Memorandum of Understanding

M/s BHEL
Trichy – 620 014

and

M/s. XXXXXXXXXXXXXXXXXX.
XXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXX
XXXXXXXXXX

(Vendor Code : XXXXX)

For supplying

Electrically Operated Handling Equipment

MOU NO : MOU / TPBHEL / HOIST- Rev.03
Date : 12-04-2018

Engineering **Quality** **Purchase** **Vendor**

Memorandum of Understanding (MOU) between BHEL / FB and M/s. xxxxxxxxxxxxxxx, for supplying Electrically operated Handling Equipments.

1.0 GENERAL:

1.1 This MOU is signed for supplying the Hoists as per the agreed standardized specification so that these details need not be discussed again and again for future supplies.

1.2 The various aspects covered in this MOU are as follows.

1.2.1 The general points are covered in Section – 1.0 – General.

1.2.2 The specification requirements are covered in Section – 2.0 – Specifications.

1.2.3 The documents to be submitted along with the offer / after placement of Order / along with the hoists are covered in Section 3.0.

1.2.4 The Inspection / Testing and Packing requirements are covered in Section – 4.0 Testing, Inspection and Packing.

1.2.5 The project specific details / data and if any customer specific requirements shall be covered in Section 5.0 – Project related Information. **DEVIATION ON PROJECT RELATED INFORMATION WILL LEAD TO REJECTION OF OFFER.**

1.2.6 **If any differences are found between the details given in Section 5.0 and other sections, Section 5.0 shall be considered as final and the vendors shall meet this requirement for that particular project.**

1.3 Sections 1.0, 2.0, 3.0 and 4.0 are standard and Section 5.0 alone will be furnished along with enquiry to the vendors for their acceptance.

1.4 **It is agreed that no deviations will be taken by the vendors while submitting their offers against future enquiries**.

1.5 Since the specifications are standardized and an understanding has been reached, the future enquiries will be floated on "SINGLE BID SYSTEM" only. Hence, if any offer is found with deviations, the same will be totally rejected and will not be considered for further evaluation.

1.6 Pre commissioning spares (if applicable) with price break up as per the list (vide Section 5.0) shall be supplied along with the hoists.

1.7 Two years recommended Spares list(vide Section 5.0) with price break up shall be enclosed.

1.8 If any special or non-standard tools are required for installation, operation or maintenance, the same shall be supplied along with the hoists.

1.9 Trouble-free operation of the equipment shall be guaranteed for a period of 18 months from the date of commissioning OR 24 months from the date of dispatch whichever is earlier.

1.10 Vendor has to provide Bank Guarantee for 10% order value (as per BHEL format) valid

for a period mentioned in point No.1.10.

1.11 Dispatch clearance will be issued along with PGMA with DU Nos. for the ordered items to vendor after the receipt of acceptable Inspection Report . Vendor agreed to mark the PGMA with DU Nos. in the casing of the packing and in the Packing Slip.

1.12 Materials shall be dispatched on "Door Delivery with or without Consignee Copy attached basis to avoid demurrage at transporter's go down".

1.13 Since the vendors works alone is approved by BHEL, it is agreed the vendor will manufacture this item in their own works only and will not off-load the jobs to any other suppliers without the written approval by BHEL.

1.14 All components of the hoists should be packed in such a way that it should not get damaged during transport.

1.15 BHEL and the Vendor shall have an involvement which will commence at bid stage and follow through the completion and acceptance, thus ensuring total conformity to Purchaser's requirements.

2.0 SPECIFICATIONS

2.1 Scope

This specification covers design, manufacture, inspection, testing and supply of electrically operated Under Hung Crane (UHC), Trolley With Hoist (TWH), and Down Shop Leads (DSL) . Technical parameters for equipment design are furnished in Section-1 to 4. For scope of supply and special requirements refer to Section-5.

This is a general specification dealing with technical requirements of various handling equipment as specified under scope. Contract requirements and special requirements (if any) for a particular project are specified in Section5.

2.2 Codes & Standards:

In addition to the following latest revisions of codes and standards, the equipment shall be designed to meet the other governing standards as applicable and also meet with the local standards where the equipment is installed.

IS 3938	...	Electric wire rope hoists.
IS 807	...	Design, Erection and testing (structural portion) of cranes and hoists code of practice.
IS 2758	...	Mild steel point hooks for use with wire rope thimbles.
IS 15560	…	Point hooks with shank upto 160 tonne -specification
IS 2266	...	Steel wire rope for general engineering purpose.
IS 2365	...	Specn for Steel Wire Suspension Ropes for Lifts, Elevators and Hoists
IS 3681	...	Gears-cylindrical gears-accuracies.
IS 325	...	Three-phase induction motors.
IS 1554 Part 1	...	Insulated cables for working voltage upto and including 1100V.
IS 4691	…	Degrees of protection provided by enclosures for rotating electrical machinery.
IS 2062	...	Hot rolled low, medium and high tensile structural steel.
IS 816	...	Code of practice for use of metal arc welding for general construction in mild steel.
IS 2074	...	Ready mixed paint air drying red oxide-zinc chrome, priming.
IS 2932	...	Enamel synthetic, exterior (a) under coating, (b) finishing.
IS 3177	...	Code of practice for electric over head traveling crane and gantry crane other than steel work cranes.
IS 13947 (Part I)	…	Specification for low-voltage switchgear & control gear
IS 1024	…	Code of practice for use of welding in bridges and structures subject to dynamic loading.

IS 1875	…	Carbon steel Billets, Blooms, Slabs and Bars for Forgings.
IS 1835	…	Specification for Round Steel wires for ropes..
IS 9968 (Part-1)	…	Elastomer insulated cables:part 1 for working voltages upto and including 1100V.
IS 5749	…	Specification for Forged Ramshorn Hooks.

2.3 Design & Constructional Requirements:

Construction of TWH, UHC and DSL shall be of consistent capacity, lift, head room, span, over hang and any other parameters as specified in Annexure- I of Section-5.

2.4 Electrically operated Under Hung Crane & Trolley With Hoist:

All equipments shall be designed for OUTDOOR application and suitable for ambient temperature range of 0 to 50ºC. Purchaser will provide electric power supply at one or more points near to the monorail / runways as required in the plant layout. Service class to be considered for design of trolley with hoist and under hung crane shall be as per class 2 of IS 3938 and IS 3177 / IS 807 respectively. All material used for construction of different components shall individually conform to applicable standard. All welds shall conform to IS 1024 and welders shall be qualified to AWS D1.1 / ASME Section IX.
Trolley with hoists and Under Hung Cranes shall be provided with protective hood and hard rubber sweepers.

