	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			

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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			

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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			

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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			

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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			

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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			

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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			

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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			

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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			

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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:**				

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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			

VOLUME – II

SECTION - 2.5

CRANES & HOISTS

1.0.0 GENERAL

This part of the specification covers the requirements for Cranes and Hoists.

This section of the specification shall be read in conjunction with other sections of the specification as appropriate and the equipment offered shall meet the requirements as spelt out therein. The system shall comprise of cranes and hoists.

2.0.0 CODES AND STANDARDS

The equipment to be provided shall specifically conform to the latest editions of the following codes, standards, specifications and regulations. Also the system design shall conform to the requirements of applicable codes as specified in the General Technical Specification

ISO 1996	:	Noise Level
IS 3938	:	Hoist
IS 3177	:	Crane
IS 3832	:	Manual Hoist
IS 2266	:	Steel Wire Ropes for General Engineering Purposes
IS 15560	:	Point Hooks with Shank up to 160 Tonne – Specification
IS 13834 (Part-5) Cranes - Classification	:	Overhead travelling and portal bridge cranes
IS 325	:	Three Phase Induction Motors.

3.0.0 DESIGN REQUIREMENTS

Crane shall be provided in the areas where the handling of the equipments / components shall have requirement in both transverse and longitudinal direction. Otherwise, hoist shall be considered. Curved monorail with hoist shall also be considered, if the equipments / components are not located inline with the monorail. Height of the building shall be finalized considering the required lift over other equipments, piping etc.

Each crane or hoist shall be complete with its accessories, supporting structure, monorail beams, rails, girders, power supply, safety devices and controls and shall conform to local statutory rules and regulation.

a) The crane and hoist shall be rigid in construction and all movements shall be smooth and non-jerky, acceleration for cross travel and long travel motors shall be limited to reasonable values as to prevent any swinging of the load.

b) In the design of components on the basis of strength, factor of safety shall not be less than Five (5) based on ultimate strength, impact, fatigue, wear and stress concentration factors shall be taken into account wherever applicable.

c) Drives shall be designed with adequate margin to give best performance and efficiency. Safety arrangement shall be incorporated to prevent damage to the motors on account of mechanical overload and electrical faults and to gearing and shaft etc. due to over stressing and other detrimental condition.

d) Casting and forging shall be of tested quality and shall confirm to their respective material specifications and shall be free from flaws and objectionable imperfection, machine true and in a workman like manner.

e) Design shall provide easy maintenance of crane and hoist.

f) Cranes and hoists capacity shall be selected by considering 25% margin over the weight of the component to be lifted.

g) Crane and hoist selection criteria

Type of Handling equipment	Crane & Hoist's Safe working load (SWL)
CRANE	
Double Girder EOT Crane	> 10T
Single Girder over head / Under Slung cranes	≤ 10T
HOIST	
Electric hoists	≥ 2000 Kg
Manual hoists with trolley	> 500 Kg and < 2000 Kg

Note: Electrical hoists shall be provided at all equipments / components location which has a lift more than 10 m (for all >500 kg and < 2000 kg). Hook shall be provided for all possible maintenance location for the weight less 500kg.

h) For guidance purposes the following crane & hoist speeds shall be considered:-

- Crane

  Hoist : 5m/min

  Trolley Travel : 10 to 15 m/min

  Bridge Travel : 15 m/min

  Creep speeds : 10% of operating speeds for all motion through VVVFD

- Hoist

  Hoisting speed : 3.5 m/min to 5 m/min

  Travel speed : 5 m/min to 10 m/min

  Creep speeds : 10% of operating speeds for all motion through VVVFD

Permits and Inspection:

The contractor shall obtain and pay for necessary permits as required including license fees for installation and inspection of the same equipments, also make such tests as called for by the regulations of such authorized representatives of such authorities as well as in the present of the Owner's representative. The contractor shall be responsible to obtain license, certificate for operating at site.

ANNEX 2.5.1

SPECIFIED DESIGN DATA

Sl.No.	Description	Unit	Data
A	**CRANE**		
1.0	General		
1.1	Type of control proposed		Pendant
2.0	**Hoisting System**		
2.1	Rope		As per IS 2266, Rope grade 1770
a)	Rope construction		IS 2266 / 6 x 36 multi strand construction Fibre core.
b)	Rope quality (material)		Extra flexible plough steel
c)	Factor of safety		Not less than 5
2.2	Rope drum		Hoist drum length shall be such that each lead of wire rope has a minimum of two full turns on the drum when the hook is at its lowest position not taking into consideration turns covered by wire rope anchorage and one spare groove for each lead of wire rope on the drum when the hook is at its highest position.
a)	Drum material		Fabricated from carbon steel as per IS 2062, Grade B and stress relieved or seamless pipe as per ASTM A 106 Grade A or B.
b)	Whether stress relieved		Yes (if fabricated)
2.3	Bearing type		Antifriction ball or roller
2.4	Hook		
a)	Hook type		Swivel “C” type single shank of suitable grade of either circular or standard trapezoidal section, point hook suitably heat treated with adequate lifting capacity. Swivel lock pin shall be provided.
b)	Hook material		Forged steel
c)	Safety latches provided		Yes
d)	Hook suspension		Thrust Bearing
2.5	Sheave material		Fabricated from cast steel / steel plate IS 2062 Gr A or B / CS Gr 280-520 IS 1030
2.6	Hoist Brake		
a)	Type		DCEM “fail to safe”
b)	Torque		150% of rated torque or greater than the torque transmitted to the brake drum from the suspended load up-to the test load.
2.7	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
a)	Material of gears		EN 9 / 55C8

Sl.No.	Description	Unit	Data
b)	Material of pinions		EN 19 /EN 24
c)	Type of gears & pinions		Spur / helical
2.8	Limit Switch type		Rotary geared + gravity type
3.0	**Cross Travel**		
3.1	CT brake		
a)	Type		DCEM " fail to safe"
b)	Torque	Nm	150% of rated torque
3.2	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
a)	Material of gears		EN 9 / 55C8
b)	Material of pinion		EN 19 / EN 24
c)	Type of gears & pinion		Spur / Helical
3.3	Wheels		
a)	Materials		Forged steel
b)	Hardness	BHN	Not more than 200BHN
c)	Type		Single flanged
d)	Wheel bearing type		Antifriction Ball/Roller
3.4	Type of limit switches		Lever
4.0	**Long Travel**		
4.1	CT brake		
a)	Type		DCEM " fail to safe"
b)	Torque	Nm	150% of rated torque
4.2	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
a)	Material of gears		EN 9 / 55C8
b)	Material of pinion		EN 19 / EN 24
c)	Type of gears/pinion		Spur / Helical
4.3	Wheels		
a)	Materials		Overhead Crane – C55 Mn 75 for overhead crane & Steel used for wheel shall not contain more than 0.06% of Sulphur or Phosphorous. Under slung Crane – Forged steel
b)	Hardness	BHN	Overhead crane – 300 to 350 BHN for under slung crane – Not more than 200BHN
c)	Type		overhead crane – Double flanged under slung crane – Single flanged
d)	Wheel bearing type		Antifriction Ball/Roller
4.4	Type of limit switches		lever
5.0	Type of Buffer Stoppers		Rubber / spring
6.0	**Electrical**		
6.1	Power supply		Shrouded type down shop leads (copper) shall be provided to supply power to crane. Power supply to Crab shall be through flexible trailing

Sl.No.	Description	Unit	Data
			conductors.
6.2	Rating		S4, 40% CDF
6.3	Number of starts/hour		300starts /h for workshop crane and other crane shall be 150 starts / hr
B	**ELECTRIC HOIST**		
1	**General**		
1.1	Design according to standard service class/ load class		IS 3938 Class II
1.2	Location (Indoor/ Outdoor)		(Based on the location)
1.3	Type of control		Pendant
2	**Hoisting System**		
2.1	Wire Rope		
a)	Rope construction		IS 2266 / 6 x 36 multi strand construction Fibre core.
b)	Rope quality (material)		Extra flexible plough steel
c)	Factor of safety		Not less than 5
2.2	Rope drum		
a)	Drum material		Fabricated from carbon steel as per IS 2062, Grade B and stress relieved or seamless pipe as per ASTM A 106 Grade A or B.
b)	Whether stress relieved		Yes (if fabricated)
c)	Bearing type		Antifriction ball or roller
2.3	Hook		
a)	Hook type		Swivel “C” type single shank of suitable grade of either circular or standard trapezoidal section, point hook suitably heat treated with adequate lifting capacity. Swivel lock pin shall be provided.
b)	Hook material		Forged steel
c)	Safety latches provided		yes
d)	Hook suspension		Thrust Bearing
e)	sheave material		Fabricated from cast steel / steel plate IS 2062 Gr A or B / CS Gr 280-520 IS 1030
2.4	Hoist Brake		
a)	Type		DCEM “fail to safe”
b)	Torque	Nm	150% of rated torque or greater than the torque transmitted to the brake drum from the suspended load up-to the test load.
2.5	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
a)	Material of gears		EN 9 / 55C8
b)	Material of pinions		EN 19 /EN 24
c)	Type of gears & pinions		Spur / helical
2.6	Type of Limit Switch		Rotary geared + gravity type

Sl.No.	Description	Unit	Data
3	**Travel**		
3.1	**CT brake**		
a)	Type		DCEM " fail to safe"
b)	Torque	Nm	150% of rated torque
c)	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
i)	Material of gears		EN 9 / 55C8
ii)	Material of pinion		EN 19 / EN 24
iii)	Type of gears & pinion		Spur / Helical
d)	**Wheels**		
i)	Materials		Forged steel
ii)	Hardness	BHN	Not more than 200BHN
iii)	Type		Single flanged
iv)	Wheel bearing type		Antifriction Ball / Roller
e)	Type of Limit switches		Lever
4	Rating		S4, 40% CDF
5	Number of starts/hour		150 starts / hr
C	**MANUAL HOIST**		
1	Standards		IS 3832 / Class-II
2	Application		(Based on location)
3	Trolley and hoist operation		Hand operated
4	Material of construction		
4.1	Trolley frame		Cast steel / Mild steel
4.2	Gears (Trolley)		Machine cut cast steel / Forged steel / C40 / C50
4.3	Lifting hook (Swivel)		Shank 'C'. Forged steel. Safety latch and swivel lock pin.
4.4	Gears		IS 3681/4460
5	Trolley wheel		Forged / cast steel / C40 with minimum 200BHN and single flanged to suit standard I beam section.
6	Brake		Screw and disc friction type

ANNEXURE-II - DEAILS OF CRANES

ANNEXURE - II

Details of Under slung Electric Crane for RC pumps and Blower Handling | **PROJECT : BHUSAWAL 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	10	EL (+) 10.6	EL (-) 0.50	35	9	1000	NPB 600X220X122.4 + CAPPING ISMC400	2500	_____ 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 10T Crane shall be, as specified in ANNEXURE -I - CUSTOMER TECHNICAL SCECIFICATION & DATA SHEET OF CRANE.

Bidder Signed with seal

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

ANNEXURE-III - PAINTING SCHEME FOR MATERIAL HANDLING EQUIPMENTS

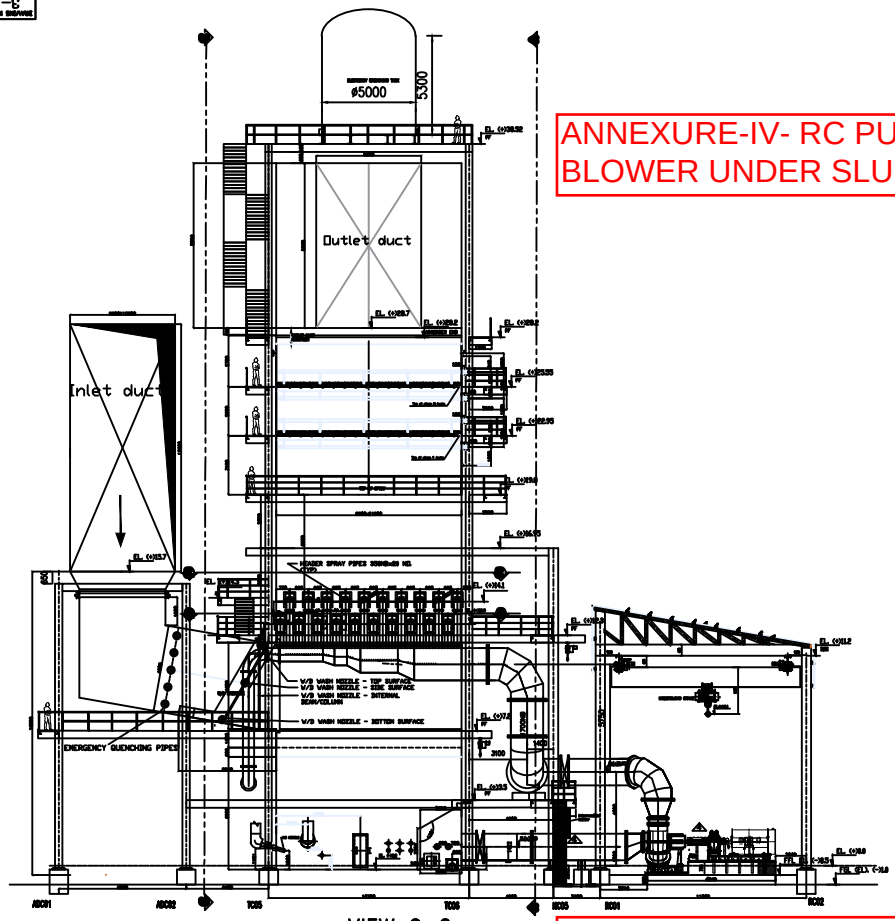
17	Slurry distribution & Oxidation Air distribution system, Viewing ports& Handling equipment Temp<90°C	FW 239 FW 243 FW 244 FW 249	Power tool cleaning to St3(SSPC-SP3	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	70	Synthetic enamel to IS 2932 grey shade 692 of IS 5 (Two coats)	70	140

