 150 NB and above shall be witnessed.
12) For Pumps, Blowers & Agitators which are offered with their own electrics (Motor & Controls) same will be interpreted / tested along with pumps and relevant tests certificates will be reviewed.
13)Raw material TC verification for plates of thickness above 40mm only. Certificate of compliance will be submitted for balance raw materials.

41	FW815	RC Pump Inlet & Outlet Valve		1, 2, 5, 6, 7 - P	---	---	1, 2 & 21 - P	1, 2 & 21 - W	1, 2 - W	B1/ B4/ B5/B17/B18	1, 2, 5, 6, 7, 10, 21, 27 & B10	Witness inspection by customer for 1no for functional testing(if it is applicable as per Note-11).
42	78473	Electrically operated Hoist & Accessories		1, 2, 10, 11, 18, 19, - P	---	---	1, 2, 19, 23 - P	1, 2, 19, 23 - W	---	B1/ B2/ B4/ B5/B17/B18	1, 2, 10, 11, 18, 19, 23, 27, 31, B10 & B11	10-Dye Penetrating test (As Applicable) 11-Hardness Test(As Applicable) 18-MRT/NO Load/Free run test(As App.) 31 - Electric Motor Routine TC Review 19 - Test for Hoist up, Down, CT & LT movement(As Applicable) 26-Operational & Functional Test (AS App.) B11-BHEL's Certificate of Conformity (COC)
43	FW293	Elevator and Accessories		1, 2 - P	---	---	1, 2, 19, 26, 31 - P	1, 2, 18, 19, 26, 31 - W	---	B1/ B2/ B4/ B5/B17/B18	1, 2, 18, 19, 26, 27, 31 & B11	18 - No Load Free ru test & brake function test for machinery unit (As App.) 26 - Tripping of over speed governor , controller operations, safety interlock, Push Buttons for Car Call, Landing Call(As App.) 31 - Electric Motor Routine TC Review B11-BHEL's Certificate of Conformity (COC)
44	FW714	Hoists		1, 2, 10, 11, 18, 19, - P	---	---	1, 2, 19, 23 - P	1, 2, 19, 23 - W	---	B1/ B2/ B4/ B5/B17/B18	1, 2, 10, 11, 18, 19, 23, 27, 31, B10 & B11	10-Dye Penetrating test (As Applicable) , 11-Hardness Test(As Applicable); 18-MRT/NO Load/Free run test(As App.);31 - Electric Motor Routine TC Review,19 - Test for Hoist up, Down, CT & LT movement(As Applicable) ,26-Operational & Functional Test (AS App.) B11-BHEL's Certificate of Conformity (COC)
45	Ref. Annexure-A	Non critical items as listed in Annexure-A		---	---	---	1, 2 - P	1, 2 - W	---	B1/ B4/ B5/ B6/ B7/B17/B18 (as applicable)	B11	Non critical items as listed in Annexure-A shall be cleared based om BHEL's Certificate of Conformity (COC)

Abbreviation:-

M : Manufacturer C : Contractor D : M.N.Dastur & Company (P) Ltd. P : Perform W : Witness R : Document Review

Prepared by Abdul Ghani
Reviewed by Renjith K
Approved by Arunachalam R

04/06/2021

Signature of Contractor & Seal
Name: BHEL BAP, Ranipet

RENJITH
Manager/Quality Assurance
BHEL/BAP/RANIPET-632 406.

Signature of Client & Seal
Name:

M.N. DASTUR & CO. (P) LTD. INSPECTION DIVISION

07.06.2021

Signature of Inspection Agency & Seal
Name: M.N. Dastur & Company (P) Ltd.

Suppliers shall submit their MQP in line with attached NALCO/MN Dastur requirements and this Indicative MQP for BHEL and NALCO/Consultant MN Dastur review and approval along with List of Make for Bought Out Items.

MANUFACTURER'S NAME & ADDRESS:

MANUFACTURING QUALITY PLAN (for indicative purpose only)

ITEM :

SUB-SYSTEM :

MQP NO.:
DATE :
PAGE No.