2.4.1 Hooks:

2.4.1.1 Hooks shall meet the dimensional, material testing & inspection requirement of IS 15560.For hooks used for lifting loads above 40 tonnes it is preferable to use Ramshorn double hooks conforming IS 5749 -1970.

2.4.1.2 The hook shall be provided with standard depress type safety latch and swivel thrust bearings with hardened race.

2.4.1.3 Lugs for fixing safety latch shall be either forged along with the hook or clamp type latch with lugs shall be provided.

2.4.1.4 Welding of lugs not permitted.

2.4.1.5 Locking arrangement shall be provided to avoid unscrewing of the hook in service.

2.4.1.6 Material of hook shall conform to IS-1875 or equivalent (with minimum tensile strength 50-62 Kg/mm2.) and made by controlled grain forging and normalized.

2.4.1.7 Proof load tests for all the hooks shall be tested as per IS 15560 (i.e. for lifting capacity upto 32T, proof load shall be two times the lifting capacity. For lifting capacity 40T to 50T, proof load shall be 1.7 times the lifting capacity).
All hooks shall be examined by MPI / LPI & UT (UT required for hooks >5.0T capacity) for cracks after proof load test. When selection of hook is Ramshorn hook, proof test should be in compliance with IS 5749:1970.

2.4.1.8 The hook shall not distort or fracture. Ball & roller bearings shall not be used in these hooks. Anti-friction thrust bearings shall be used.

2.4.2 Wire Ropes:

Wire ropes shall meet the requirement of IS 2266 / IS 2365. Shall have six strands of 37/36 wires per strand with an ultimate tensile strength of 180 Kg/mm^2. The wire rope shall be galvanized, as per IS 1835 type B. All wire ropes shall be proof load tested for 2 times of SWL/Fall. Breaking load shall not be less than five times SWL/Fall. Indicating the breaking force of wire rope, test certificate provided by the wire rope manufacturer for breaking load test shall be furnished during inspection. The rope shall be of sufficient length to retain two full wraps on the drum at lowest hook position.

2.4.3 Drum & Sheave:

Drum shall be of welded steel or seamless steel and Sheave shall be of cast or welded steel. The drum shall accommodate all the length of rope required for the lift plus two dead wraps at each anchor point without overlap. Drum can be grooved right or left or both, and grooves shall suit the ropes used. Sheaves shall be equipped with sheave guards to retain the rope in groove.

2.4.4 Gears & Pinions:

Material of construction shall be conforming to relevant Indian Standard (IS:3681) / (BS 970) or equivalent and shall be hardened if required to achieve the specified hardness. Hardness for Cross Travel & Long Travel (CT & LT) shall be in the range of 250 to 290 BHN for pinions and 215 to 255 BHN for gears. Hardness for hoisting shall be in the range of 285 to 300 BHN for pinions & 250 to 265 BHN for gears. In case of case hardened gears and pinions, a max. hardness of 350 BHN for gears and 390 BHN for pinions is acceptable. However, vendor shall maintain and ensure that gear hardness is always less than pinion hardness by at least 35 BHN. Helical/Spur gears shall be used for hoists, CT & LT. All gears and pinions shall be examined by LPI/MPI for surface cracks after hardening. In case of enclosed gearing, means shall be provided for ample lubrication. Such lubrication points are to be indicated in the drawing. The vendor shall specify the specification of lubricant, market trade names, quantity of lubricant requirement and frequency of lubrication.

2.4.5 Wheels:

Shall be made out of forged or low carbon steel/cast steel with heat treated to 175 to 200 BHN hardness. The drive gears, if any, integral with the wheel shall be of the same material and hardness. Trolley wheels for hoists shall be spur geared type, cast / forged 4 wheeled out of which 2 wheels shall be driven by motor.

2.4.6 Rotating & Stationary shafts:

The material for shafts shall be as per relevant Indian standard or its equivalent and shall be hardened and tempered with a minimum tensile strength of 60 Kg/mm^2 and hardness shall be maximum 175 to 250 BHN. UT test shall be done

for all Shafts of diameter more than 50mm. UT acceptance norms shall be as per ASME section VIII; Division 2.

2.4.7 Bearings:

Shall be reputed make (FAG/SKF/TATA/NBC) and shall meet relevant IS standards. All bearings shall be designed to give a minimum service life of 20 years.

2.4.8 Brakes:

Hoisting, cross travel and long travel shall be provided with electro- mechanical friction shoe type brake or Disc type brakes or Electromagnetic disc type brake or Electro hydraulic thruster brake. The brakes shall be released with electric power and fail-safe in case of power failure. All brakes shall, irrespective of controller portion, be applied immediately on operating an emergency push button or switch. It shall be possible to arrest the load at any desired location with minimum slip. Slip with reference to speed shall be specified along with the offer.

2.4.9 Trolley:

Shall be of minimum 4 wheeled out of which 2 wheels should be spur geared type and fabricated construction. Trolley shall be designed to suit the monorail size (straight or curved monorail, Which Purchaser will furnish during drawing approval). The travel path of the trolley on monorail (straight / curved) shall be read from BHEL drawing furnished along with the enquiry.

2.4.9.1 For ID Fan and Economiser handling hoists, suitable integral platform shall be provided at hoist to access control panel / motor / trolley / brake etc.,

2.4.10 Frame:

The frame shall be designed to proper strength, built from steel plates with bolted/welded construction.

2.4.11 End Carriages: (For Cranes)

Shall be of minimum 4 wheeled out of which 2 wheels should be spur geared type and fabricated construction. Suitable wheelbase shall be provided. End carriages shall be designed to suit the runway beam size. (Which Purchaser will furnish during drawing approval.) End carriages shall be connected with crane girder by welding or by fasteners (For ease of transportation, if site welding is required, the same shall be done at site by Purchaser).

2.4.12 Crane Girders:

Crane girders shall be of rolled section. Fabricated beam and welded beam shall not be used for this purpose unless otherwise accepted/approved by the Purchaser for special cases. For such cases, refer annexure-I of Section-5 to this specification for details. Camber / deflection under load shall be within SPAN / 1000 mm. In case vendor desires to provide higher camber, the same shall be clearly specified in the drawing. In any case camber provided shall not exceed –

- In case of double girder crane:

(Span ÷1000mm) + (Deflection under self-load of trolley with hoist ÷2)

- In case of single girder crane:

(Span ÷1000mm) + Deflection under self-load of trolley with hoist

Allowable bend shall be 1mm/metre and maximum bend shall not exceed 6mm for total span.

2.4.12.1 Buffers shall be provided for stopping the crane.

2.4.12.2 Design of crane should ensure anti tilting and anti toppling while the hoist is at overhang side.

2.5 Down Shop Leads (DSL):

DSL system shall be designed to transfer the power supply from End user supply point to the equipment, which is moving on runway beams / monorails. The DSL system shall be of Cable trolley type or Taut wire loop type as per contract requirement specified in Section 5.