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

GENERAL NOTES

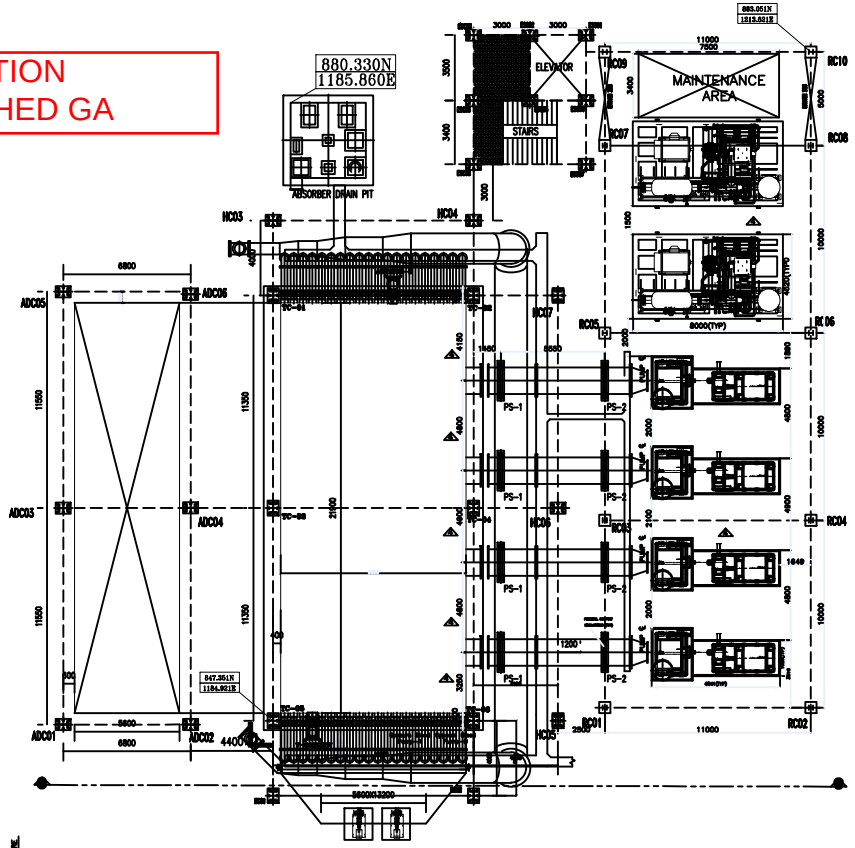
1. No painting is required for Galvanized, non-ferrous & stainless steel items, except as indicated above.
2. Machined items are to be applied with coat of temporary rust preventive oil
3. PGMAs covered in sub-supplier (ie., Purchased) items viz., Agitator and other sub-delivery components etc., are not indicated in the above list. However, the Painting Schedule for all items supplied by all sub-suppliers and BOI under the scope of BHEL shall be same as for main equipment covered in this document.
4. In sub-assy, wherever plates / sheets of thickness less than or equal to 5mm and rods are used, very minor items like clamps, small items etc - Power Tool or Hand Tool Cleaning to SSPC - SP 3 / SP 2 shall be followed and painting under Sl no:01 of FGD shall be followed.
5. Ground shade/colour of finish paints and identification tag/band for equipments, piping, pipe services, supporting structures and other components is followed as per the color coding practice at site.
6. All components covered under different PGMAs are to be painted. In case any component is left out, the same shall deemed to be included under the relevant section.
7. All threaded and other surfaces of foundation bolts and its materials, insulation pins, Anchor channels, Sleeves shall be coated with temporary rust preventive fluid and during execution of civil works; the dried film of coating shall be removed using organic solvents.
8. All steel structures shall be provided with painting as given in the specification. Further, painting system shall also meet the requirements of corrosivity category C3 (durability high) as per ISO 12944.
9. Finish coat to be applied after an interval of min 10 hrs and within 6 months (after completion of intermediate coat).
10. Bottom of base plate including below zero level portion marked in Supporting Columns of structures which will be embedded in concrete, those surfaces shall be prepared by manual cleaning to ST3 and provided with primer coat of chlorinated rubber based zinc phosphate primer of min. 50 µm DFT.

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

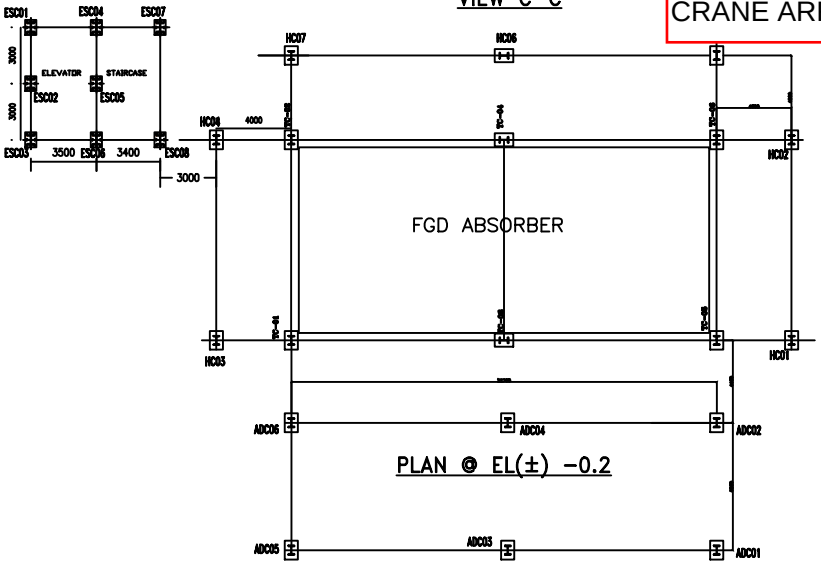


VIEW C–C

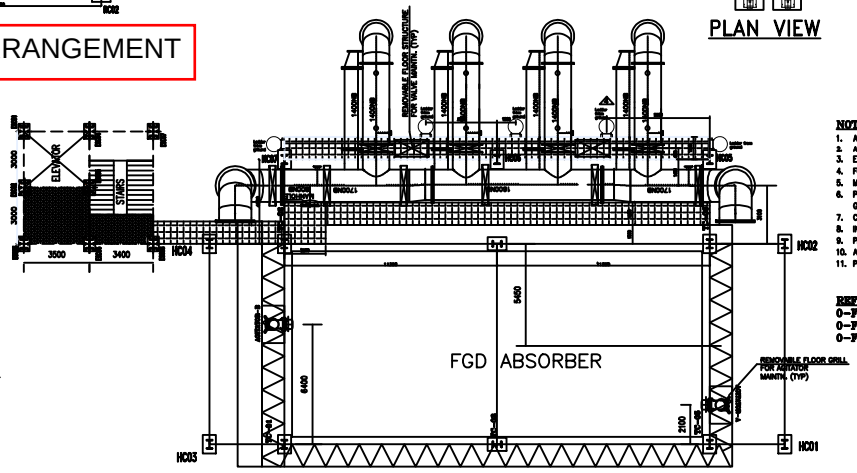
CRANE ARRANGEMENT



PLAN VIEW



PLAN @ EL(±) –0.2



PLAN @ EL(±) 3.5 (Rotated 90° counter–clockwise)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL ELEVATIONS ARE IN METER.
3. EL(±) 0.000 CORRESPONDS TO RL(+)200 M.
4. FGL AT ABSORBER AREA IS AT RL 208 M.
5. MIST ELIMINATOR ELEVATION IS FINAL. PIPE LOCATION AND ITS SUPPORT ARE BASED ON VENDOR GA.
6. PUMP COLUMN LOCATIONS ARE FINAL. PUMP AXIS, PUMP END CONNECTION DETAILS AND FOUNDATION HEIGHT ARE BASED ON VENDOR GA.
7. CORROSION ALLOWANCE IS 2 MM.
8. INSPECTION AND TESTING SHALL BE AS PER APPROVED QAP.
9. PAINTING SHALL BE AS PER APPROVED PAINTING SPECIFICATION.
10. ABSORBER DESIGN IS AS PER IMPS AND IS STANDARD.
11. PG TEST SHALL BE AS PER ASME PTC40.

REFERENCE DRAWING–

0–FW–000–1786 GA OF ABSORBER SHEET 2/4
0–FW–000–1787 GA OF ABSORBER SHEET 3/4
0–FW–000–1788 GA OF ABSORBER SHEET 4/4

MAHAGENCO REFERENCE DRAWING NO. 3–FW–000–00861

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BHUSAWAL 1X660MW

CUST.NO: B4UB

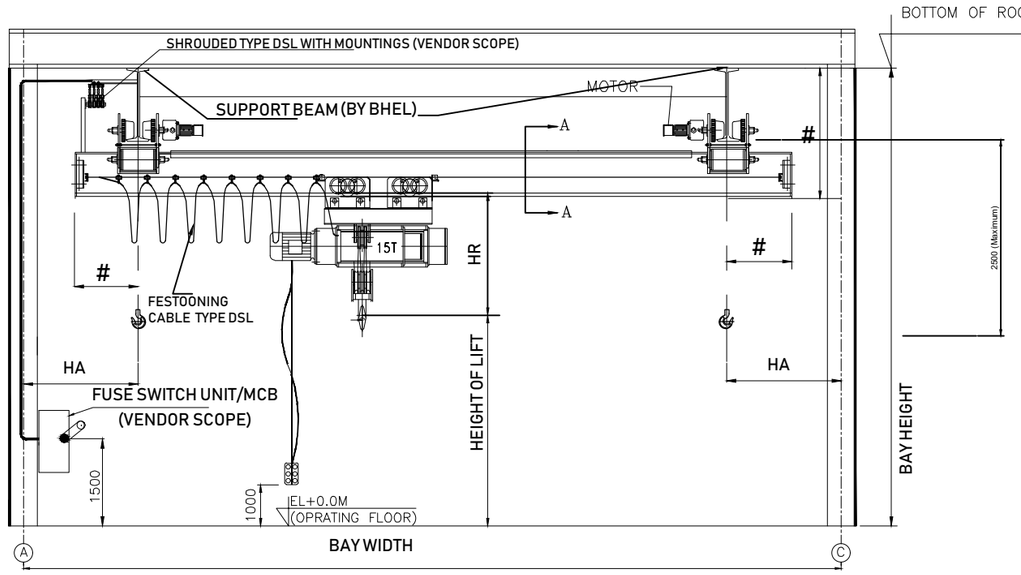
Bharat Heavy Electricals Ltd, BOILER AUXILIARIES PLANT, RANIPET–632 406

TITLE: GA of Absorber, Sh 01 of 04

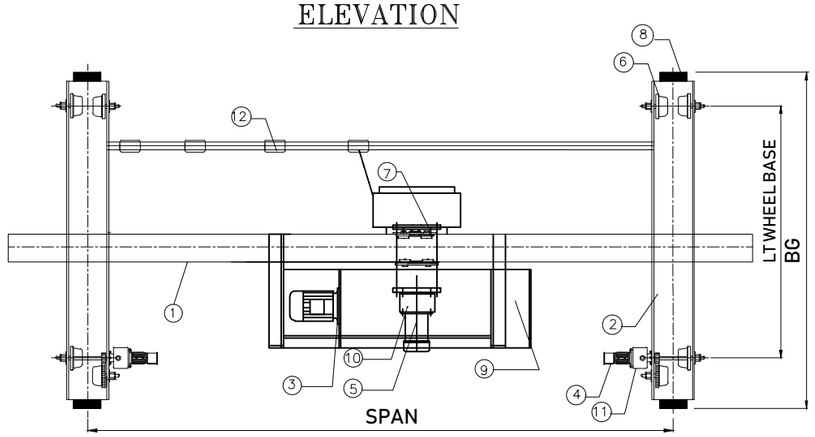
DRAWING NO.: 0–FW–000–1785, REV 04

REV	DATE	REMARKS
04	26.07.22	Revision
03	19.06.20	Revision
02	25.04.20	Revision
01	19.04.20	Revision
00	27.03.20	Initial Issue

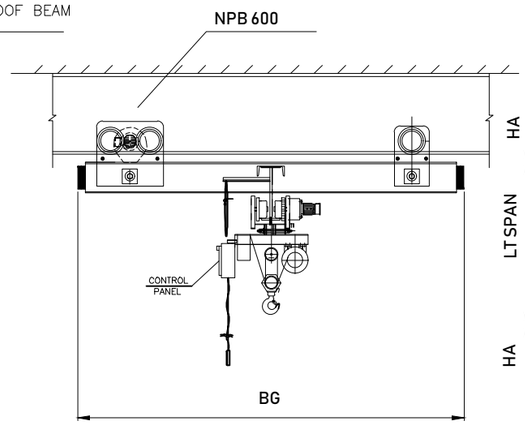
ANNEXURE-V- TYPICAL GA OF UNDER SLUNG ELECTRIC CRANES



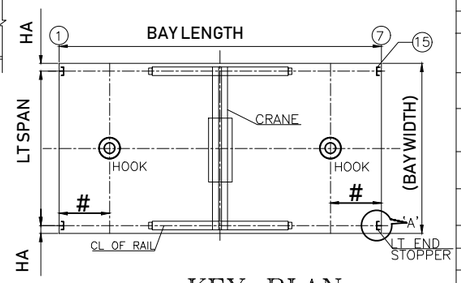
ELEVATION



PLAN



SIDE VIEW



KEY PLAN

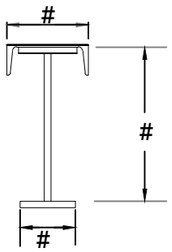
19	CT/LT GEAR BOX HOUSING	VENDOR TO SPECIFY
18	HOIST GEAR BOX. HOUSING	VENDOR TO SPECIFY
17	PULLEY	VENDOR TO SPECIFY
16	ROPE DRUM	VENDOR TO SPECIFY
15	LT END STOPER	VENDOR TO SPECIFY
14	CT END STOPER	VENDOR TO SPECIFY
13	HOOK	VENDOR TO SPECIFY
12	CT DSL	VENDOR TO SPECIFY
11	LT GEAR	VENDOR TO SPECIFY
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 GIRDER

DETAIL AT SECTION AA

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



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

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

Please note :
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.
This is a Typical under slung crane. vendor shall provide as per Vendor design to Suit layout & Spec.