PROJECT :
PACKAGE :
CONTRACT NO. :
MAIN SUPPLIER : BHEL

SL. NO.	COMPONENT / OPERATIONS	CHARACTERSTICS	CL	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D*	10			11
1	RAW MATERIAL:													
1.1	MS Plates for Trolley Plates , pulleys & Rope drum (or seamless Pipe) MS beams & Channels	Chemical & Mechanical Properties	B	Lab Analysis	Sample	Sample	IS: 2062 Gr A or B	IS: 2062 Gr A or B	MTC / ALC	√	P	V	–	The plates of thickness 25mm and above shall be ultrasonically tested.
1.2	Castings for Bearing Plates, Rope Guide, Pulleys etc	Chemical & Mechanical Properties.	B	Lab Analysis	Sample	Sample	As per DPSI approved drgs	As per approved drgs	MTC / ALC	–	P	V	–	
1.3	Forgings for Shafts,wheels,Hook, Axles & Gears / Pinion	Chemical,Mechanical & Properties.	B	Document review	100%	100%	As per DPSI approved drgs	As per approved drgs	MTC / ALC	–	P	V	–	
	Wheels Hardness.	Hardness	B	Document review	100%	100%	As per DPSI approved drgs	As per approved drgs	MTC / ALC	–	P	–	–	
		Soundness	B	UT / MPI Test Report	100%	100%	A388/ASME Sec VIII Div2	A388/ASME Sec VIII Div2	IR	–	P	V	V	*UT required for dia / thick-ness above 40mm. *MPI and LPI apply after Machining process for Hooks Only.
	BOUGHTOUT ITEMS													
1.4	Trailing cables (Power & control)	Routine Test,Make,Type & Rating	B	~~Document~~ review	100%	100%	NTPC Approved TDS	Approved TDS/ ~~IS:694-1990~~	MTC	√	V	V	V	
1.5	Wire Rope	Breaking load, Dimensional,Make,Type & Rating	B	~~Document~~ review	As per IS	As per IS	IS:2266/2365 Appd Drg	IS:2266/2365 Appd Drg	MTC	√	V	V	–	
1.6	Motor	Routine Test,Make,Type & Rating	A	Review	100%	10%	IS: 325 / Appvd drg	IS: 325 / Appvd drg	MTC and COC	√	V	V	V	*For Motors acceptance reffers Note No.-3.
1.7	Brake	Routine Test,Make,Type & Rating	B	~~Document~~ review	100%	10%	Mfg Std	Mfg Std	MTC	√	P	V	V	
~~1.8~~	~~O/I Relay~~	Routine Test for VFD & Control Transformer	B	~~Document~~ review	100%	100%	IS: 12021 / Mfr Std	Mfr TC	Mfr TC	√	V	V	V	
1.9	Control Transformer,MCB,Fuse, Lamp,Selector Switch,Contractor,VFD, o/l relay	Make,Type & Rating	B	Document review	100%	100%	As per approved drgs/Spec	Appvd drg	IR	√	P	V	V	

2
1

LEGEND: Cl : Class (A : Critical,B : Major, C : Minor).
** M : Manufacturer/Sub-contractor,
C : BHEL
N : CLIENT
"P": PERFORM; "W": WITNESS; "V" : VERIFICATION.
MTC : Manufacturer's Test Certificate.
ALC : Approved Lab Certificate.
IR : Inspection Report.
*Records,Identified with Tick(√) shall be essentially included in QA documentation.

MANUFACTURER/SUBCONTRACTOR	MAIN SUPPLIER	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE		NAME & SIGN. OF APPROVING AUTHORITY & SEAL		

MANUFACTURER'S NAME & ADDRESS:

MANUFACTURING QUALITY PLAN

ITEM : BOILER LIFTING DEVICE-CRANES & HOISTS.

SUB-SYSTEM :

MQP NO.:
DATE :
PAGE No. 2 of 3

PROJECT :
PACKAGE :
CONTRACT NO. :
MAIN SUPPLIER :