2.5.1 Cable Trolley Type:

Cable trolleys shall run on "Tee" track / I-Beam. The system shall consist of:

- ❖ "Tee" track
- ❖ Cable Trolleys
- ❖ Flexible power cable (Fixed & Trailing)
- ❖ Switch fuse units / Isolators
- ❖ Supports for Auxiliary girder or "Tee" track / I-Beam
- ❖ Link chain
- ❖ Fasteners

2.5.1.1 Construction:

2.5.1.1a "Tee:" Track / I-Beam:

The system shall be provided with rolled sections suitable for cable trolley wheels as per the relevant Indian Standard. The “Tee” track / I-Beam shall be designed with minimum deflection for smooth travel of cable trolleys.

2.5.1.1b Cable Trolleys:

4-wheeled cable trolleys shall be of sturdy design constructed with suitable material. Diameter of trolley wheels shall be minimum 40mm. and with double seal roller or ball bearing. The cable trolleys shall be designed to take the load of cable and moving with the cable load smoothly on auxiliary girder or "Tee" track. Suitable arrangement shall be provided to tie the power cable and link chain with cable

trolley. Vendor shall specify the construction of material selected in the offer. Arrangement drawing shall be submitted along with the offer for review. After placement of purchase order, the same shall be submitted for approval. Vendor shall indicate the weight of total cable trolleys in the drawing.

2.5.1.1c Flexible Power Cable: (Fixed & Trailing)

(For Cable trolley & Taut Wire Loop type)

The trailing cable shall be suitable for 415V AC; 3 phase with neutral; 50Hz.; copper PVC flexible cable, PVC 650/1100V grade, suitable size/rating (for all motors running simultaneously) for the equipment under supply. The power supply flexible trailing cable shall comply with latest revision of IS 694 and other relevant Indian standard for the equipment under supply. If any special requirement, respective IS Standard as mentioned in Section –5 of this specification shall be followed. For sub-vendor list refer clause no 2.12.5. Vendor shall indicate the weight of total system in the drawing.

2.5.1.1d Switch Fuse Units or Isolators: (For Cable trolley type & TW Loop type)

The system shall be supplied along with suitable switch fuse units / isolators to take the full load current, when the equipment trolley with hoist and under hung

crane) is working with maximum safe working load. For sub-vendor list refer clause no 2.12.6.

2.5.1.1e Supports:

The system shall be provided with suitable supports to take the load of “Tee” track / I-Beam, cable trolleys, power flexible trailing and other materials.

2.5.1.1f Link Chain:

The system shall be provided with suitable link chain to pull the trolleys, which is with the load of cable. During pulling of cable trolleys due to impact load, the chain shall not fail at any point. The chain shall be made out of minimum 3mm diameter carbon steel wire.

2.5.1.1g Fasteners:

Suitable fasteners shall be provided. Fasteners shall be electro - galvanized / Hot dipped.

2.5.2 Taut wire loop:

Ceramic reel insulator shall drag on stretched steel wire with trailing cable. The system shall consist of:

- Bracket
- End hook
- Flexible power cable (Fixed & Trailing)

- ❖ Switch fuse units/Isolators
- ❖ Reel insulator
- ❖ Steel wire rope
- ❖ Rope clamp & thimble
- ❖ Leather belt or nylon wire rope
- ❖ Fasteners.

2.5.2.1 Construction:

2.5.2.1a Bracket:

Suitable size and material shall be provided to take the load of cable and axial force by the end hook.

2.5.2.1b End hook:

Suitable end hook shall be provided for the size of steel wire rope.

2.5.2.1c Reel insulator:

Cable reel insulators shall be of ceramic, with suitable size of the stretch wire. Suitable arrangement shall be provided in the reel insulator to tie the trailing cable with nylon rope or leather belt.

2.5.2.1d Steel wire rope:

Steel wire rope shall be of minimum 6mm diameter as per latest revision of IS 2365. Steel wire rope shall be suitably sized for load of cable without sagging for the total travel length.

2.5.2.1e Rope clamp & thimble:

Suitable rope clamps and thimbles shall be provided to tie the rope with bracket through end hook.

2.5.2.1f Leather belt or nylon tie:

Leather belt or nylon tie shall be supplied to tie the trailing power cable with reel insulator.

2.5.2.1g Fasteners:

Suitable fasteners shall be provided wherever required. Fasteners shall be Electro-galvanized / hot dipped.

2.6 Electricals & controls:

2.6.1 CT, LT & Hoisting Motors (AC; Non-Flame Proof)

2.6.1.1 Site condition

2.6.1.1a	Altitude above sea level	: Less than 500m.
2.6.1.1b	Ambient temp. Condition	: 0 - 50°C
2.6.1.1c	Relative Humidity	:100%
2.6.1.1d	Atmosphere	: Dusty, salty, corrosive and highly polluted.
2.6.2	Standard (Latest revision)	: IS 325, IEC 60034, IS 3177
2.6.3	Application	: Trolley with hoist and Under Hung Crane
2.6.4	Duty cycle	: S3/S4; Duty factor: 40% CDF.
2.6.5	No of starts	: 150 starts/Hours
2.6.6	Pullout Torque	: 275 % of the full load torque
2.6.7	Rated voltage, frequency	: 415V, ±10%; 50 Hz±5% and combined 10% absolute
2.6.8	Minimum starting voltage	: 80% of the rated voltage (Cl. 2.6.5)
2.6.9	Capacity to restart (at Voltage Specified in cl.no 2.6.5)	No limitation on no. of starts. Calls for many starts at frequent intervals. Vendor to specify on any limitation
2.6.10	Direction of rotation	: Bi-directional
2.6.11	Class of insulation	: Class `F' temp. rise limited to class `B'

2.6.12 Winding treatment:

The insulation shall be given tropical and fungicidal treatment for successful operation of the motor in hot humid and tropical climate

2.6.13	Temperature rise	: With in specified limits. Vendor to specify.
2.6.14	Starting current	: Vendor to specify.
2.6.15	Method of motor starting	: DOL

2.6.16 Type of enclosure:

IP 55 as per IS 4691.

2.6.17 Terminal Box:

2.6.18.1	Type	: Weather proof IP 55
2.6.18.2	Cable gland	: Double compression type, Brass with nickel plated
2.6.18.3	Cable entry	: Suitable for both, top and bottom entry.
2.6.19	Type of terminals	: Stud type with plain washers, spring/ washers check nuts & Lugs.
2.6.20	Fault level	: 50 KA at 415V.