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		

PROJECT: **MAHAGENCO BHUSAWAL** **(1 X 660 MW)** **(BHEL WO No: R4U8)** **MAIN CONTRACTOR:** **BHEL – RANIPET** **SUB CONTRACTOR & ADDRESS:** **(To be filled by VENDOR)**	**CONTRACT QUALITY REQUIREMENTS (CQR) for UNDERSLUNG CRANE** **MAHAGENCO BHUSAWAL** **(1 X 660 MW)** **(BHEL WO No: R4U8)**	**DOC.NO:** **BAP:R4U8:** **Bhusawal: USC: 001** **Rev NO.: 00** PAGE: Page 1 of 2 DATE : 24.11.2022	**##Enquiry No:** **##Supplier Name:** **##Offer reference:** **##Date:**

Sl. NO.	DESCRIPTION	BHEL/ Ultimate customer MAHAGENCO Requirements	##Specific confirmations by the vendor
		ITEM: UNDERSLUNG CRANE	
01	**Quality Plan Requirement**	**1.** MQP (Manufacturing Quality Plan) is applicable for these Underslung crane and accordingly Manufacturer shall submit the QP for BHEL review and approval. **2.** If any of Manufacturer who is having MAHAGENCO/Consultant DCPL approved QP and having validity, the same is applicable for these Underslung Cranes for inspection. **3.** If vendor does not have MQP/RQP, they should submit a fresh MQP to BHEL for review & approval in line with attached Indicative MQP and QP format. (copy attached).	
		BHEL/BHEL authorized inspection agency inspection as per approved QP is applicable before dispatch.	
02	**Inspection Methodology**	No material shall be dispatched without BHEL or its authorized inspection agency inspection with required CHP/MDCC clearances.	
03	**Painting Requirements**	Painting requirement like paint shade and painting thickness including no of coats if any are to be ensured by supplier as per BHEL/Ultimate customer MAHAGENCO approved data sheet/drg/spec (As applicable).	
04	**For inspection call**	To raise inspection call by BHEL/BHEL AIA inspection including for type test witnessing, vendor is requested to contact Mr MS Aditya Chakravarthy., Manager (QCProc).,Mobile no: +919489202788., Email id: msachakravarthy@bhel.in and Mr.Zeeshan Ali., Dy. Mgrr (QC-Proc)., Mobile no: +91 9443149691 .,Email id: zeeshan@bhel.in for inspection related activities for immediate response / resolution.	
05	**Packing**	Required Packing & preservation shall also to be ensured as per requirements stipulated in Engg spec / drg / data sheet to avoid any damage during transit, handling damages & storage at site.	
06	**Impotant Note**	Supplier shall ensure Credentials of design and Manufacturing capabilities w.r.t. Underslung Crane as per Spec/data sheet/approved QAP/Drg etc.	

PROJECT: **MAHAGENCO BHUSAWAL** **(1 X 660 MW)** **(BHEL WO No: R4U8)** **MAIN CONTRACTOR:** **BHEL – RANIPET** **SUB CONTRACTOR & ADDRESS:** **(To be filled by VENDOR)**	**CONTRACT QUALITY REQUIREMENTS (CQR) for UNDERSLUNG CRANE** **MAHAGENCO BHUSAWAL** **(1 X 660 MW)** **(BHEL WO No: R4U8)**	**DOC.NO:** **BAP:R4U8:** **Bhusawal: USC: 001** **Rev NO.: 00** PAGE: Page 2 of 2 DATE : 24.11.2022	**##Enquiry No:** **##Supplier Name:** **##Offer reference:** **##Date:**

Sl. NO.	DESCRIPTION	BHEL/ Ultimate customer MAHAGENCO Requirements	##Specific confirmations by the vendor
		ITEM: UNDERSLUNG CRANE	
07	**Document Package/Dossier**	Supplier shall give Specific confirmation for Document Package in the event of an order (3 hard copies + 2 CDs in PDF file) for onward transmission to customer and same shall contain the following with proper linkages (.) 1. Index Sheet 2. BHEL approved QP. 3. TCs identified by BHEL or its authorized inspection agency for record for "CHP" and Verification portion as given in approved QAP/Data sheet/spec (As applicable). 4. Final Inspection Report by BHEL / BHEL AIA + TC 5. MAHAGENCO/Consultant or its authorized inspection agency CHP/MDCC. 6. Type test reports conducted/submitted with BHEL /BHEL AIA/ MAHAGENCO/Consultant or its authorized inspection agency (As applicable).	

Supplier signature with seal

Necessarily to be filled up by the vendor at the time of offer itself otherwise the offer may not be considered w.r.t Quality Requirements being customer specific requirements.

Manufacturer's Logo, if available Format No	MANUFACTURER'S NAME & ADDRESS	**MANUFACTURING QUALITY PLAN** **PRODUCT:** **SUB-SYSTEM : EPC PACKAGE**	**PROJECT: MAHAGENCO BHUSAWAL (1 X 660 MW) PROJECT** **BHEL PO NO & DATE:** **MQP NO:** **REV NO:** **DATE: DD/MM/YYYY** PAGE: 1 OF 1

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

Record of Revisions

Rev No	Date	Clauses revised	Description of Revision

PREPARED BY	**REVIEWED & APPROVED BY**
MANUFACTURER	**MAIN SUPPLIER (BHEL)**
SIGNATURE & SEAL	

LEGEND: *** RECORDS** IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** **M:** MANUFACTURER, **C:** BHEL / BHEL AIA, **N:** CUSTOMER; **P:** PERFORM, **W**: WITNESS, **V:** VERIFICATION;
CLASS: **A** - CRITICAL**; B** - MAJOR; **C** – MINOR;
TC- MILL /MANUFACTURER'S TEST CERTIFICATE; **IR**- INSPECTION REPORT.

1166738/2022/BAP-QA_MECH

Suppliers not having MAHAGENCO approved QP shall submit their MQP in line with this Indicative MQP for BHEL 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 M	QUANTUM OF CHECK C/N	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	D*	AGENCY M	AGENCY C	AGENCY N	REMARKS
1	2	3	4	5	6		7	8	9		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 → Routine Test for VFD & Control Transformer

1 → Control Transformer,MCB,Fuse, Lamp,Selector Switch,Contractor,VFD, o/l relay

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 : PAGE No. 3 of 3
	SUB-SYSTEM :	

SL. NO.	COMPONENT / OPERATIONS	CHARACTERSTICS	CL	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N			9	D*	M 10	C	N	11
1	2	3	4	5	6		7	8						
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%	L	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 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	

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.

TECHNICAL SPECIFICATION
OF
ELECTRIC WIRE ROPE HOIST (EWRH) WITH TROLLEY

Buyer(Purchaser)	:	M/s.BHEL
Application	:	Wet Limestone Flue Gas Desulphurization

Bharat Heavy Electricals Limited
Ranipet – 632 406

REV	DATE	DESCRIPTION	PREPARED	APPROVED
00	19-08-2022	Fresh Release	Jyotish Kumar Patel JYOTISH KUMAR PATEL (DM/EDC-FGD)	KESAVAN V (SDGM/EDC-FGD)

CONTENTS

1.0	INTENT OF SPECIFICATION
2.0	SCOPE
3.0	CODES AND STANDARDS
4.0	DESIGN REQUIREMENT
5.0	FEATURES OF CONSTRUCTION (MECHANICAL SYSTEM)
6.0	ELECTRICAL SYSTEM
7.0	EARTHING
8.0	MAKE OF COMPONENTS
9.0	PAINTING PROCEDURE
10.0	WARRANTY
11.0	STARTUP &COMMISSIONING SPARES, RECOMENDATED SPARE
12.0	SUPERVISION OF ERECTION,TESTING AND COMMISSIONING
13.0	DOCUMENTS DURING BID STAGE
14.0	DOCUMENTS ON PLACEMENT OF ORDER
15.0	INSPECTION
16.0	O&M MANUAL
17.0	PACKING
18.0	NAME PLATE
19.0	MARKING
20.0	ANNEXURES

Bidder sign & seal:

1.0. INTENT OF SPECIFICATION

This specification covers design, manufacture, inspection, testing at bidder's and/ or his sub vendor's work(s), packing, and transportation of ELECTRIC WIRE ROPE HOIST along with accessories etc. which is to be furnished in the Flue Gas Desulphurization plant.

a. It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to Purchaser/ Customer, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgment is not in full accordance herewith.

b. The requirement(s) specified under different sections of this specification shall be considered while quoting for this tender.

c. The bidder shall be deemed to have understood completely all the tender drawings and documents and quoted accordingly.

d. The bidder has to note carefully the parameters, estimated capacities of equipment indicated and the tender drawing in the specification are only for guidance of the bidder. The system shall be designed as per relevant standards/ codes and exact capacities and quantities are to be estimated by the bidder. All such estimations and design calculations shall be submitted for Purchaser's approval.

e. Contract shall be unit rate basis for this package. Variations in quantities during contract stage shall be settled on basis of unit rate quoted by the bidder in the tender. During contract stage, quantities of various items of BOQ may vary to any extent and same unit rates will be applicable.

f. Deviation: There shall preferably be no deviation on technical specification. In case of any deviation, the bidder shall indicate separately the deviations clause-wise with respect to the specification in the 'Schedule of Deviation' given in **ANNEXURE-I**. Deviations in any other form including clarifications / assumptions / etc will not be considered and it will be construed that the bid conforms strictly to the specification.

g. Compliance to this specification shall not relieve the Bidder of the responsibility of furnishing equipment and accessories/auxiliaries of proper design, materials and workmanship to meet the specified start up and operating conditions.

h. All accessories, items of work, though not indicated but required to make the system complete for its safe, efficient, reliable and trouble free operation and maintenance shall also be in supplier's scope unless specifically excluded.

Special Note : In case of variance between sections, the requirement of CUSTOMER TECHNICAL SPECIFICATION shall prevail. BHUSAWAL Customer contract specification of HOIST is provided as Annexure - A to the specification & shall be referred strictly.

Bidder sign & seal:

2.0 SCOPE:

This specification covers the design, material constructional features, manufacture, testing, inspection, packing, supervision for erection & commissioning and supply of electric wire rope hoists assembly, with cross travel complete in all respect including control box, flexible trailing cable, festooning arrangement of feeding power to trolley assembly (cable trolleys), drag chain, auxiliary girder, FUSE-SWITCH unit etc. The assembly shall be complete in all respect ready for erection & commissioning.

2.1 APPLICATION

The electric wire rope hoists and trolley are meant for handling for equipment installed at Flue Gas desulfurization plant.

2.2 SCOPE OF SUPPLY OF HOIST

Each Electric wire rope hoists should necessarily consists of the following items:

Capacity : As per Enquiry
Maximum trolley travel speed for electric hoists : As per Annexure-III (Hoist Details)
Maximum trolley hoisting speed for electric hoists : As per Annexure-III (Hoist Details)

S. No	Description	Unit	FOR EACH ELECTRIC WIRE ROPE HOISTS
1	EWRH assembly for lifting & cross travel including brakes, drum with ropes suitable for required height of lift, electrical control panel, Pendant PB with control cable with link chain suitable against each EWRH capacity, Height (H), Length of travel (L) & Radius (R) as per As per Annexure-III (Hoist Details) & Layout GA as per Enquiry.	ST	As Per Enquiry
2	Fuse with enclosure suitable for outdoor installation, wall mounted Per Crane	NO	1 for Each Hoist
3	Trailing flexible copper cable for power supply	MR	To suit for Each Hoist
4	Galvanized link drag chain	MR	To suit for Each Hoist
5	Cable trolley assembly	ST	To suit for Each Hoist
6	Auxiliary girder assembly for trailing cable for a cross travel length	MR	To suit for Each Hoist
7	Rain hood for Hoist motor, cross travel motor and control box per Hoist	ST	1 for Each Hoist
8	Grease gun with grease	NO	1 for Each Hoist
9	10 % lubricant	ST	1 for Each Hoist

2.3 DESIGN & CONSTRUCTIONAL REQUIREMENTS

Construction of Electric wire rope hoists with Trolley shall be of consistent capacity, lift, head room, Hoist & Trolley speed, Travel Length, radius of Travel, Monorail beam size and any other parameters as specified in **Annexure-III** (Hoist Details) and **Annexure-V** (General arrangement layout drawing).

Bidder sign & seal:

Note: Vendor has to design Hoist Headroom as minimum as possible. The Hoist Headroom value shall be specified in Vendor technical offer itself.

3.0 **CODES AND STANDARDS**

The applicable codes and standards are as given below (with latest amendments if any) / equivalent international standards.

3.1.0	Electric wire rope hoist	: IS 3938
3.2.0	Service class	: IS 807
3.3.0	Drum, Sheave	: IS 3938
3.4.0	Gears	: IS 3681,IS 7403
3.5.0	Rope	: IS 2266
3.6.0	Hook	: IS 3815
3.7.0	Bearings	: IS 6455,IS 6457
3.8.0	Grease nipple	: IS 4009
3.9.0	Motor	: IS 325,IS 4691,IS 4729
3.10	Cables	: IS 694 Part I&II,IS 3961 IS 1554,IS 9968,IS 6380
3.11	Structural materials	: IS 2062
3.12	Earthing	: IS 3043
3.13	Colour shade	: IS 5
3.14	AC Contactors	: IS 13947 Part - IV
3.15	HRC Cartridge fuse links upto 650V	: IS 9224
3.16	Heavy duty air brake switches and composite units for air brake switches and fuses for voltage not exceeding 1000V : IS 4064	
3.17	General requirements for switchgear and control gear for voltage not exceeding 1000 V	: IS 4237
3.18	Control switches for voltage upto and including 1000 V AC, 1200 V DC (Part-I&II)	: IS 6875
3.19	The offered Hoist shall comply with all the latest statuary regulation and safety code/standard applicable. Nothing in this specification shall relieve the vendor of his responsibility.	