SL. NO.	COMPONENT / OPERATIONS	CHARACTERSTICS	CL	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D*	10			11
2.1	Welding Soundness.	Butt Joints under tension & compression and T-Joints (if any for Girder,Rope Drum and End carriage). (100%RT& DPT)	B	RT	100%	100%	ASME Sec VIII Div1, UE51/UW52	ASME Sec VIII Div1, UE51/UW52	IR	–	P	V	V	RT Films Review.
		Other Butt Joints 100% MPI & DPT.	B	MPI/LPI	100%	100%	ASME Sec VIII Div1, Appex.-8	ASME Sec VIII Div1, Appex.-8	IR	√	P	V	–	
		Fillet weld	B	LPI	100%	100%	ASME Sec VIII Div1, Appex.-8	ASME Sec VIII Div1, Appex.-8	IR	√	P	V	–	
2.2	Gear Box	(Major Load Parts) Ideal Run Test	B	Temp.Rise, Vibration,Noise Level, Reduction Ratio,Oil Leakage test	100%	10%	Approved Data sheet/Tech. Specification	As per Manufacturer standard.	IR	√	P	W	V	Sampling Test per Type/Capacity.
2.3	Wheels/shafts/axle/gear & pinion	Strength	B	MPI / LPI	100%	100%	ASME Sec VIII Div2	ASME Sec VIII Div2	IR	–	P	V	–	NDT shall be done after hardfacing & Machining .
2.4	Hook	Strength	B	Proof Load Test	100%	10%	IS: 15560/IS: 3815	As per approved drgs & TDS	IR	√	P	W	V	
		Soundness (After load test)	B	MPI/LPI	100%	10%	ASME Sec VIII Div1, Appex.-8	ASME Sec VIII Div1, Appex.-8	IR	√	P	W	V	NDT(MPI/LPI) shall be done after Proof load test of Hook .
2.5	Control Panel	HV,IR	A	Electrical Test	100%	100%	IS: 13947 Part I- 1993	As per approved drgs & TDS	IR	√	P	W	W	Paint adhesion no peel off,thickness min 50 microns(Powder coated).
		Functional / Interlock test	A	Electrical Test	100%	100%	As per DPSI approved drgs	As per approved drgs	IR	√	P	W	W	
		Paint Shade & Thickness,Adhesion	A	Visual/Measurement	100%	100%	As per DPSI approved drgs	As per approved drgs	IR	√	P	W	W	
		DOP by paper insertion	A	Visual	100%	100%	Not able to insert when door is closed.	As per approved drgs	IR	√	P	W	W	
		Dimension	A	Visual/Measurement	100%	100%	As per DPSI approved drgs	As per approved drgs	IR	–	P	W	W	

LEGEND: Cl : Class (A : Critical,B : Major, C : Minor
** M : Manufacturer/Sub-contractor,
C : **BHEL**
N : CLIENT
*P": PERFORM; "W": WITNESS; "V" : VERIFICATION.
MTC : Manufacturer's Test Certificate.
ALC : Approved Lab Certificate.
IR : Inspection Report.
*Records,Identified with Tick(√) shall be essentially included in QA documentation.

MANUFACTURER/SUBCONTRACTOR	MAIN SUPPLIER	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE		NAME & SIGN. OF APPROVING AUTHORITY & SEAL		

MANUFACTURER'S NAME & ADDRESS:	MANUFACTURING QUALITY PLAN		PROJECT : PACKAGE : CONTRACT NO. : MAIN SUPPLIER : I
	ITEM :	MQP NO.: DATE :	
	SUB-SYSTEM :	PAGE No. 3 of 3	

SL. NO.	COMPONENT / OPERATIONS	CHARACTERSTICS	CL	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D*	10			11
3.1	Assembled Crane & Hoist	Overall Dimensional and Functional test.	B	Visual Measurement	100%	10%	As per approved drgs	As per DPSI approved drgs	IR	√	P	W	W	Sampling Test per Type/Capacity.
3.2	Performance	Load Test / Overload Test	B	Speeds, Diflection of Girder	100%	10%	IS:3177, IS:807 & IS:3938 & Approed G A Drawing Should not exceed span/900	IS:3177, IS:807 & Approed G A Drawing Should not exceed span/900	IR	√	P	W	W	Sampling Test per Type/Capacity. @: 100% witness for Cranes. 100% witness for Hoists of 10T and above. 10% witness for Hoists of 6T-10T Capacity.
3.3	Painting and Packing	Appearance	B	Visual	100%	–	As peapprvdProcedure, Drg, Tech specification.	As peapprvdProcedure, Drg Tech Specification		–	P	V	–	

LEGEND: Cl : Class (A : Critical,B : Major, C : Minor

** M : Manufacturer/Sub-contractor,
C : Doosan power Systems India Pvt. Ltd.
N : **BHEL**

"P": PERFORM; "W": WITNESS; "V" : VERIFICATION.
MTC : Manufacturer's Test Certificate.
ALC : Approved Lab Cerificate.
IR : Inspection Report.
*Records,Identified with Tick(√) shall be essentially included in QA documentation.