2.6.21 Terminals:

Separately terminated with clear identification in main terminal box with double compression type glands.

2.6.22 Lifting device : Eye bolt or lugs to facilitate safe lifting.

2.7 Controls & Interlocks:

The control system shall envisage a control cabinet and a push button operating station. The push button control shall have control for power switching to the motors and forward/reverse motion. The control voltage of both cabinet and push button station shall be 110V AC 50 HZ. single phase. The control stations shall have enclosure protection of IP 55 (IS:13947). Necessary electrical interlocks shall be included in control cabinet for fail-safe operation. Vendor shall clearly bring out all the interlocks in the control wiring drawing and submit the same for approval. Limit switches shall be provided for long and cross travel hoists. These switches shall be interlocked to cut off power to the motor and restrict further movement when the limits are crossed. Crimping tool shall be used for fitting lugs.

2.8 Control Cabinet:

2.8.1 Application:
To house all the power contactors, control transformers, control relays, fuses, indicating lamps, switches and protection circuits of all motors of hoist.

2.8.2 Type:
Wall mounting type. Normally mounted on a framework of the hoist. The cabinet shall be made of minimum 1.6mm thick cold rolled sheet.

2.8.3 Motor Protection:
All motor shall be protected against under voltage, over load and short circuit condition.

2.8.4 Isolator :
Input power to the cabinet through switch fuse unit is required.

2.8.5 Thermal over load relays : Shall be provided suitably for all motions.

2.8.6 Indicating Lamps : Shall be provided wherever required.

2.8.7 Terminal Blocks:
Shall be of Clip on type. Shall be suitable for 1.5mm^2 copper conductor. 20% of additional terminal blocks shall be supplied as spares along with the supply.

2.8.8 Customer Supply voltage : 415V 50 Hz. 3 phase

2.8.9 Control voltage : 110V 50 Hz.

2.8.10 Enclosure Protection: (For Control Cabinet & Pendant Station)

IP 55 as per IS 13947(part I).

2.8.11 Glands:
Shall be double compression type, Brass with nickel plated. To be included in vendor scope as per requirement.

2.8.12 Internal Wiring:

1. PVC 1100V Grade 1.5 mm^2 multi-strand /copper conductor.
2. All power wiring with red and black.
3. All control wiring is to be with grey wire & shall be marked with ferules as per wiring diagram.

2.9 Control Box:

2.9.1 Type:
Pendant station to house all start/stop/forward/reverse/up & down push button for all motors.

2.9.2 Location : Hanging from equipment. Push button pendant station shall be provided at above one meter from operating floor.

2.9.3 Push Button:
For all start green push button and for stop red push button shall be used. Make shall be of Siemens / L&T / GE / Telemechanic / BCH/Technic/ Control & Switchgear (C&S) . Push button shall return to "off" position when released. One stop push button shall be lockable to enable switch off power supply when equipment in not in use.

2.9.4 Control Voltage: 110 V AC 50 Hz. Single phase.

2.9.5 Enclosure Protection:
IP 55 as per IS 13947 Part I.

Box material:

Cold rolled sheet steel with 1.6mm thickness minimum.

2.10 Cabling:
Vendor shall include all the power and control cables necessary for the system. The cable shall comply with IS 1554. The power cable shall be of copper PVC flexible and vendor shall indicate the conductor size and over all size in the offer for all the motors. The control cable shall be armoured of 1.5 mm^2 copper conductor only. The no. of cores, cable size etc shall be indicated in the offer. There shall be 20% spare cores available for all control cables offered. If any special requirement, respective IS Standard as mentioned in Section –5 of this specification shall be followed.

2.11 Earthing :
All electrical equipments (motor, control cabinet etc.,) shall be provided with required elements (like bolt, washer, nut etc.,) for proper earthing at site.

2.12 Electrical & Control Items shall be as per the approved Sub-Vendor/Make List given below.

2.12.1 Control &Thermal Over Load Relays: Siemens/BCH/L&T/GE/ Telemechanic/ C&S

2.12.2 Transformers :SE / Kappa / Ind Coil /JE/ Vikas / Logicstat

2.12.3	Motors	: NGEF/Kirloskar/Siemens/Crompton-Greaves / Bharat Bijlee/Autolec/GEC/Alstom
2.12.4	Limit Switches	:BCH / Omron / Nucon / Festo / Siemens / Kaycee / EMM / SOC
2.12.5	Power & Control Cable	:CMI Ltd. / Delton Cables / Fixwell / Pushincords /Asian cables/Cable corporation of India / Finolex /Incab/Universal/Polycab/KEI
2.12.6	Isolator / Switch Fuse Units	: Siemens / L&T / GE / C&S
2.12.7	Power Switches	: Siemens / L&T / GE / C&S

2.14 Name Plates:

2.13.1 Nameplates shall be provided with non-corrosive material

2.13.2 Name plates shall have details of the equipment, model no., type, capacity, lift, span, and motor & brake details.

2.13.3 All lubrication points shall be provided with nameplates.

2.15 Limit switches and Electrical Protective devices

Limit switches and Electrical protective devices are to be supplied as per IS:3938 - 1983

3.0 DOCUMENTS TO BE SUBMITTED

3.1 Along with Offer.

3.1.1 Quality plan, General arrangement & DSL arrangement / Schematic drawing showing the critical dimensions with complete bill of materials. All dispatchable components / assemblies shall be indicated in detail. Sub-vendor items' make also shall be indicated in the drawing.

3.1.2 Wiring circuit diagram with details of make, type and rating of all components.

3.1.3 Spares list if required for 3 years of trouble free operation along with price. Commissioning / Initial spares shall form part of the base offer.

3.1.4 Duly filled-in and signed General Data Sheet (Section 5) for trolley with hoist, under hung crane and down shop lead system with all required details.

3.1.5 Write up on special features if any.

3.1.6 Technical specification for equipment.

3.1.7 Catalogues and other details of the product shall be submitted along with the offer.

3.1.8 Exclusion:

Any exclusion from scope of supply shall be clearly spelt out in the offer itself. Exclusion of major / critical items shall make the offer liable for rejection.

3.2. After Placement of Order.

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3.2.1 Quality plan shall be submitted by vendor for Purchaser's approval.

3.2.2 Dimensional drawings of Under Hung Crane, Trolley With Hoist, Down Shop Leads, cable trolley, control panel and wiring diagram with B O M for approval.