4.0 **DESIGN REQUIREMENT**

The Electric wire rope hoists shall be designed and constructed in accordance with the latest revision of **IS: 3938** and shall be suitable for **Duty class 2**.

Electric wire rope hoists and trolley shall be complete with hoisting and cross travel motor, wire rope drum, wire rope, hook, gear box for CTs hoist wheels with Trolley necessary gearing, sheaves, shoe type electro Mechanical Type brakes with asbestos lining for hoisting & cross travel, guides, weather and dust proof pendent push button station, & control panel, all wiring, 4 core Power cable with Festoon arrangement of feeding power to trolley assembly, galvanised drag (link) chain with complete supporting arrangement, pendent cable, limit switches, earthing terminals and other accessories to make system complete and ready for erection &

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commissioning. The hoist assembly shall be fully balanced. Counter weight, if any, required shall be supplied as a part of the system. Limit switches shall be provided for over hoisting, over lowering and for cross travel limits at both extreme position.

The supplier shall provide 63A fuse switch unit (FSU) with enclosure designed for IP 55 degree of protection, to receive the power supply. The FSU shall be provided with crimping type ATC lug to receive owner's Aluminium unarmoured power cable. The FSU shall be located 5meters away from the hoist. Control supply shall be 110V AC, 50Hz and the same shall be derived from 3ph, 415V, and 50Hz supply provided at 63A FSU. Suitable earthing terminal shall be provided in the FSU enclosure for terminating the earth conductor of the flexible trailing cable. All outdoor Electrical equipment's shall be suitable for IP 55 Degree of protection. Power supply provided for the panels shall be 415V, 3 PH, 3 wire only. Vendor to make suitable transformer arrangement inside the panel for single-phase control supply.

5.0 FEATURES OF CONSTRUCTION (MECHANICAL SYSTEM)

5.1 DRUM

Rope drum shall be either cast/seamless/welded to sustain concentrated loads resulting from the rope pull. Drum shall be machine grooved right or left or both with grooves of a proper shape to suit the ropes used. Drum shall accommodate all the length of the rope required for the lift plus two dead wraps at each anchor point, without over lapping. 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.

5.2 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.

5.3 SHEAVES

Rope sheaves shall be cast steel, cast steel, or mild steel as suitable for the Duty conditions and shall be confirm the relevant IS. Grooves shall be machined to the proper shape for the rope used. Sheaves shall be equipped with sheave guards to retain the rope in groove. Sheaves shall be fully guarded so that the rope cannot come off.

When the load is supported by more than one fall of the rope off the drum and bottom block are used, the rope system shall be equalized by using equalizing sheaves.

5.4 GEARS

Gears shall be cut from quality alloy steel of chromium, nickel. Pinions shall be of heat treated alloy steel.All gears and pinions shall be of hardened and tempered steel with machine cut teeth in metric modules. Surface hardening of steel is not acceptable.

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5.5 **BEARINGS**

All running shafts and wheels shall be fitted with ball / roller bearings with a rated life not less than 20 years based on equivalent running time as per IS:3938.Bearings shall comply with relevant IS/BS. depending upon the capacity and loading conditions the manufacturer shall design suitable grease lubricated or oil lubricated bearings.

5.6 **ROTATING AND STATIONERY SHAFT**

Shafts and axles shall be of 080 M40 as per BS 970

5.7 **LUBRICATION**

The hoists shall be supplied with all required lubricants, one number grease gun shall be supplied.

5.8 **HOIST ROPE**

Hoist ropes shall be of extra flexible steel rope with a well lubricated and having six strands of 36 wires per strands, pre-formed type, hemp cored, and regular lay construction. 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. 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. Hoisting rope shall confirm to IS 2266.The rope shall be hot dip galvanized. The rope shall be free from kinks and shall be continuous. **Minimum number of falls of rope shall be four (4)**. Reverse bend of ropes is not acceptable.

5.9 **HOOK**

Swivelling type forged circular shank section Hooks shall be solid, forged, heat treated, high tensile steel of tough construction and shall be provided with a standard depress type safety latch. It shall have swivels and operate on bearings with hardened race. Lock to prevent hooks from unscrewing shall be provided. Hook shall be confirm to the relevant Indian standard.The materials Hooks shall be as per relevant Indian standard.

5.10 **BRAKES**

Hoisting motor and trolley motor shall be equipped with Electro Mechanical type with asbestos lining. 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.

5.11 **ROPE GUIDE**

Rope guides shall have wear resistant property, prevents slack rope, and retains wire rope in the barrel grooves.

5.12 **TROLLEY WHEELS**

Trolley wheels shall be of single flange type in the taper treads. The wheels shall be mounted on antifriction bearings and shall be easily removable for repair/ replacement.

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5.13 **LINK (DRAG) CHAIN**

Hot dip Galvanised Link (drag) chain shall be provided for the Flexible Trailing cable, to avoid direct loading on the cable.

5.14 **AUXILIARY GIRDER FOR TRAILING CABLE**

Auxiliary girder system shall be provided for the support of Festoon arrangement of feeding power to trolley assembly. The Trolleys for the trailing cable shall be supported by the Auxiliary Girder. The Auxiliary Girder will be supported by the main beam (main beam will be supplied by the Purchaser). The hoist supplier shall provide obligatory support materials to support the Auxiliary Girder on the main beam at an interval not exceeding 750mm. complete structural materials required for Auxiliary Girder system shall be included in the scope of supply of the hoist supplier.

5.15 **MOTOR OPERATED GEARED TROLLEY**

Motor operated geared trolley shall have two (2) pairs of wheels, one pair of which shall be driven through motor. Trolley for cross travel shall be designed to accommodate a wide range of I-beams and shall Trolley shall be capable of travelling on straight as well as curved monorails with the design being such to maintain uniform distribution of pressure on the flanges.

6.0 ELECTRICAL SYSTEM

Electrical system comprises of 63A Fuse Switch Unit/MCB, Control panel, Pendent Push Button Station, Trailing cable, Pendent cable, Hoist & Cross travel motors with electro mechanical brake etc., to make the system complete. All these items are included in the scope of supply of the vendor.

6.1 **CONTROL PANEL**

Control panel shall be provided to house the electrical components like fuses, contactors, over load relays, isolators, switches, 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 CRCA sheet steel and shall be dust and vermin proof, suitable for outdoor condition. The control panel shall be designed for IP 55 degree of protection. Adequate number of DOUBLE COMPRESSION type cable glands (heavy duty) of brass with nickel plating and Annealed Tinned Copper lugs 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 wall mounted type & easily approachable from the floor by a standing man.

6.2 **CONTROL SUPPLY TRANSFORMER**

Dry type step down control supply transformer 415V/110V AC shall be provided to derive control supply for starter operation and 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

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6.3 **MOTOR**

The motor shall meet IS 325 or equivalent international standards. The motor shall be designed for frequent reversal, braking and acceleration. Frequency of reversal shall be minimum 150 times/hour. The motor shall be rated for S4 duty 40% cyclic duration factor. Maximum continuous rating 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. For electric hoists, trolley movement and hoisting shall be effected by using two separate motors.

6.4 **ENCLOSURE**

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

6.5 **INSULATION AND WINDING**

Motors shall have minimum class "B" type insulation. 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.

6.6 **MOTOR FRAME**

The frame shall be cast and rigid.

6.7 **DIRECTION OF ROTATION**

The motors shall be designed for both directions of rotation.

6.8 **TERMINAL BOX OF MOTORS**

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 double compression cables glands and ATC lugs shall be provided to receive the power cables.

6.9 **VIBRATION**

The motor vibration and noise shall be within the limits specified in IS 12065 and IS 12075. The noise level shall be limited to 85 dB when measured at a distance of 1.5m from the Hoist assembly.

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6.10 **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.

6.11 **CONTACTOR**

All Contactors shall be suitable for DOL application of full voltage with coils suitable for the control voltage provided by the supplier. Contactor construction shall be rugged and such as to avoid ingress. For control purpose, only Auxiliary contactors shall be used. Relays are not acceptable in place of Auxiliary Contactors. The power contactors shall heave Mechanical interlocking in addition to Electrical interlocking so that at any point of time only any one of the two Power contactors (either Up of Down, Left or Right) will be energized.

6.12 **THERMAL OVER LOAD RELAYS**

Thermal over load relays wherever provided shall be ambient temperature compensated with suitable setting ranges. 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.

6.13 **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.

6.14 **INDICATING LAMPS**

LED 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 replace- able 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.,

6.15 **WIRING**

The control panel wiring shall be complete in all respects and ready for connection of external power for terminating external cables. Necessary 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 min. 2.5 sq.mm multistranded copper, PVC insulated 650V/1100V wires.

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6.16 **TERMINATION**

All power and control wires shall be terminated on terminal block/component using crimping type tinned copper lugs/connectors.

Terminal block 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.

6.17 **PENDANT PUSH BUTTON STATION**

Pendant shall be provided with flourscent up, down, forward, reverse travel & Emergency stop push buttons. The Emergency Pus Button shall be Lockable type. Its power supply shall be limited to 24V AC.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, EMEGENCY STOP.

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 Indian standard. The Push button shall be properly shrouded so as to prevent water & dust entry.

6.18 **LIMIT SWITCHES:**

Limit switches shall be provided for over hoisting, over lowering, extreme left and extreme right positions. Necessary Limit switch actuating arrangement shall be provided to actuate the limit switch at the above positions. The Limit switches shall have enclosures designed for IP 55 degree of protection. Proximity switches are not acceptable in place of Limit switches.

6.19 **FUSE SWITCH UNIT**

Metal enclosed, FOUR/THREE POLE as suitable fuse switch unit (SFU) of 63A, 415V, AC, rating suitable for indoor location shall be provided. Suitable Nickel-Chromium plated brass DOUBLE COMPRESSION glands and crimp type ATC lugs to receive purchaser's 3c-6 sq. mm AL unarmoured FRLS cable & vendor’s 4C-4 sqmm copper unarmoured cable shall be provided. Cable glands and lugs shall also be provided for the flexible trailing cable. The FSU shall be provided with 2 Nos of earthing terminals with M12 screws, nuts and washers. FSU with enclosure suitable for outdoor installation, **Wall mounted**.

6.20 **CABLES**

The trailing cable shall be 1100 V grade extra flexible having 4 cores and as per IS 9968. The trailing flexible cable shall carry the power supply to the Hoist from the Switch Fuse unit. The conductor cross section shall be minimum 4 sq.mm multi- stranded tinned copper of class 5 of IS

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8130. The insulation shall be heat resistant elastomeric compound based on ETHYLENE PROPYLENE RUBBER **(EPR)** with continuous withstanding temperature of 90 Deg C The inner sheath shall be heat resistant elastomeric compound with black colour. The outer sheath shall be marked with cable size, voltage grade by embossing, sequential marking at every one meter of length by embossing.

The power cables between HOIST / CT MOTORS to control box, the pendent cable and other control cables shall be as per IS 1554. The conductor shall be multi- stranded PLAIN ANNEALED copper with minimum cross section of 1.5 sqmm for control. The insulation shall be extruded PVC. The inner sheath shall be extruded PVC and the outer sheath shall be extruded-PVC. In addition, the outer sheath shall be marked with cable size, voltage grade, the word FRLS at every 5 meters and sequential marking of length at every one meter. The sheath shall be black in colour. Power cable supports shall be festoon type arrangement.

7.0 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 shall be in supplier's scope. BHEL will provide the earthing material from the Switch Fuse Unit to the nearest Earth Grid. Any other Items/components other than specified above, which are required for proper functioning of the Hoist are also part of the vendor Scope of Supply.

8.0 MAKE OF COMPONENTS:

Only one of the following makes shall be used. Mix up of make for same item is not acceptable. Any deviation with respect to the makes given below is not acceptable.

Sl No.	Components	Make
1.	Hoist/Cross travel motor	AUTOLEC/SIEMENS/KEC/NGEF/ABB/CROMPTON GREAVES /BHARAT BIJLEE
2.	Cable	INCAB/CCI/DELTON/FORT/GLOSTER/UNIVERSAL CABLES / ASIAN CABLES/ NICCO
3.	Fuse switch unit/MCB	L&T / SIEMENS / CONTROLS & SWITCHGEAR (STROMBERG) /GE//SCHNEIDER/SPACEAGE SWITCHGEAR/CGL/ABB
4.	Power switch	L&T/ SIEMENS/CONTROLS & SWITCHGEAR/ SCHNEIDER/GE
5.	Power contactor	L&T/SIEMENS/TELEMECHANIQUE/BCH/GE
6.	Auxiliary contactor	L&T/SIEMENS/TELEMECHANIQUE/BCH/GE
7.	Thermal overload relay	L&T/SIEMENS/TELEMECHNIQUE/BCH/GE
8.	Fuse	L&T/SIEMENS/GE/CONTROLS&SWITCHGEAR/BUSMANN/GE
9.	Push button	L&T/SIEMENS/TEKNIC/BCH/CONTROLS&SWITCHGEAR/TELEMECHANIQUE/GE
10.	LED type Indicating lamp	L&T/SIEMENS/BCH/TEKNIC/RASS CONTROLS/GE
11.	Internal wiring	BIS (IS) CERTIFIED MAKE
12.	Glands	COMET/SUNIL&CO/QUALITYPRECISION/BRACCO/ARUP ENGINEERING.
13.	Lugs	DOWELLS/3D

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14.	Terminal block	ELMEX/TOSHA/CONNECTWELL/WAGO/PHOENIX
15.	Control switch	L&T/SIEMENS/KAYCEE/CONTROLS&SWITCHGEAR/SCHNEIDER/GE
16.	Selector switch	L&T/ SIEMENS/KAYCEE/GE
17.	Fuse carriers	L&T/SIEMENS/GE/CONTROLS&SWITCHGEAR/BUSMANN
18.	Auxiliary transformer	AE/KAPPA/INDCOIL/LOGICSTAT/PRECISE/ SOUTHERNELECTRICAL/STATIC TRANSFORMER/G&M
19.	Limit switches	SIEMENS/BCH/JAI BALAJI
20.	Neutral link	L&T/SIEMENS/GE/SCHENIDER/CONTROLS & SWITCHGEAR
21.	Hoist Brake	BCH/L&T/ SIEMENS / NTPC APPROVED
22.	Cross Travel Brake	EMCO/PRETHE / NTPC APPROVED
23.	WIRE ROPE	USHA MARTIN/ BHARAT WIRE ROPES / MAYUR / ARADHYA
24.	Limit Switch	BCH/JAI BALAJI/SIEMENS/KAYCEE
25.	Bearings	SKF/FAG

Make of various components for NTPC projects are subject to NTPC approval. No additional delivery or price implication is acceptable due to NTPC comment on make of components. Mix up of make for same item is not acceptable in any enquiry.