MANUFACTURER/SUBCONTRACTOR	MAIN SUPPLIER	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE			NAME & SIGN. OF APPROVING AUTHORITY & SEAL	

NOTES:
1) ALL MATERIAL OF CONSTRUCTION AND MAKES SHALL BE AS PER APPROVED DRAWINGS
2) MAKE OF MOTORS & BRAKES SHALL BE AS PER ~~APPROVED DRAWINGS AND~~ BOI LIST. & upto 50 KW
3) Acceptance of motor less than 30KW based on Manufacturer COC. And Above than 30KW acceptance based on I inspction Witnessed report and manufacturer COC.

A). **Less than 30 KW-**Acceptance of motor less than 30 KW is based on COC of the manufacturer & the contractor confirming as follows. It is hereby confirmed that the above mentioned motor/motor was /were manufacured taking care of NTPC specific requirment regarding amb. temp,voltage & freuency Variation,hot start,pull out torque,starting KVA/KW,temp.rise,distance between centre of stud & gland plate and tested in accordance with approved drawings/data sheet.

B). **30 KW and above:-** Acceptance of motor rating between 30 KW & 50 Kw is based on NTPCreview of Routine test inspection as per IS 325 witnessed by main contractor along with COC of the manufacturer & the contractor confirming as follows. It is hereby confirmed that the above mentioned motor/motor was /were manufacured taking care of NTPC specific requirment regarding amb. temp,voltage & freuency Variation,hot start,pull out torque,starting KVA/KW,temp,rise,distance between centre of stud & gland plate and tested in accordance with approved drawings/data sheet.

OEM SUPPLIER WITH OEM MFGR.'s LOGO (TO BE FILLED BY OEM SUPPLIER)	UNDERSLUNG CRANE MANUFACTURER'S NAME AND ADDRESS (TO BE FILLED BY OEM / UNDERSLUNG CRANE MANUFACTURER)	**MANUFACTURING QUALITY PLAN** ITEM: UNDERSLUNG CRANE FOR FGD APPLICATION SUB-SYSTEM: FGD	QP NO.:UNDERSLUNG CRANE:001 REV.NO.: 00 DATE: PAGE: …. OF….	PROJECT NALCO DAMANJODI 1 X 18.5 MW FGD PACKAGE (BHEL W.O no: R182) MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR (OEM) & ADDRESS: (TO BE FILLED BY OEM SUPPLIER)

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C / N					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.

		LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** **M:** OEM MANUFACTURER **C:** MAIN SUPPLIER – BHEL/BHEL AIA , **N**: NALCO **P:** PERFORM **W**: WITNESS AND **V:** VERIFICATION. AS APPROPRIATE, **CHP:** SHALL IDENTIFIED IN COLUM "N" AS ' W"		DOC. NO.: REV…… CAT…..		
OEM MANUFACTURER	MAIN (BHEL) SUPPLIER		FOR CUSTOMER USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

***(To be submitted In the company letter head by supplier)**

Form - 1

Subject: Public Procurement (Preference to Make In india)

References:

1.P-45021/2/2017-B.E-ll dated. 15th June-2017,
2.P-45021/2/2017-PP(BE-II) dated. 28th May-2018 ,
3.P-45021/2/2017-PP(BE-II) dated. 29th May-2019.
4.P-45021/2/2017-PP(BE-II) dated. 4th June-2020

We hereby declare with reference to above subject and references that M/s ----------(Tick whichever is applicable as below)

"Class-I local supplier" meeting the requirement of minimum local content equal to 50%(fifty percent) or more defined in the above government notification for the goods and services
(or)
"Class-II local Supplier" meeting the requirement of local content 20% to less than 50%(fifty percent) defined in the above government notification for the goods and services

Please mention the details against the following:

Enquiry no:---------- dated. ----------

Type of Supplier (Class-I/Class-II) ……

Product:----------

Project:……..

Details of location at which local value addition will be made is as follows:

We also understand that the false declarations will be in breach of the code of Integrity under rule 175(1)(i)(h) of the General financial rules for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of the General Financial Rules along with such other actions as may be permissible under law.

Authorized Signature M/s _____

(Signature and seal)

Place:……..

Date:……

From.
M/s_____
Address:_____

Note: For offer value INR 10 crores or more, shall be vetted/endorsed by statutory auditor or cost auditor, for the declared local content.

***(To be submitted In the company letter head by supplier)**

Form – 2

I/we are bidder from _____ (Address with country). We do not belong to any of the below category mentioned.

1. Any of entity/office/workshop of your organisation/incorporation, established in a country sharing land border with India, If yes, provide the full address of all such locations.

2. Any of subsidiary of your organisation/incorporation, established in a country sharing land border with India, If yes, provide the full address of all such locations.