3.2.3 Data sheet (Section –5) for hoists and cranes for Purchaser / End user's approval.

3.2.4 The following calculations/details shall be furnished.

3.2.4.1 Hoist motor and Travel motor power calculations.

3.2.4.2 Brake Torque calculations and Brake selection for each hoist.

3.2.4.3 Main Hoist rope and wire rope selection.

3.2.4.4 Cross travel and Long travel wheel load and wheel diameter calculations/details.

3.2.5 Priced List of Recommended Spares for 2 years trouble free operation and maintenance. (if applicable)

3.2.6 After final approval 3 copies of above drawings shall be submitted.

3.2.7. Vendor to fill and submit motor data sheet Annexure –IV.

3.3 Along with the Hoists:

3.3.1 Physical, Chemical, NDE and hardness test certificates shall be provided wherever applicable for trolley / crane wheels, wire ropes, pulleys, hook, gears, pinions, and shafts.

3.3.2 Test certificates for having carried out the tests as per Section-4 of this specification under Purchaser and End user's presence.

3.3.3 Test reports for wire rope and hooks.

3.3.4 Test reports for NDT examination of gears, wheels, pinions and hooks.

3.3.5 Type test and routine test certificates for motors and as per IS 325.

3.3.6 Performance test certificates for UHC, TWH, safety devices and other electrical items.

3.3.7 TC for control panel, pendent stations and motors shall be provided.

3.3.8 The vendor check list shall be filled up at the manufacturer's work and shall be duly signed by inspection engineer and manufacturer's representative.

3.3.9 Drawing & O&M Manuals:

3.3.9.1. The bill of material shown in the drawing shall match with that of the dispatchable unit as indicated in the packing slip.

3.3.9.2 The drawing shall be prepared in AUTOCAD and vendor shall forward both hard copies (6 copies each) and CD (Copied with drawing files) to the Purchaser.

3.3.9.3 O & M Manuals:

3.3.9.4 6 sets of operation and maintenance manuals shall be provided with details for storage, installation, erection procedures, drawings, motor data sheet, relay characteristics, operating and troubleshooting, lubrication schedule, spares data, spares identification drawings, spares replacement procedure and special requirements if any. All copies are to be sent to BHEL / Tiruchirappalli.

3.3.9.5 3 sets of CDs for the above manual.

3.3.9.6 The hard copies of the Manuals should be in printed form only.

3.3.9.7 The size of manuals should be in correct A4 size with drawings in A3 size. Large size drawings (greater than A3 size) should be reduced in A3 size and inserted.

3.3.9.8 Drawings shall be of printed or laser printed form only.

3.3.9.9 O & M manuals, (hard copies and CD) shall be submitted to BHEL / Tiruchirappalli prior to dispatch of the equipment.

3.3.9.10 Manual, generally should contain the following:

3.3.9.10a Data sheet with makes of components supplied.

3.3.9.10b Maintenance (including, storage, installation, Erection and lubrication wherever necessary) and service

3.3.9.10c Recommended spares for 2 years trouble free service.

3.3.9.10d Trouble shooting

3.3.9.10e Assembly drawings with part list, dimensional drawings & other applicable drawings.

3.3.9.10f Manuals should pertain only to the types or model supplied for the particular contract. Copies are to be sent to BHEL / Tiruchirappalli only.

4.0 TESTING, INSPECTION AND PACKING

4.1 Purchaser's and End user's representative shall have access to the works of vendor at all reasonable times for the purpose of witnessing the purchased equipment being tested.

4.2. All electrical and mechanical equipment like motor, ropes, cables, electrical control panel etc. shall be tested as per the relevant IS standard at the vendor's / Sub-vendor's works.

4.3. The Trolley with hoist shall be run 5 times at manufactures works. First and 5th runs shall be tested with 125% safe working load. Second, third and fourth run with safe working load shall be conducted without any pause. The motor currents shall be checked and shall be with in the rated full load current of each motor at safe working load. The hoist shall be capable of lifting load from mid-air and moving the load without any problem. Normal speed shall be achieved during full load tests. Headroom variation shall be checked & allowable variation is 50mm only. Hook approach shall be checked as per approved drawing. (Ref. Standard : cl.20.2 of IS 3938)

4.4. The brakes for hoisting, long travel and cross travel shall be tested with 125% safe working load. The brakes shall be capable of holding this load, when the load is suspended by the hoist hook. As per IS 3177, the long travel motion should be tested at manufacturer's works on no load keeping the crane on sleepers or test

bench. Maximum slip (braking path) shall be as per approved data sheet / drawing for hoisting and cross travel motions.

4.5 Test shall be conducted for effectiveness of automatic devices for hoist to limit the upward/downward & travel of hoist and to limit the forward & reverse travel of crane. The limit switch shall be checked at vendor's works. Others shall be checked at site by Purchaser / End user and if found defective, the same shall be replaced at free of cost by vendor.

4.6 Before the hoist is put into operation, over load relays (electrical) shall be tested for lift & cross travel and sustain 125% safe working load. Long travel with 125% SWL shall be tested at site by Purchaser / End user and if found defective, the same shall be replaced at free of cost by vendor.

4.7 Trolley with hoist and under hung crane gears shall be tested with & without load for alignments, smooth and trouble-free operation.

4.8 Equipment shall be tested for hoisting and cross travel with 125% SWL.

4.9 Hoisting, and cross travel speed shall be tested and shall ensure the tolerance with in 10%. Hoisting and CT shall be tested for minimum 1.0 to 2.0m. (for hoisting-height & for cross travel-length). Long travel speed shall be tested at site. Vendor shall be responsible for meeting for full lift and lower limit switch operation at site. Any failure at site to meet the above requirement shall be resolved by the vendor at site at his cost.

4.10 Long travel shall be tested at site with and without safe working load by Purchaser / End User and if found defective, the same shall be replaced at free of cost by vendor.

4.11 Load test for TWH and UHC shall be carried out after installation at site under the supervision of the vendor's representative, to the satisfaction of the Purchaser / End user. Vendor should depute their Engineer for a period of 10 days per boiler free of cost.

4.12 All welding shall be tested with LPI / MPI. All butt welds shall be tested with radiography. Acceptance norms for radiography shall be as per AWS D1.1. /ASME Sec IX.

4.13 Hooks:

4.13.1 Raw material test certificate shall be submitted by manufacturer for scrutiny.

4.13.2 Proof load test should be done as per IS 15560 on each hook irrespective of capacity. When selection of hook is Ramshorn hook, proof test should be in compliance with IS 5749:1970.

4.13.3 After proof load test, hook shall be examined for cracks, deformation, flaws and other defects with LPI / MPI & UT. No linear indications or cracks are acceptable

while carrying-out LPI / MPI. Acceptance norm for UT shall be as per A388/ ASME - Section VIII - Division 2- AM203.2 / ASTM E446.