9.0 **PAINTING PROCEDURE:**

For Painting of Hoist Refer **ANNEXURE-IV.**

PAINTING OF CONTROL PANELS:

(The below details are Tentative, 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.

Paint shade shall be as per RAL 5012 (Blue) for Motor.

10.0 **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.

11.0 **START UP & COMMISSIONING SPARES:**

Start-up & Commissioning Spares shall be part of the main supply of the EWRH. 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 equipment's are energized.

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Items/comenponets belong to a HOIST shall be send to site in a single packing as far as possible or traceable identical number mark needs to mention in sub-assembly /sub parts.

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.

RECOMENDATED SPARE

The Bidder shall offer electrical / electronic / mechanical spares for 2 years trouble free operation of the Electric wire rope Hoists. (Unit Price along with quantity of each item of spare shall be offered in the price bid)

12.0 Price of each item is to be given separately for **SUPERVISION OF ERECTION, TESTING AND COMMISSIONING**

Erection of EWRH will be done by owner as per vendor's Erection Manual and check List. Supervision of Erection and Commissioning of the EWRH at project site is in bidder's scope. Bidder shall include towards supervision of erection, pre-commissioning & post- commissioning check-up, start-up, testing and trial runs. TA/DA, boarding and lodging shall be borne by the bidder and shall be inclusive in supply portion.

However, refer the **ANNEXURE- II** for complete supervision of Erection, testing and Commissioning EWRH.

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.

13.0 DOCUMENTS TO BE SUBMITTED DURING BID STAGE

Along with the offer

1. Clause by clause confirmation for this Technical specification.
2. In case, Deviations are considered essential by the Bidder (after exhausting all possible efforts), the same shall be separately listed, to be spelt out clearly in **Annexure-I.**
3. Typical GA of HOIST with BOM for the system.
4. Rating of cross travel and hoist motor.
5. Headroom of Hoist.

The bidders are instructed not to submit bidders' own technical specification and any other technical details.

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14.0 DOCUMENTS TO BE FURNISHED ON PLACEMENT OF ORDER:

Immediately on placement of order, the supplier shall submit the following Documents to BHEL for approval. Manufacturing shall be initiated only after obtaining approval from BHEL.

1. General Arrangement drawing of Hoist, Cross Travel arrangement, Auxiliary Girder & Trailing cable system, Control Panel, Pendant Push button station etc.
2. Bill of materials for the Hoist, Cross travel arrangement, Auxiliary Girder System, all cables under the scope etc.
3. Calculation for Factor of safety on selection of Steel wire rope.
4. Power and Control scheme.
5. Bill of material indicating description of the item, rating, make, quantity, type reference etc., for a) Panel mounted components, b) Pendent mounted components, c) Items covered in the system like trailing cable, trolley etc.,the make of components shall be separate and form part of vendor QP.
6. Hoist mounting arrangement.
7. Gasketting and locking arrangement of Control panel.
8. Justification for a) Motor rating selected, b) Rope selected, c) VA rating of control transformer.
9. List of items mounted in the assembly and list of loose item supplied along with weight.
10. Packing drawings.
11. Data sheet for Hoist, Data sheet for Hoist & cross travel motor, Data sheet for Brake and Data sheet for trailing & pendent cable.
12. Cable schedule for hoist indicating size, termination between which equipment, Rating, quantity, make etc.
13. Shipping list indicating items, quantity, and weight and package number to be submitted before inspection call is given. Despatch shall be maintained in line With the shipping list.
14. All the drawings shall be prepared in AutoCAD. After final approval the above documents shall be submitted in CD apart from hard copy.
15. The drawings and data sheets shall be submitted in soft media.pdf format, apart from 6 sets from hard copy. For BHEL approval.

15.0 INSEPCTION:

The inspection will be carried out based on the following documents.

1. BHEL Purchase order
2. BHEL Technical specification
3. Quality plan, Quality checklist indicated in the Enquiry.

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4. BHEL approved supplier drawing/data sheets.

16.0 O&M MANUAL:

O&M instruction manual in the required quantity as in enquiry shall be supplied directly to BHEL Ranipet in required numbers as per enquiry immediately after the despatch of the hoist. Instruction manual shall be submitted in soft media apart from hard copies. Hard copy of the O&M manual shall be sent along with the hoist. Ten (10) hard copies and five (05) sets of electronic copies of all documents are to be submitted in the English language.

The O&M manual shall include but not limited to the following.

1. Dos & Don'ts during receipt, storage, erection & commissioning.
2. Instruction to be followed on receipt, storage & erection.
3. Construction details of the hoist assembly.
4. Drawing indicating various parts of EOH assembly with part numbers.
5. Recommended lubrication & maintenance schedule.
6. Cut view drawing for the Gear box assembly.
7. As built drawings, BOM, cable schedule.
8. Disposal procedure for environmental hazardous material if any.

17.0 PACKING AND FORWARDING:

The ELECTRICAL HOIST and accessories shall be properly packed to avoid damage during transit & storage. Wooden crate (fumigated) 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.
Each package or shipping units shall be clearly marked or stenciled on at least two sides –

NTPC SITE (ADDRESS AS PER ENQUIRY), PO number, Supplier name. 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.

Items/comenponets belong to a HOIST shall be send to site in a single packing as far as possible or traceable identical number mark needs to mention in sub-assembly /sub parts.

18.0 NAME PLATE

The name plate shall be non-corrosive material (metallic) indicating manufacturer's name, serial number, rating, capacity type. Name plate to be written in English. Equipment identification number to be mentioned in the name plate. Hoists shall have permanent inscription in English on each side readily recognizable from floor level stating safe working load.

19.0 MARKING

As per IS 3938 latest.

Bidder sign & seal:

20.0 ANNEXURES

ANNEXURE-I

LIST OF DEVIATIONS/EXCEPTIONS TO THE ENQUIRY DOCUMENT

Sl No	Clause No	Page No	Description of Deviation

Note: Enlarge the table to incorporate items

SIGNATURE OF BIDDER ----------

NAME ----------

DESIGNATION ----------

Bidder sign & seal:

		Bidders Acceptance / Comments
ANNEXURE - II Supervision of erection, testing and commissioning	Refer Enclosed specification.	
ANNEXURE - III HOIST details	Refer Enclosed specification.	
ANNEXURE - IV Painting of Hoist	Refer Enclosed specification.	
ANNEXURE - V General Arrangement layout Drawing	Refer Enclosed specification.	

SIGNATURE OF BIDDER ----------

NAME ----------

DESIGNATION ----------

Bidder sign & seal:

ANNEXURE-II

SUPERVISION OF ERECTION, TESTING AND COMMISSIONING

Price of each item is to be given separately for **SUPERVISION OF ERECTION, TESTING AND COMMISSIONING**

Erection of ELECTRIC WIRE ROPE HOIST (EWRH) will be done by owner as per vendor's Erection Manual and check List.

However, the Bidder/vendor shall make visit for the supervision of erection, pre-commissioning & post- commissioning check-up, start-up, testing and trial runs of all the items covered under the scope of supply.

The Bidder/vendor have to make two numbers of visit for the supervision erection & commissioning, testing for **Each electric Hoist** – 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 Electric Hoist

SL NO	DESCRIPTION	QUANTITY (SET)
1	SUPERVISION OF ERECTION OF ELECTRIC WIRE ROPE HOIST AS PER SPEC FGD: EWRH REV00 AT BHUSAWAL SITE AS FRIST VISIT FOR EACH ELECTRIC HOIST.	As Per Enquiry.
2	SUPERVISION OF COMMISSIONING, INSPECTION AND TESTING OF ELECTRIC WIRE ROPE HOIST AS PER SPEC FGD: EWRH REV00 AT BHUSAWAL SITE AS SECOND VISIT FOR EACH ELECTRIC HOIST.	As Per Enquiry.

Vendor shall quotes charges for **complete work for supervision** for erection & commissioning, testing for each Electric Hoist.

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 & commissioning, testing for each Electric Hoist.

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.

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ELECTRIC WIRE ROPE HOIST (EWRH) WITH MOTOR DRIVEN TROLLEY										PROJECT:	BHUSAWAL FGD PROJECT			
SL NO	AREA	TYPE OF Hoist	CAPACITY OF HOIST	MAXIMUM SPEED		HOIST MONO-RAIL I BEAM BOTTOM ELEVATIONS (Hoist Monorail in BHEL Scope)	FLOOR LEVEL	TRAVEL LENGTH	PATH	MINIMUM RADIUS OF TRAVEL	HOIST MONORAIL I-BEAM (in BHEL scope)	HEIGHT OF BOTTOM OF MONORAIL I-BEAM TO HOIST HOOK	HEIGHT OF BOTTOM OF MONORAIL I-BEAM TO HOIST HOOK - HOIST HEAD ROOM: VENDOR TO SPECIFY	TOTAL QNTY
				HOSTING	CROSS TRAVEL									
			TON	METER PER MINUTE	METER PER MINUTE	(EL (+/-) IN METER)	(EL (+/-) IN METER)	(METER)	CURVED / STRAIGHT	(MM)	NPB / ISMB /UB	(MM)	(MM)	(SET)
ABSORBER AREA														
1	ELECTRIC HOIST FOR RC PUMP INLET VALVE	ELECTRIC	5	As per Annexure - A	As per Annexure - A	EL (+) 6.2M	EL (-)1.0M	24	STRAIGHT	NA	NPB 600X 220 X 1 22.4 + CAPPING SMC 400	As minimum as possible.- Vendor to specify Actaul value,	_____	As per Enquiry
2	ELECTRIC HOIST FOR RC PUMP OUTLET VALVE	ELECTRIC	5	As per Annexure - A	As per Annexure - A	EL (+) 11.3M	EL (-)1.0M	24	STRAIGHT	NA	NPB 600X 220 X 1 22.4 + CAPPING SMC 400	As minimum as possible.- Vendor to specify Actaul value,	_____	As per Enquiry
3	ELECTRIC HOIST ABSORBER AGITATOR	ELECTRIC	2	As per Annexure - A	As per Annexure - A	EL (+) 6.5M	EL (-)1.0M	6.5	STRAIGHT	NA	ISMB 300	As minimum as possible.- Vendor to specify Actaul value,	_____	As per Enquiry

NOTE : 1) Depending upon Hoist head room , the actual height of lift for hoist shall be arrived. 2) * are Tentative.

Special Note: The respective Speed of Hoist / CT shall be, as specified in ANNEXURE -A - CUSTOMER TECHNICAL SCECIFICATION FOR HOIST.

Bidder sign & seal:

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
31	Handling Equipment in FGD- Chain pulleys, Hoists& Manhole door, Air cannon silo, Bag filter& fan assy, Nozzles and Flanges	FW 713 FW 714 FW 717 FW 723 FW 724 FW 725	Power tool cleaning to St3(SSPC-SP3	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	70	Synthetic enamel to IS 2932 grey shade 692 of IS 5 (Two coats)	70	140

ANNEXURE - IV Painting of Hoist

Bidder sign & seal:

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

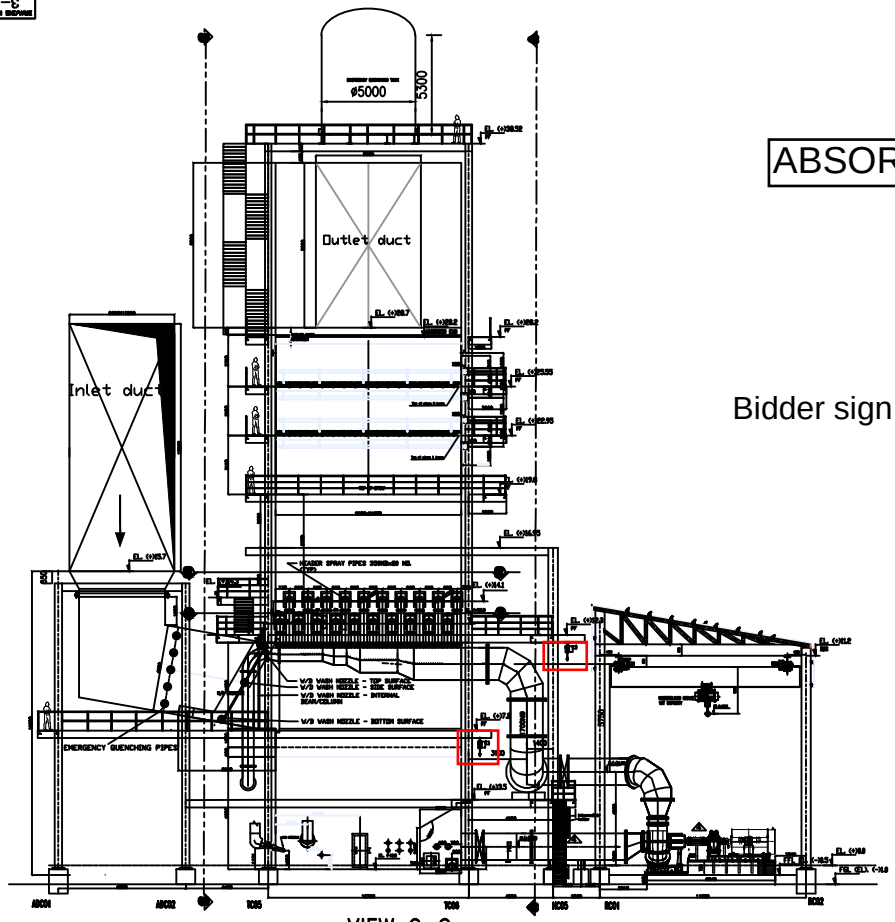
GENERAL NOTES

1. No painting is required for Galvanized, non-ferrous & stainless steel items, except as indicated above.
2. Machined items are to be applied with coat of temporary rust preventive oil
3. PGMAs covered in sub-supplier (ie., Purchased) items viz., Agitator and other sub-delivery components etc., are not indicated in the above list. However, the Painting Schedule for all items supplied by all sub-suppliers and BOI under the scope of BHEL shall be same as for main equipment covered in this document.
4. In sub-assy, wherever plates / sheets of thickness less than or equal to 5mm and rods are used, very minor items like clamps, small items etc - Power Tool or Hand Tool Cleaning to SSPC - SP 3 / SP 2 shall be followed and painting under Sl no:01 of FGD shall be followed.
5. Ground shade/colour of finish paints and identification tag/band for equipments, piping, pipe services, supporting structures and other components is followed as per the color coding practice at site.
6. All components covered under different PGMAs are to be painted. In case any component is left out, the same shall deemed to be included under the relevant section.
7. All threaded and other surfaces of foundation bolts and its materials, insulation pins, Anchor channels, Sleeves shall be coated with temporary rust preventive fluid and during execution of civil works; the dried film of coating shall be removed using organic solvents.
8. All steel structures shall be provided with painting as given in the specification. Further, painting system shall also meet the requirements of corrosivity category C3 (durability high) as per ISO 12944.
9. Finish coat to be applied after an interval of min 10 hrs and within 6 months (after completion of intermediate coat).
10. Bottom of base plate including below zero level portion marked in Supporting Columns of structures which will be embedded in concrete, those surfaces shall be prepared by manual cleaning to ST3 and provided with primer coat of chlorinated rubber based zinc phosphate primer of min. 50 µm DFT.

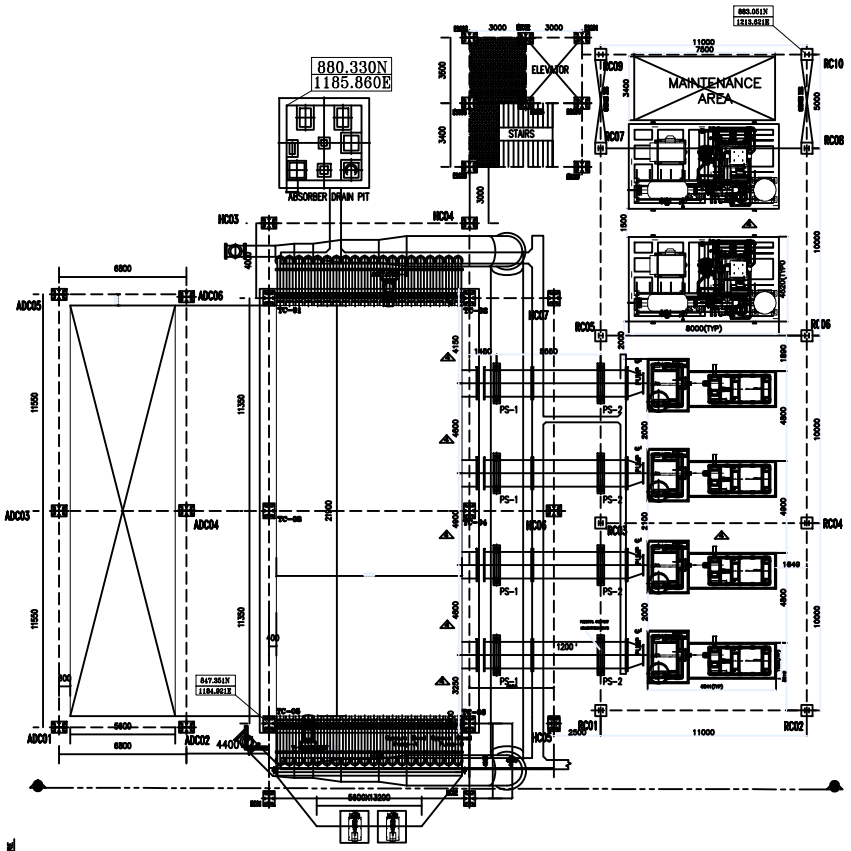
Bidder sign & seal:

ABSORBER GA

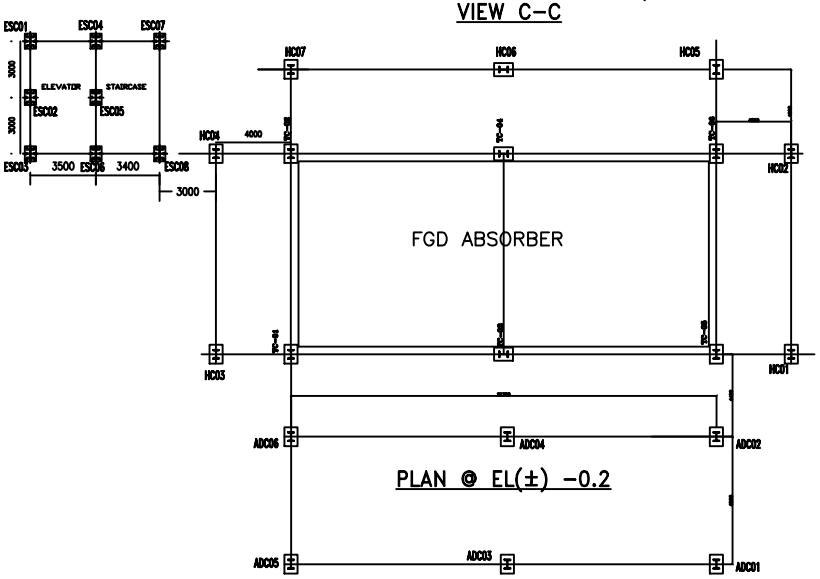
Bidder sign & seal:



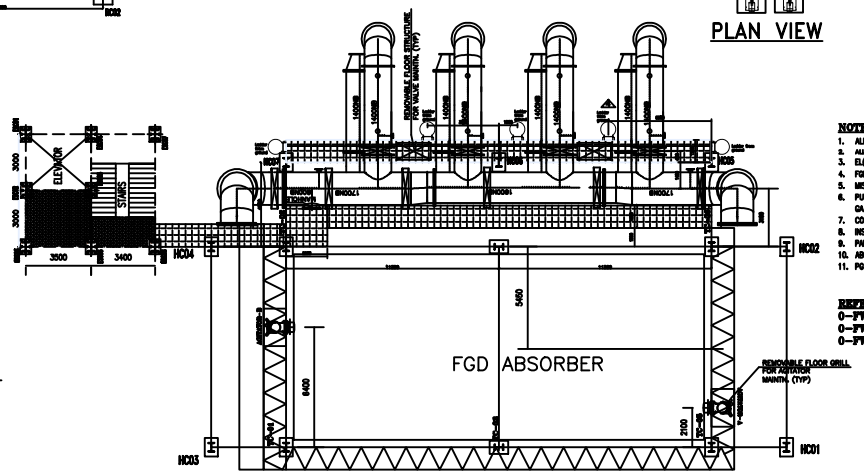
VIEW C-C



PLAN VIEW



PLAN @ EL(±) -0.2



PLAN @ EL(±) 3.5 (Rotated 90° counter-clockwise)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL ELEVATIONS ARE IN METER.
3. EL(±) 0.000 CORRESPONDS TO RL(+)209 M.
4. FGL AT ABSORBER AREA IS AT RL 208 M.
5. MIST ELIMINATOR ELEVATION IS FINAL. PIPE LOCATION AND ITS SUPPORT ARE BASED ON VENDOR GA.
6. PUMP COLUMN LOCATIONS ARE FINAL. PUMP AXIS, PUMP END CONNECTION DETAILS AND FOUNDATION HEIGHT ARE BASED ON VENDOR GA.
7. CORROSION ALLOWANCE IS 2 MM.
8. INSPECTION AND TESTING SHALL BE AS PER APPROVED QAP.
9. PAINTING SHALL BE AS PER APPROVED PAINTING SPECIFICATION.
10. ABSORBER DESIGN IS AS PER BHPS AND IS STANDARD.
11. PG TEST SHALL BE AS PER ASME PTC40.