3. Any of entity/office/workshop of your organisation/incorporation, controlled in a country sharing land border with India, If yes, provide the full address of all such locations.

4. Any of entity whose beneficial owner is situated in a country sharing land border with India, If yes, provide the full name, address of all such locations.

5. Any Indian Agent available, If so, Provide details of address and contacts.

6. Any employee/directors who is/are citizen of country sharing land border with India, If yes, provide the full name, employee code and address of all such locations.

7. Any of consortium/joint venture of your organisation/incorporation, established in a country sharing land border with India, If yes, provide the full address of all such locations.

Meaning of beneficial owner

1) In case of a company or limited liability partnership, beneficial owner is the natural person, who, whether acting alone or together, or through one or more judicial 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 percent 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 rights or shareholder's agreement or voting agreement.

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

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 and any other

***(To be submitted In the company letter head by supplier)**

natural person exercising the ultimate effective control over the trust through a chain of control of ownership.

6) An agent is a person employed to do any act for another, or to represent another in dealing with third person.

We have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India, we hereby declare that we do not belongs to any such country and are eligible to be considered.

In case, any of information is found to be false, even after bid acceptance, immediate termination may happen and action will be taken as per law.

Format is being filled without altering any of the clause mentioned in the given format**

Dated: _____

Authorised Sign and stamp_____

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:
Date:

To
Bharat Heavy Electricals Limited,
Boiler Auxiliaries Plant,
RANIPET -632 406,
Tamil Nadu,
INDIA

Dear Sirs,

In consideration of the **Bharat Heavy Electricals Limited** 1 (hereinafter referred to as the `Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at "**BHEL House", SIRI Fort, New Delhi- 110049** through its Unit at **Boiler Auxiliaries Plant located at Ranipet-632406, Tamil Nadu, INDIA** having awarded to _____ 2 having its registered office at _____ herein after referred to as the `Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No. / **PO No** _____ dated _____3. Valued at Rs_____ 4 (Rupees (In words) . _____) for _____5 (hereinafter called the `Contract') and the Contractor having agreed to provide a Contract Performance Guarantee equivalent to 10% (Ten Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract.

We _____ (hereinafter referred to as the Bank), having registered/Head Office at _____ and inter alia a branch at _____ being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer a maximum amount Rs _____ **(Rupees _____)** without any demur, immediately on a demand from the Employer. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding **Rs. _____ (Rupees_____)**.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor/Supplier in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the contractors/supplier shall have no claim against us for making such payment.

We the _____ bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid andits claims satisfied or discharged.

We _____ BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Contractor/Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Contractor/Supplier and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor/Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Contractor/Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall remain in force up to _____ 6 with a validity period of ____months & claim period of 3 months and shall be extended from time to time for such period as may be desired by Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor/Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the _____7 we shall be discharged from all liabilities under this guarantee thereafter.

We _____BANK, lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed Rs _____ (Rupees _____ Only) 8
b) This Guarantee shall be valid up to _____ 9
c) Unless the Bank is served a written claim or demand on or before _____ 10 all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Dtd :
Place of Issue:

1.NAME AND ADDRESS OF EMPLOYER i.e., Bharat Heavy Electricals Limited.
2 NAME AND ADDRESS OF VENDOR/CONTRACTOR/SUPPLIER
3.DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE
4.BG AMOUNT IN FIGURES AND WORDS
5.PROJECT/SUPPLY DETAILS
6.VALIDITY DATE with a validity of 3 months claim period.
7.DATE OF EXPIRY OF CLAIM PERIOD
8.BG AMOUNT IN FIGURES AND WORDS
9.VALIDITY DATE
10. DATE OF EXPIRY OF CLAIM PERIOD

Ple note: The Validity period wrt our conditions applicable for the Supply / Erection & condition.

Bankers, Auditors & Share Transfer Agent

Bankers
Axis Bank
Bank of Baroda
Canara Bank
Central Bank of India
CITI Bank N.A
Deutsche Bank AG
Export-Import Bank of India
HDFC Bank Limited
IDBI Bank
Indian Bank
Indian Overseas Bank
Indusind Bank
Kotak Mahindra Bank
Punjab National Bank
RBL Bank Ltd.
Standard Chartered Bank
State Bank of India
The Federal Bank Limited
Union Bank of India

Registered Office
BHEL House, Siri Fort, New Delhi-110049 (India)
CIN: L74899DL1964GOI004281
Phone: 011-66337000, Fax: 011-66337428
www.bhel.com shareholderquery@bhel.in