4.14 Under Hung Crane:

4.14.1 Check the dimensions of the under hung crane as per relevant standard.

4.14.2 Deflection Test: Under hung crane shall be tested for deflection with safe working load at the middle point of the span. Datum line for deflection is obtained by placing hoist at one extreme of the span with hook approach. The deflection with Safe Working Load at centre of span compared with this datum should be less than= $\frac{SPAN}{1000} mm$.

4.15 Down Shop Lead System (DSL):

4.15.1 Cable trolley shall be tested for smooth running on "Tee" track with cable load.

4.15.2 Cable reel insulator shall be tested for smooth running on steel wire rope with cable load.

4.15.3 Any discrepancy found in the design and/or supply shall be resolved by Vendor at the installation (site) at Vendor's Cost.

4.16 Electrical components:

4.16.1 The insulation values of all electrical equipments should be checked. Reading shall be not less than 1.0 MΩ with an unregulated type tester with DC voltage not less than twice the rated voltage.

4.16.2 Control panel shall be verified for make, model no. and location of all relays & components as per the approved drawing.

4.16.3 Functional test shall be conducted for power and control circuits.

4.16.4 Test for high voltage and measurement of insulation resistance shall be conducted.

4.16.5 Degree of protection test report shall be submitted. (Type test report)

4.16.6 The satisfactory operation of each controller, switch, contactor relay, other control devices, the connectors of all circuits and protective devices shall be tested under the most unfavourable conditions.

4.16.7 TC for control panel, pendant stations and motors shall be provided.

4.18 Painting, Protection, Packing, Supply and Identification:

4.18.1 Surface Preparation:

Weld slag & spatter shall be removed and the surfaces to be coated shall be free from contamination. Surface defects shall be removed by suitable methods. Sharp edges shall be smoothened by grinding. Prior to surface preparation oil, grease, drilling emulsions, cutting emulsions and preservative agents shall be carefully removed by suitable solvents. The surface shall be carefully dried with clean cloths to prevent the dissolved impurities from spreading over the entire surface. The

surface shall be cleaned by wire brush and shot blasting if required. Proper adhesiveness of paint to the surface shall be ensured.

4.18.2 Painting:

Normal painting schedule is as detailed below. For special requirement if any, refer Annexure-IV of Section-5 to this specification.

4.18.3 **Control cabinet:**

Exterior: Grey; Interior: Brilliant white - glossy finish with enamel paint. For special painting if any, refer Section 5 to this specification. Paint thickness: Exterior - 120 microns; Interior - 80 microns minimum
Alternatively, control panel shall be of powder coated but both outside and inside will be of grey in colour.

4.18.4 Two coat of red oxide with minimum 40 microns DFT as per IS 2074 and two coats of synthetic enamel paint with minimum 40 microns DFT as per IS 2932.
Colour Scheme:

Under hung crane	: Golden Yellow
Trolley with hoist	: Golden Yellow
Interlock mechanism	: Ash Grey
DSL Components	: Ash Grey
Hook	: Black

4.18.5 All the despatchable units shall be packed in a wooden case with waterproof material.
4.18.6 The material shall be dispatched with clear bill of material for each system.
4.18.7 Each and every despatchable item shall be identified with item number. Purchase Order reference number and tagged properly for easy identification.
4.18.8 Two sets of as-built arrangement drawings and electrical circuit drawings shall be sent along with the consignment.

5.0 PROJECT RELATED INFORMATIONS

Project Name : MAITREE SUPER THERMAL POWER PROJECT 2 X 660 MW (1725-1726)

Enquiry No. / P.O.No. :

Sl.No.	Description	Specification	Vendor Confirmation Yes / No
5.1	Hoist, Crane & DSL Parameter	Refer Annexure-I	
5.2	Painting schedule & Special requirements		
5.3	Power & Control cable code	As per ISO standard	
5.3.1	Power supply	415V, AC, 3PH, 50HZ	
5.3.2	Control supply	110V, AC , 50 HZ	
5.4	Commissioning Spares	Vendor to specify	
5.5	2 Years recommended spares	Vendor to specify	
5.6	Data Sheet	(Annexure-III) Vendor to fill and submit	
5.7	G.A. Drawings (for hoists, cranes, DSL, Wiring diagram, pendant etc.)	Vendor to submit	
5.8	Motor Data Sheet	(Annexure –IV) Vendor to fill and submit	
5.9	Type of Motor	Squirrel cage induction	
5.10	Refer clause 2.2 for Codes & Standards:	Codes & standards shall be as per International standard.	

		No Indian Standard Specification and Indian Standard materials shall be used for this contract except for following: IS 2062; IS 1363; IS 1364; IS 1366; IS 1367; IS 2269; IS 15629; IS 6688; IS 549; IS 2016; IS 2393; IS 3063; IS 5370; IS 6689	

Note: 1. Deviation in the above requirements shall reject the offer.
2. If required, please add more sheets.

Project : MAITREE STPP 2X660MW **Annexure - I to specification MOU / TPBHEL / HOIST-REV.03**
Cust No.:1725-1726
Enq. / P.O.No.:

Trolley with Hoist - Electrically Operated										
Sl. No.	Appln.	Ref Drg No	Drg Item no	Cap. in T.	Lift in m.	Hd. room in mm.	Monorail			Qty / Blr. in nos.
							Type	Size	Bottom Elev. In MM	
01	PA/FD Fan Rotor	1-99-100-40893/00	03	05.00	9.25	Supplier to furnish	Weld Beam	700x300-20/16	10368	2
02	PA/FD Fan Motor	1-99-100-40893/00	01	20.00	6.00		Weld Beam	700x300-40/16	7700	2
03	ID Fan Rotor	1-99-100-40894/00	01	20.00	13.50		Weld Beam	900x400-25/20	15300	1
04	ID Fan Motor	1-99-100-40894/00	03	40.00	11.60		Weld Beam	900x400-50/25	13988	1
05	APH Elements	1-99-400-40896/03	01	2.00	24.30		Weld Beam	600x250-20/12	25568	1
06	SCAPH handling	1-99-400-40895/02	01	2.50	12.60		Weld Beam	600x250-16/12	13468	1
07	CW Pump**	0-99-300-40373/00	01	12.00	06.50		Lug mounted hoists with Chain Pulley Blocks			2

Note :

The lift shown in the table is approximate only ; depending upon head room of the hoist it may be altered.

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.

** -(Lug mounted hoists with Chain Pulley Blocks) Two hoists are to be interconnected by a single control panel for tandem operation. Vendor shall include fixed power supply cable from power supply point to the equipment. Length - 15.00m and Switch Fuse Unit. 3 Number of lugs designed to support the loaded hoist & suitable for welding at site to be supplied .(2 Lugs for electric hoist & 1 Lug for manual chain hoist.)