REFERENCE DRAWING:-

0-FW-000-1766 GA OF ABSORBER SHEET 2/4
0-FW-000-1767 GA OF ABSORBER SHEET 3/4
0-FW-000-1768 GA OF ABSORBER SHEET 4/4

MAHAGENCO REFERENCE DRAWING NO. 3-FW-000-00861

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BHUSAWAL 1X660MW

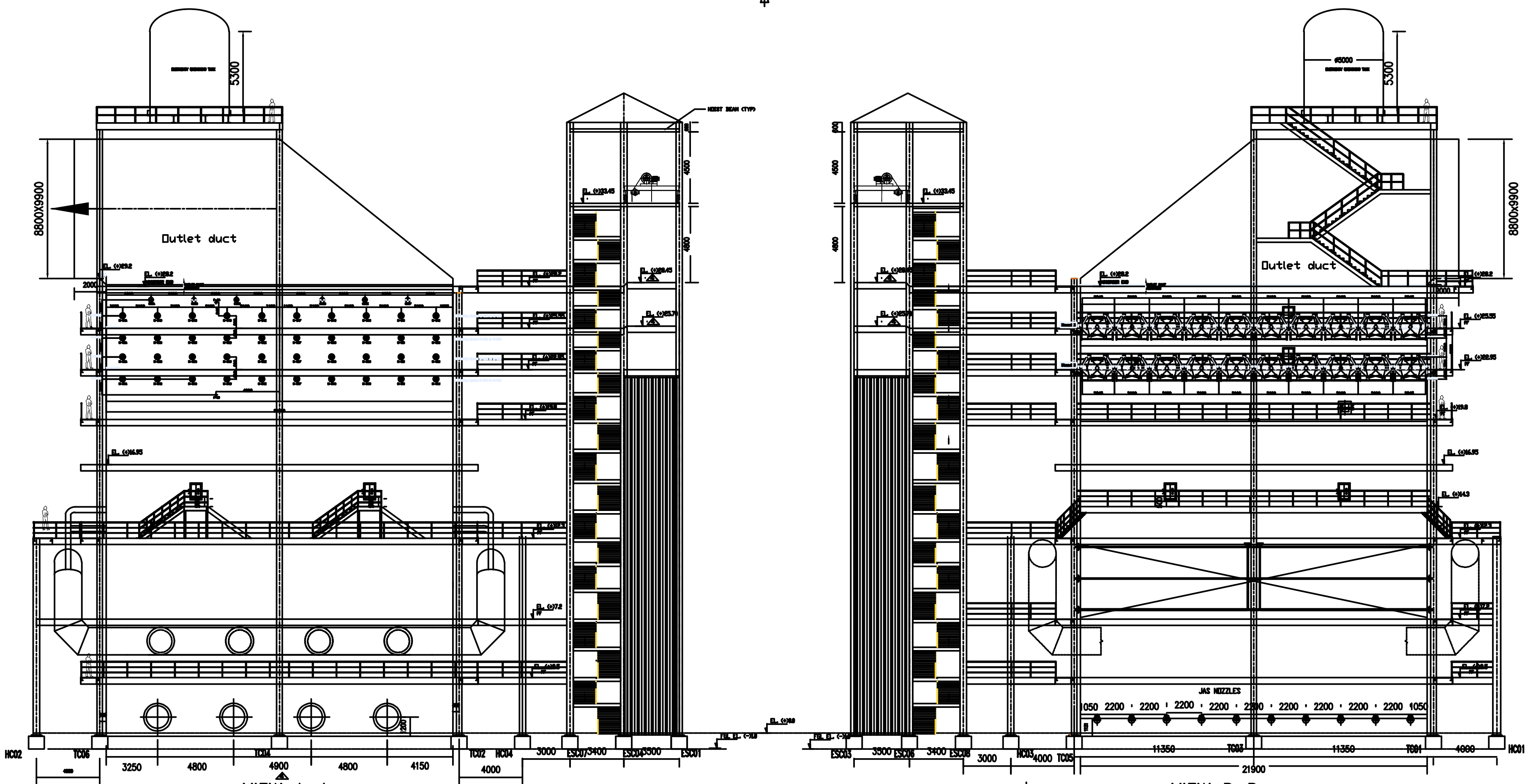
CUST. NO: B4UB

Bharat Heavy Electricals Ltd
BOILER AUXILIARIES PLANT
RANIPET-632 406

TITLE: GA of Absorber
Sh 01 of 04

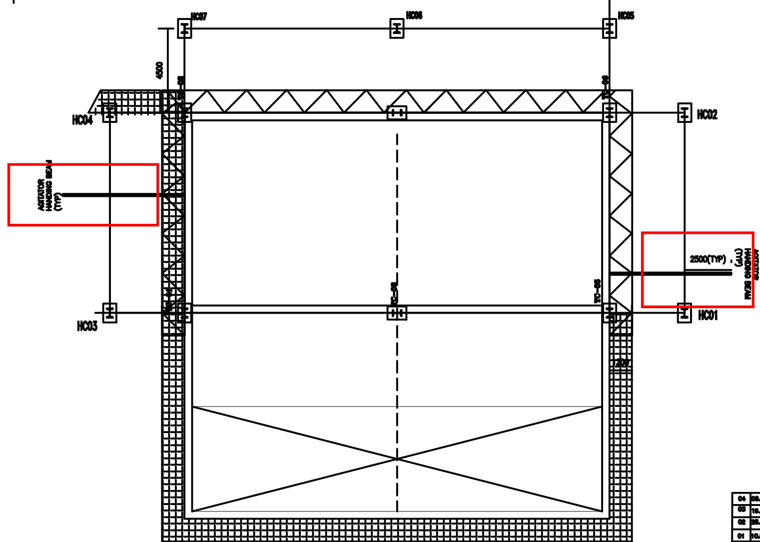
DRAWING NO.: 0-FW-000-1785

REV: 04



VIEW A-A

VIEW B-B



PLAN @ EL(±) 7.2

OUTLET DUCT	CS + 3mm thick Glass Flake Lining				
AIR SUPPLY FIRE	-	-	-	CARBON STEEL	-
MIST ELIMINATOR	-	-	-	-	Poly Sulfone
JET AIR SPARGER	-	-	-	FRP(Vinylester Resin) +Alumina ceramic	–
EXTERNAL BOLT & NUT	A193 B7 & A194 2H	A193 B7 & A194 2H	A193 B7 & A194 2H	A193 B7 & A194 2H	A193 B7 & A194 2H
INTERNAL BOLT & NUT	UNS S 31603 (SS 316)	UNS N 10276 (C276)	UNS N 10276 (C276)	-	UNS N 10276 (C276)
SPRAY NOZZLE	UNS S 31603 (SS 316)	UNS N 10276 (C276)	SiC	-	Poly Propylene
SPRAY PIPE (Inside ABS/Duct)	UNS S 31603 (SS 316)	UNS N 10276 (C276)	FRP + SiC coating	-	Poly Propylene
SPRAY HEADER (Outside Absorber)	-	-	CS + Rubber lining	-	-
FDN BOLT & NUT	-	-	-	IS 2062 E250 A/BR	-
INTERNAL SUPPORT (Including support beams for spray pipes, mist eliminator & baffle wall)	UNS S 31603	UNS N 10276 (C276)	CS + 2mm C276 Cladding/Lining	CS + 2mm C276 Cladding/Lining	CS + 2mm C276 Cladding/Lining
GASKET	PTFE	PTFE	RUBBER	RUBBER	RUBBER
NOZZLE FLANGE	IS 2062 E250 BR	UNS N 10276 (C276)	IS 2062 E250 BR + 2mm C276 Lining	IS 2062 E250 BR + 2mm C276 Lining	IS 2062 E250 BR + 2mm C276 Lining
NOZZLE NECK	IS 2062 E250 BR [IS 1239 / IS 3589]	UNS N 10276 (C276)	IS 2062 E250 BR + 2mm C276 Lining	IS 2062 E250 BR + 2mm C276 Lining	IS 2062 E250 BR + 2mm C276 Lining
MANHOLE BOLT & NUT	CS + GALV.	-	CS + GALV.	CS + GALV.	CS + GALV.
MANHOLE COVER	IS 2062 E250 A/BR	-	CS + 2mm C276 Cladding/Lining	CS + 2mm C276 Cladding/Lining	CS + 2mm C276 Cladding/Lining
MANHOLE FLANGE	IS 2062 E250 A/BR	-	CS + 2mm C276 Cladding/Lining	CS + 2mm C276 Cladding/Lining	CS + 2mm C276 Cladding/Lining
MANHOLE NECK	IS 2062 E250 A/BR	-	CS + 2mm C276 Cladding/Lining	CS + 2mm C276 Cladding/Lining	CS + 2mm C276 Cladding/Lining
BOTTOM PLATE	-	-	-	CS (7mm min) + 2mm C276 Clad Plate	-
SHELL/CASING	IS 2062 E250 A/BR 7mm thick	UNS N 10276 (C276)-6mm thick	CS (7mm min) + 2mm C276 Clad	CS (7mm min) + 2mm C276 Clad Plate	CS (7mm min) + 2mm C276 Clad Plate
SERVICE AREA --->	**EMERENCY QUENCHING AREA**	**GAS INLET AREA (WET DRY INTERFACE)**	**ABSROBER SPRAY PIPE AREA**	**ABSORBER TANK AREA**	**MIST ELIMINATOR AREA**
		ABSORBER			

MATERIAL SPECIFICATION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL ELEVATIONS ARE IN METER.
3. EL(±) 0.000 CORRESPONDS TO RL(+)209 M.
4. FGL AT ABSORBER AREA IS AT RL 208 M.
5. MIST ELIMINATOR ELEVATION IS FINAL. PIPE LOCATION AND ITS SUPPORT ARE BASED ON VENDOR GA.
6. PUMP COLUMN LOCATIONS ARE FINAL. PUMP AXIS, PUMP END CONNECTION DETAILS AND FOUNDATION HEIGHT ARE BASED ON VENDOR GA.
7. CORROSION ALLOWANCE IS 2 MM.
8. INSPECTION AND TESTING SHALL BE AS PER APPROVED QAP.
9. PAINTING SHALL BE AS PER APPROVED PAINTING SPECIFICATION.
10. ABSORBER DESIGN IS AS PER MHPS AND IS STANDARD.
11. PG TEST SHALL BE AS PER ASME PTC40.

REFERENCE DRAWING:-

0-FW-000-1786 GA OF ABSORBER SHEET 2/4
0-FW-000-1787 GA OF ABSORBER SHEET 3/4
0-FW-000-1788 GA OF ABSORBER SHEET 4/4

MAHAGENCO REFERENCE DRAWING NO. 3-FW-000-00861

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: **BHUSAWAL**

CUST.NO: R4U8

Bharat Heavy Electricals Ltd
BOILER AUXILIARIES PLANT
RANIPET-632 406

DEPT: FGD | SCALE: 1:100 | APPD: KUMAR | 19.06.20

TITLE: **GA of Absorber**
Sh 02 of 04

DRAWING NO: 0-FW-000-1786 | REV 04 | U 01

VOLUME – II

SECTION - 2.5

CRANES & HOISTS

1.0.0 GENERAL

ANNEXURE - A

This part of the specification covers the requirements for Cranes and Hoists.

This section of the specification shall be read in conjunction with other sections of the specification as appropriate and the equipment offered shall meet the requirements as spelt out therein. The system shall comprise of cranes and hoists.

2.0.0 CODES AND STANDARDS

The equipment to be provided shall specifically conform to the latest editions of the following codes, standards, specifications and regulations. Also the system design shall conform to the requirements of applicable codes as specified in the General Technical Specification

ISO 1996	:	Noise Level
IS 3938	:	Hoist
IS 3177	:	Crane
IS 3832	:	Manual Hoist
IS 2266	:	Steel Wire Ropes for General Engineering Purposes
IS 15560	:	Point Hooks with Shank up to 160 Tonne – Specification
IS 13834 (Part-5) Cranes - Classification	:	Overhead travelling and portal bridge cranes
IS 325	:	Three Phase Induction Motors.

3.0.0 DESIGN REQUIREMENTS

Crane shall be provided in the areas where the handling of the equipments / components shall have requirement in both transverse and longitudinal direction. Otherwise, hoist shall be considered. Curved monorail with hoist shall also be considered, if the equipments / components are not located inline with the monorail. Height of the building shall be finalized considering the required lift over other equipments, piping etc.

Each crane or hoist shall be complete with its accessories, supporting structure, monorail beams, rails, girders, power supply, safety devices and controls and shall conform to local statutory rules and regulation.

a) The crane and hoist shall be rigid in construction and all movements shall be smooth and non-jerky, acceleration for cross travel and long travel motors shall be limited to reasonable values as to prevent any swinging of the load.

b) In the design of components on the basis of strength, factor of safety shall not be less than Five (5) based on ultimate strength, impact, fatigue, wear and stress concentration factors shall be taken into account wherever applicable.

c) Drives shall be designed with adequate margin to give best performance and efficiency. Safety arrangement shall be incorporated to prevent damage to the motors on account of mechanical overload and electrical faults and to gearing and shaft etc. due to over stressing and other detrimental condition.

d) Casting and forging shall be of tested quality and shall confirm to their respective material specifications and shall be free from flaws and objectionable imperfection, machine true and in a workman like manner.

e) Design shall provide easy maintenance of crane and hoist.

f) Cranes and hoists capacity shall be selected by considering 25% margin over the weight of the component to be lifted.

g) Crane and hoist selection criteria

Type of Handling equipment	Crane & Hoist's Safe working load (SWL)
CRANE	
Double Girder EOT Crane	> 10T
Single Girder over head / Under Slung cranes	≤ 10T
HOIST	
Electric hoists	≥ 2000 Kg
Manual hoists with trolley	> 500 Kg and < 2000 Kg

Note: Electrical hoists shall be provided at all equipments / components location which has a lift more than 10 m (for all >500 kg and < 2000 kg). Hook shall be provided for all possible maintenance location for the weight less 500kg.

h) For guidance purposes the following crane & hoist speeds shall be considered:-

- Crane

  Hoist : 5m/min

  Trolley Travel : 10 to 15 m/min

  Bridge Travel : 15 m/min

  Creep speeds : 10% of operating speeds for all motion through VVVFD

- Hoist

  Hoisting speed : 3.5 m/min to 5 m/min

  Travel speed : 5 m/min to 10 m/min

  Creep speeds : 10% of operating speeds for all motion through VVVFD

Permits and Inspection:

The contractor shall obtain and pay for necessary permits as required including license fees for installation and inspection of the same equipments, also make such tests as called for by the regulations of such authorized representatives of such authorities as well as in the present of the Owner's representative. The contractor shall be responsible to obtain license, certificate for operating at site.

ANNEX 2.5.1

SPECIFIED DESIGN DATA

Sl.No.	Description	Unit	Data
A	**CRANE**		
1.0	General		
1.1	Type of control proposed		Pendant
2.0	**Hoisting System**		
2.1	Rope		As per IS 2266, Rope grade 1770
a)	Rope construction		IS 2266 / 6 x 36 multi strand construction Fibre core.
b)	Rope quality (material)		Extra flexible plough steel
c)	Factor of safety		Not less than 5
2.2	Rope drum		Hoist drum length shall be such that each lead of wire rope has a minimum of two full turns on the drum when the hook is at its lowest position not taking into consideration turns covered by wire rope anchorage and one spare groove for each lead of wire rope on the drum when the hook is at its highest position.
a)	Drum material		Fabricated from carbon steel as per IS 2062, Grade B and stress relieved or seamless pipe as per ASTM A 106 Grade A or B.
b)	Whether stress relieved		Yes (if fabricated)
2.3	Bearing type		Antifriction ball or roller
2.4	Hook		
a)	Hook type		Swivel “C” type single shank of suitable grade of either circular or standard trapezoidal section, point hook suitably heat treated with adequate lifting capacity. Swivel lock pin shall be provided.
b)	Hook material		Forged steel
c)	Safety latches provided		Yes
d)	Hook suspension		Thrust Bearing
2.5	Sheave material		Fabricated from cast steel / steel plate IS 2062 Gr A or B / CS Gr 280-520 IS 1030
2.6	Hoist Brake		
a)	Type		DCEM “fail to safe”
b)	Torque		150% of rated torque or greater than the torque transmitted to the brake drum from the suspended load up-to the test load.
2.7	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
a)	Material of gears		EN 9 / 55C8

Sl.No.	Description	Unit	Data
b)	Material of pinions		EN 19 /EN 24
c)	Type of gears & pinions		Spur / helical
2.8	Limit Switch type		Rotary geared + gravity type
3.0	**Cross Travel**		
3.1	CT brake		
a)	Type		DCEM " fail to safe"
b)	Torque	Nm	150% of rated torque
3.2	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
a)	Material of gears		EN 9 / 55C8
b)	Material of pinion		EN 19 / EN 24
c)	Type of gears & pinion		Spur / Helical
3.3	Wheels		
a)	Materials		Forged steel
b)	Hardness	BHN	Not more than 200BHN
c)	Type		Single flanged
d)	Wheel bearing type		Antifriction Ball/Roller
3.4	Type of limit switches		Lever
4.0	**Long Travel**		
4.1	CT brake		
a)	Type		DCEM " fail to safe"
b)	Torque	Nm	150% of rated torque
4.2	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
a)	Material of gears		EN 9 / 55C8
b)	Material of pinion		EN 19 / EN 24
c)	Type of gears/pinion		Spur / Helical
4.3	Wheels		
a)	Materials		Overhead Crane – C55 Mn 75 for overhead crane & Steel used for wheel shall not contain more than 0.06% of Sulphur or Phosphorous. Under slung Crane – Forged steel
b)	Hardness	BHN	Overhead crane – 300 to 350 BHN for under slung crane – Not more than 200BHN
c)	Type		overhead crane – Double flanged under slung crane – Single flanged
d)	Wheel bearing type		Antifriction Ball/Roller
4.4	Type of limit switches		lever
5.0	Type of Buffer Stoppers		Rubber / spring
6.0	**Electrical**		
6.1	Power supply		Shrouded type down shop leads (copper) shall be provided to supply power to crane. Power supply to Crab shall be through flexible trailing