Prepared and Checked:

Approved:

Annexure-III to MOU / TPBHEL / HOIST

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

The following data sheet/check list is to be filled by the vendor and submitted . This data sheet shall form part of ordering specification and shall be approved by Purchaser on acceptance of the offer. All columns are to be filled up. "Non-applicability" shall be specified. Separate *Data sheet/check list for each type of crane and TWH offered shall be submitted*

Technical Data Sheet / Check list for Electrically Operated Under Hung Crane (UHC) & Trolley With Hoist (TWH)

Ref no	Description	Spec clause no	As per spec	As quoted
Gen.1.0	**Codes & Standards**	2.2		
Gen.1.1	Electric wire rope hoists….	2.1	IS 3938	
Gen.1.2	Code of practice.cranes and hoists	2.2	IS 807	
Gen.1.3	Mild steel point hooks…	2.3	IS 2758	
Gen.1.4	Point hooks with shanks upto 160t	2.4	IS 15560	
Gen.1.5	Steel wire rope…	2.5	IS 2266	
Gen.1.6	General plan-spur & helical gears	2.6	IS 3681	
Gen.1.7	Three phase induction motor	2.7	IS 325	
Gen.1.8	PVC insulator cables…	2.8	IS 694	
Gen.1.9	Degrees of protection-elec. M/c..	2.9	IS 4691	
Gen.1.10	Weldable structural steel	2.10	IS 2062	
Gen.1.11	Code of practice.metal arc welding..	2.11	IS 816	
Gen.1.12	Ready mixed paint…	2.12	IS 2074	
Gen.1.13	Enamel synthetic ..coat/finish…	2.13	IS 2932	
Gen.1.14	Code of practice .. Electrical..crane	2.14	IS 3177	
Gen.1.15	Spec for..switch gear & control gear	2.15	IS 13947-Part1	
Gen.1.16	Code of practice .. For welding…	2.16	IS 1024	
Gen.1.17	Carbon steel forging ….	2.17	IS 2004	
Gen.1.18	Round steel wire for ropes	2.18	IS 1835	
Gen.1.19	Elastomer insulated cables….	2.19	IS 9968-Part-1	
CR1.0	**Under hung crane-UHC**			
CR1.1	Capacity - in tons	Annexure-I		
CR1.2	Span - in m.	Annexure-I		
CR1.3	Overhang on either side - in mm.	Annexure-I		
CR1.4	Operating floor - in m.	Annexure-I		
CR1.5	Service class of crane/hoist	2.4	Class 2	
CR1.6	All welding	2.4	IS 1024	
CR1.7	Welder qualification	2.4	AWS D1.1/ASME section IX	
CR2.0	**Wheels-UHC**	2.4.5		
CR2.1	Wheel shape to match with runway beam	2.4.5	Vendor to confirm	
CR2.2	Wheel material	2.4.5	Forged/cast steel	
CR2.3	Wheel diameter - in mm.	2.4.5	Vendor to specify	
CR2.4	Wheel base - in mm.	2.4.5	Vendor to specify	
CR2.5	BHN	2.4.5	200 BHN Max.	
CR3.0	**Crane girder-UHC**	2.4.12		
CR3.1	Section	2.4.12	Rolled section	

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
CR3.2	Size	2.4.12	Vendor to specify	
CR3.3	Material	2.4.12	Vendor to specify	
CR3.4	Camber / Deflection	2.4.12	Span/1000mm	
CR3.5	Allowable bend	2.4.12	1mm/m	
CR3.6	Maximum bend	2.4.12	6mm	
CR3.7	Provision of buffers	2.4.12.1	Vendor to specify	
CR3.8	Provision of anti tilt / topple arrangement	2.4.12.2	Vendor to specify	
CR4.0	**Wheel bearing-UHC**	2.4.7		
CR4.1	Type	2.4.7	Vendor to specify	
CR4.2	Size	2.4.7	Vendor to specify	
CR4.3	Make	2.4.7	FAG/SKF/Tata/NBC	
CR5.0	**Crane speed-UHC**			
CR5.1	Maximum speed in m/min.		Vendor to specify	
CR5.2	Minimum speed in m/min		Vendor to specify	
CR6.0	**Weight of the crane - in Kgs.**		Vendor to specify	
CR7.0	**Dimensions of crane**	Vendor drawing	Vendor to specify	
CR8.0	**Limit switch-UHC-LT&CT**	2.12.4		
CR8.1	Type	2.12.4	Heavy duty	
CR8.2	Make	2.12.4	BCH/Omron/Nucon/ Festo/ Siemens/ Kaycee/ EMM/ SOC	
CR8.3	Rating	2.12.4	Vendor to specify	
CR9.0	**Crane Motors-UHC-LT**	2.6.0	Conform to IS 325	
CR9.1	Motor Rating		Vendor to specify	
CR9.2	Motor Type		Vendor to specify	
CR9.3	Motor Make		Vendor to specify	
CR9.4	Duty factor	2.6.4	40% CDF	
CR9.5	Duty cycle	2.6.4	Continuous/S3/S4	
CR9.6	Enclosure	2.6.14	IP 55	
CR9.7	Power supply (equipment)		415 VAC; 50Hz	
CR9.8	Quantity		Vendor to specify	
	Crane Motors-UHC-CT	2.6.0	Conform to IS 325	
CR9.9	Motor Rating		Vendor to specify	
CR9.10	Motor Type		Vendor to specify	
CR9.11	Motor Make		Vendor to specify	
CR9.12	Duty factor	2.6.4	40% CDF	
CR9.13	Duty cycle	2.6.4	Continuous/S3/S4	
CR9.14	Enclosure	2.6.14	IP 55	
CR9.15	Power supply (equipment)		415 VAC; 50Hz	
CR9.16	Quantity		Vendor to specify	