Sl.No.	Description	Unit	Data
			conductors.
6.2	Rating		S4, 40% CDF
6.3	Number of starts/hour		300starts /h for workshop crane and other crane shall be 150 starts / hr
B	**ELECTRIC HOIST**		
1	**General**		
1.1	Design according to standard service class/ load class		IS 3938 Class II
1.2	Location (Indoor/ Outdoor)		(Based on the location)
1.3	Type of control		Pendant
2	**Hoisting System**		
2.1	Wire Rope		
a)	Rope construction		IS 2266 / 6 x 36 multi strand construction Fibre core.
b)	Rope quality (material)		Extra flexible plough steel
c)	Factor of safety		Not less than 5
2.2	Rope drum		
a)	Drum material		Fabricated from carbon steel as per IS 2062, Grade B and stress relieved or seamless pipe as per ASTM A 106 Grade A or B.
b)	Whether stress relieved		Yes (if fabricated)
c)	Bearing type		Antifriction ball or roller
2.3	Hook		
a)	Hook type		Swivel “C” type single shank of suitable grade of either circular or standard trapezoidal section, point hook suitably heat treated with adequate lifting capacity. Swivel lock pin shall be provided.
b)	Hook material		Forged steel
c)	Safety latches provided		yes
d)	Hook suspension		Thrust Bearing
e)	sheave material		Fabricated from cast steel / steel plate IS 2062 Gr A or B / CS Gr 280-520 IS 1030
2.4	Hoist Brake		
a)	Type		DCEM “fail to safe”
b)	Torque	Nm	150% of rated torque or greater than the torque transmitted to the brake drum from the suspended load up-to the test load.
2.5	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
a)	Material of gears		EN 9 / 55C8
b)	Material of pinions		EN 19 /EN 24
c)	Type of gears & pinions		Spur / helical
2.6	Type of Limit Switch		Rotary geared + gravity type

Sl.No.	Description	Unit	Data
3	**Travel**		
3.1	**CT brake**		
a)	Type		DCEM " fail to safe"
b)	Torque	Nm	150% of rated torque
c)	Gear box		Fabricated Fe 410w IS:2062 Gr A/B & stress relieved
i)	Material of gears		EN 9 / 55C8
ii)	Material of pinion		EN 19 / EN 24
iii)	Type of gears & pinion		Spur / Helical
d)	**Wheels**		
i)	Materials		Forged steel
ii)	Hardness	BHN	Not more than 200BHN
iii)	Type		Single flanged
iv)	Wheel bearing type		Antifriction Ball / Roller
e)	Type of Limit switches		Lever
4	Rating		S4, 40% CDF
5	Number of starts/hour		150 starts / hr
C	**MANUAL HOIST**		
1	Standards		IS 3832 / Class-II
2	Application		(Based on location)
3	Trolley and hoist operation		Hand operated
4	Material of construction		
4.1	Trolley frame		Cast steel / Mild steel
4.2	Gears (Trolley)		Machine cut cast steel / Forged steel / C40 / C50
4.3	Lifting hook (Swivel)		Shank 'C'. Forged steel. Safety latch and swivel lock pin.
4.4	Gears		IS 3681/4460
5	Trolley wheel		Forged / cast steel / C40 with minimum 200BHN and single flanged to suit standard I beam section.
6	Brake		Screw and disc friction type

1166741/2022/BAP-QA_MECH

PROJECT: **MAHAGENCO BHUSAWAL** **(1 X 660 MW)** **(BHEL WO No: R4U8)** **MAIN CONTRACTOR:** **BHEL – RANIPET** **SUB CONTRACTOR & ADDRESS:** **(To be filled by VENDOR)**	**CONTRACT QUALITY REQUIREMENTS (CQR) for ELECTRICALLY OPERATED HOIST** **MAHAGENCO BHUSAWAL** **(1 X 660 MW)** **(BHEL WO No: R4U8)**	**DOC.NO:** **BAP:R4U8:** **Bhusawal: EOH: 001** **Rev NO.: 00** PAGE: Page 1 of 1 DATE : 24.11.2022	**##Enquiry No:** **##Supplier Name:** **##Offer reference:** **##Date:**

Sl. NO.	DESCRIPTION	BHEL/MAHAGENCO Requirements	##Specific confirmations by the vendor
		ITEM: ELECTRICALLY OPERATED HOISTS (EOH)	
01	**Quality plan Requirement**	Vendor shall confirm to meet the requirement of SQP ref no. SQP QP No. QP:E:810 Rev.06 dt 16.08.2014 (copy attached) and arrange to submit the SQP duly endorsed (signature and stamp) in all pages for accepting the QAP in totality in the event of Purchase Order.	
03	**Inspection Methodology**	BHEL/BHEL AIA Inspection as per this SQP is must before dispatch. No material shall be dispatched without BHEL/BHEL AIA inpection with required CHP/MDCC clearances.	
04	**For inspection call**	To raise inspection call by BHEL/BHEL AIA inspection including for type test witnessing, vendor is requested to contact Mr MS Aditya Chakravarthy., Manager (QCProc).,Mobile no: +919489202788., Email id: msachakravarthy@bhel.in and Mr.Zeeshan Ali., Dy. Mgrr (QC-Proc)., Mobile no: +91 9443149691 .,Email id: zeeshan@bhel.in for inspection related activities for immediate response / resolution.	
05	**Packing**	Required Packing & preservation shall also to be ensured as per requirements stipulated in Engg spec / drg / data sheet/PO condition to avoid any damage during transit., handling damages & storage at site.	
06	**Painting**	Paint color and coating thickness to be ensured as per requirements stipulated in Engg spec / drg / data sheet.	
07	**Document package**	Specific confirmation for Document Package in the event of an order (2 hard copies + 2 soft copies) is to be given containing the following with proper linkages (.) (i) Index Sheet (ii) QP (iii) TCs identified by BHEL for record for "CHP" and Verification portion as given in SQP. (iv) Final Inspection Report + all applicable Test Certificates (v) BHEL/BHEL authorized Inspection Agency report + TC (vi) Type test reports conducted/submitted with approval with approved data sheet and BOM with actual make used with Customer approved drgs. (vii) MAHAGENCO CHP/MDCC.	

##Supplier signature with seal

Necessarily to be filled up by the vendor at the time of offer itself otherwise their offer may not be considered w.r.t Quality Requirements being customer specific requirements.

Ranipet	QUALITY DEPARTMENT M/S BHEL RANIPET TAMIL NADU-632 406	STANDARD QUALITY PLAN									
		ITEM/SUB SYSTEM: STANDARD QUALITY PLAN ELECTRICALLY OPERATED HOIST						Doc. Ref. No	QP:E:810		
								Rev. No	06		
								Date	16 08 2014		
								Page No	Page 1 of 4		

Sl no 1	Component & operation 2	Characteristics 3	Class 4	Type of Check 5	Quantum of Check 6	Reference Documents 7	Acceptance Norms 8	Format Of Records 9	Agency 10		Remarks 11
									M	B	
1.0	**RAW MATERIAL**										
1.1	MS Plates for DRUM,Pulley, MS Beams and Channels	Chemical & Mech. Properties	Major	Lab analysis	Sample	Specn as per Drawing	Raw Material TC	P	V		
		NDE	Major	UT*	100%	SA 435	Lab TC	P	V		*For plate thickness > 40mm
1.2	Castings for Bearing, Plates, Rope guide etc	Chemical & Mech. Properties	Major	Lab analysis	Sample	Specn as per Drawing	Manufacturer's TC	P	V		
1.3	Forging for Wheel	Chemical & Physical properties	Major	Lab analysis	100%	Specn as per Drawing	Manufacturer's TC	P	V		
		NDE	Major	UT	100%	SA388/ASME Sec.VIII Div 2 Cl:3.3.4	Lab TC	P	V		
1.4	Forging for Shafts,axles and gears & pinions for Hoist.	Chemical & Mech. Properties	Major	Document Review	100%	Specn as per Drawing	Manufacturer's TC	P	V		
		NDE	Major	UT**	100%	SA388/ASME Sec.VIII Div 2 Cl:3.3.4	Lab TC	P	V		** For dia/Thickness>40 mm
1.4 .1	Gears & Pinions (After final machining/grinding)	NDE	Major	MPI/LPI*	Sample	ASTM E709/E 165 or equivalent. No crack/linear indication	Lab TC	P	V		

PREPPARED BY	REVIEWED BY	APPROVED BY
CH. ANIL SINGH Asst. Engineer Gr. I / QA BHEL/BAP/ RANIPET - 632 406	P. YASODAKRISHNA Engineer / Quality Control(Proc) BHEL/BAP/RANIPET-632 406	C. SRINIVASAN DGM Senior Manager / Quality BHEL/BAP/ RANIPET - 632 406

1166741/2022/BAP-QA_MECH

Ranipet	QUALITY DEPARTMENT M/S BHEL RANIPET TAMIL NADU-632 406	STANDARD QUALITY PLAN		
		ITEM/SUB SYSTEM: STANDARD QUALITY PLAN ELECTRICALLY OPERATED HOIST	Doc. Ref. No	QP:E:810
			Rev. No	06
			Date	16 08 2014
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Sl no 1	Component & operation 2	Characteristics 3	Class 4	Type of Check 5	Quantum of Check 6	Reference Documents 7	Acceptance Norms 8	Format Of Records 9	Agency 10		Remarks 11
									M	B	
1.4.2	Hook	Chemical & Mech. Properties	Major	Document Review	100%	IS-3815-1969 & IS 2004-1991	Lab TC	P	V		
		Soundness	Major	UT or RT, MPI@	100%	SA388/ASME Sec.VIII Div 2 Cl:3.3.4 or ASTM E466		P	V		@ No cracks are permitted
	BOUGHT OUT ITEMS										
1.5	Trailing Cables	IR capacity	Major	Document Review	100%	IS:9968-1988 Part-1/IS:4289/BHEL/NFR SPEC	Raw Material TC	P	V		
1.6	Wire rope	Size/Surface Condition & Visual	Major	Dimensions ,Destr. Test	10%	IS:2266-2002	Raw Material TC	P	V		
1.7	Motor	Make, type & Rating	Major	Review	100%	IS 325-1996 & BHEL Specification	TC	P	V		Motor TC/IR shall be reviewed by BHEL/BHEL TPI
		Routine test	Major	Electrical	100%	IS 325-1996 & BHEL Specification	MTC	V	V		
	Fasteners-Galvanized	Verification	Major	Visual	100%	IS:1367-2002		P	---		

PREPPARED BY	REVIEWED BY	APPROVED BY
	P. YASODAKRISHNA Engineer / Quality Control(Proc) BHEL/BAP/RANIPET-632 406	C. SRINIVASAN DGM/Senior Manager / Quality BHEL/BAP/ RANIPET - 632 406

Ranipet	QUALITY DEPARTMENT M/S BHEL RANIPET TAMIL NADU-632 406	STANDARD QUALITY PLAN								
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Sl no 1	Component & operation 2	Characteristics 3	Class 4	Type of Check 5	Quantum of Check 6	Reference Documents 7	Acceptance Norms 8	Format Of Records 9	Agency 10		Remarks 11
									M	B	
2.0	INPROCESS CONTROL										
2.1	Rope & drum assembly	Dimension	Minor	Measurement	100%	As per drawing		TC	P	V	
	Welding	Welder Qualification	Minor	Verification	100%	AWS.D1.1/WPS		WQR			
2.2	Gear Box Housing	Leak Test	Major	Kerosene Test	100%	Fill test-No leakage allowed		TC	P	V	
2.3	Wheel, Gears & Pinions	NDE		MPI	100%	As per BHEL Specification		TC	P	W	
2.4	Hook	Proof Load test	Major	Load test	100%	IS 3815		TC	P	W	
		Soundness after Load Test	Major	LPI	100%	ASTM E 165/No crack (linear indication to be ground)					
		Type	Minor	Verification	100%	BHEL Specification		TC	P	V	
3.0	FINAL INSPECTION										
3.1	Control Panel	Electrical	Major	IR + HV test,	100%	IS 8623 (LATEST)		TC	P	W	
				Functional	100%	As per BHEL Specification/ Appd DRG					
		Paint	Minor	Shade, DFT, adhesion	100%	As BHEL specification , No peel off for adhesion		TC	P	W	
		Enclosure	Minor	Degree of protection	--	As per BHEL specification		TC	P	W	

PREPPARED BY	REVIEWED BY	APPROVED BY
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Ranipet	QUALITY DEPARTMENT M/S BHEL RANIPET TAMIL NADU-632 406	STANDARD QUALITY PLAN		
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Sl no 1	Component & operation 2	Characteristics 3	Class 4	Type of Check 5	Quantum of Check 6	Reference Documents 7	Acceptance Norms 8	Format Of Records 9	Agency 10		Remarks 11
									M	B	
3.2	Performance with control panel	Hoist	Major	Load test, Over load test, Speed control, Dimensions,Lift & Travel*	100%	IS:3938		TC	P	W	*including electrical interlock functional test.
3.3	Verification of Single Phasing Effect (If applicable)	Electrical	Major	Single phasing test	100%	At the time of single phasing, protection has to stop the motor		TC	P	W	
3.4	Painting and packing and stability	Appearance	Major	Visual	100%	BHEL specification			P	--	

Records of revision:

Rev 00	15 08 96	Original Issue
Rev 01	05 02 98	Revised based on letter ref.no: BAP:QA:97:2815 DT 14 10 97 and general review.
Rev 02	19 11 98	Revised based on SIMADRI QP:SIMH:862/00 & based on feed back received from QC/Proc.
Rev 03	03 02 99	Revised based on sub vendors feed backs and general review.
Rev 04	10 09 11	Revised based on sub vendors feed backs and general review
Rev 05	06 10 11	Revised based on sub vendors feed backs and general review
Rev 06	16 08 14	Revised based on sub vendors feed backs and general review

Legend:P=Perform,W=witness,V=Verification,M=Manufacturer/sub supplier, B=BHEL/BHEL TPI ,TC=Test certificate, IR=Inspection Report

PREPPARED BY	REVIEWED BY	APPROVED BY
CH. ANIL SINGH Asst. Engineer Gr. I / QA BHEL/BAP/ RANIPET - 632 406	P. YASODAKRISHNA Engineer / Quality Control BHEL/BAP/RANIPET-632 406	C. SRINIVASAN DGM~~Senior Manager~~ / Quality BHEL/BAP/ RANIPET - 632 406 16/08/2014

***(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

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