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
CR10.0	**End stopper-UHC**			
CR10.1	Provided		Vendor to specify	
CR10.2	Type		Vendor to specify	
CR11.0	Clearance between Runway beam bottom & Crane girder top - in mm.		Vendor to specify	
HO1.0	**Trolley With Hoist(TWH)**			
HO1.1	Capacity - in tons	Annexure-I		
HO1.2	Lift - in m.	Annexure-I		
HO1.3	Headroom - in mm.	Annexure-I		
HO1.4	Approximate Hoist dimension	Vendor drawing	Vendor to specify	
HO1.5	Operating floor - in m.	BHEL drawing	Vendor to confirm	
HO1.6	Approximate weight - in Kgs.		Vendor to specify	
HO1.7	Service class of crane/hoist	2.4	Class 2	
HO1.8	All welding	2.4	IS 1024	
HO1.9	Welder qualification	2.4	AWS D1.1/ASME section IX	
HO2.0	**Hoist speed-TWH**			
HO2.1	Maximum speed - in m/min		Vendor to specify	
HO2.2	Minimum speed - in m/min		Vendor to specify	
HO3.0	**Cross travel speed-TWH**			
HO3.1	Maximum speed - in m/min		Vendor to specify	
HO3.2	Minimum speed - in m/min		Vendor to specify	
HO4.0	**Trolley -TWH**	2.4.9		
HO4.1	Type	4 - wheeled-Min	Vendor to specify	
HO4.2	Design to suit monorail size		Vendor to confirm	
HO5.0	**Trolley wheels-TWH**	2.4.5		
HO5.1	Type	3.1.5	Spur geared	
HO5.2	Wheel diameter - in mm.	3.1.5	Vendor to specify	
HO5.3	Material of construction	3.1.5	Cast / forged steel	
HO5.4	Hardness	3.1.5	200 BHN Max.	
HO5.5	Quantity	3.1.5	Vendor to specify	
HO6.0	**Wire rope-TWH**	2.4.2		
HO6.1	Code	2.4.2	IS 2266 / IS 2365	
HO6.2	Rope construction	2.4.2	6 strands of 37/36	
HO6.3	Rope diameter - in mm.	2.4.2	Vendor to specify	
HO6.4	Number of falls	2.4.2	Vendor to specify	
HO6.5	Ultimate tensile strength	2.4.2	Vendor to specify	
HO6.6	Whether wire rope has sufficient extra length to retain two full wraps on the drum	Yes / No	Vendor to confirm	
HO6.7	Rope material	2.4.2	Galvanised	
HO6.8	Core material	2.4.2	Vendor to specify	

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
HO6.9	Breaking load	2.4.2	5 times SWL	
HO7.0	**Rope drum-TWH**	2.4.3		
HO7.1	Diameter - in mm.	2.4.3	Vendor to specify	
HO7.2	Material of construction	2.4.3	Cast / weld steel	
HO7.3	Construction	2.4.3	Seamless/fabricated	
HO8.0	**Hook-TWH**	2.4.1		
HO8.1	Code	2.4.1.1	IS 15560	
HO8.2	Material (Forged)	2.4.1.6	IS 2004-35C8	
HO8.3	Minimum tensile strength	2.4.1.6	50-62 kg/mm ²	
HO8.4	Capacity - in tons	2.4.1	Vendor to specify	
HO8.5	Safety latch provided in the hook	2.4.1.2	Vendor to confirm	
HO8.6	Bearing in the swivel hook	2.4.1.2	Thrust bearing	
HO8.7	Locking arrangement of hook	2.4.1.5	Forged lug/clamp latch	
HO8.8	Examination	2.4.1.7	MPI / LPI	
HO8.9	Hooks > 5 ton capacity	2.4.1.7	UT	
HO8.10	Proof load test as per	2.4.1.7	IS 15560	
HO9.0	**Bearing for Cross Travel-TWH**	2.4.7		
HO9.1	Type	2.4.7	Vendor to specify	
HO9.2	Size	2.4.7	Vendor to specify	
HO9.3	Make	2.4.7	FAG/SKF/Tata/NBC	
HO10.0	**Bearing for Hoist-TWH**	3.1.7		
HO10.1	Type	3.1.7	Vendor to specify	
HO10.2	Size	3.1.7	Vendor to specify	
HO10.3	Make	3.1.7	FAG/SKF/Tata/NBC	
HO11.0	**Hoist Motors - TWH**	2.6.0	Conform to IS 325	
HO11.1	Motor Rating		Vendor to specify	
HO11.2	motor Type		Vendor to specify	
HO11.3	Motor Make		Vendor to specify	
HO11.4	Duty factor	2.6.4	40% CDF	
HO11.5	Duty cycle	2.6.4	Continuous/S3/S4	
HO11.6	Enclosure	2.6.14	IP 55	
HO11.7	Power supply (equipment)		415 VAC; 50Hz	
HO11.8	Quantity			
HO12.0	**Cross travel motor-TWH**	2.6.0	Conform to IS 325	
HO12.1	Motor Rating		Vendor to specify	
HO12.2	motor Type		Vendor to specify	
HO12.3	Motor Make		Vendor to specify	
HO12.4	Duty factor	2.6.4	40% CDF	
HO12.5	Duty cycle	2.6.4	Continuous/S3/S4	
HO12.6	Enclosure	2.6.14	IP 55	
HO12.7	Power supply (equipment)		415 VAC; 50Hz	
HO12.8	Quantity			

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
HO13.0	**Limit switch-Hoist**	2.12.4		
HO13.1	Type	2.12.4	Heavy duty	
HO13.2	Make	2.12.4	BCH/Omron/Nucon/ Festo/ Siemens/ Kaycee/ EMM/ SOC	
HO13.3	Rating	2.12.4	Vendor to specify	
HO14.0	**Limit switch for CT-TWH**	2.12.4		
HO14.1	Type	2.12.4	Heavy duty	
HO14.2	Make	2.12.4	BCH/Omron/Nucon/ Festo/ Siemens/ Kaycee/ EMM/ SOC	
HO14.3	Rating	2.12.4	Vendor to specify	
HO15	Approach platform at hoist for panel, motor & brake		Vendor to confirm	
DSL.1.0	**DSL system for Long Travel**	2.5		
DSL.1.1	Travel length - Wire / Cable trolley	Annexure-I		
DSL.1.2	Type	Cable trolley/Taut wire loop		
DSL.1.3	Cable length - Fixed cable		Vendor to specify	
DSL.1.4	Cable length - Tailing cable		Vendor to specify	
DSL.1.5	Cable size & rating		Vendor to specify	
DSL.1.6	***Cable tolley type***	2.5.1		
DSL.1.6.1	Type of trolley	2.5.1.1.b	4 - wheeled type	
DSL.1.6.2	Material of construction	2.5.1.1.b	Vendor to specify	
DSL.1.6.3	Diameter of trolley wheel	2.5.1.1.b	Min. dia 40 mm	
DSL.1.6.4	Type of Bearing used		Double seal roller/ball	
DSL.1.6.5	Make of bearing used		FAG/SKF/Tata/NBC	
DSL.1.6.6	Trolley track	2.5.1.1.a	Tee track/I-Beam	
DSL.1.6.7	Loop size	2.5.1.1.b	Vendor to specify	
DSL.1.6.8	Link chain size / diameter	2.5.1.1.b	Vendor to specify	
DSL.1.6.9	Pitch between two cable trolleys	2.5.1.1.b	Vendor to specify	
DSL.1.6.10	Supply of Earthing conductor	2.5.1.1.b	Vendor to confirm	
DSL.1.6.11	Provision of suitable supports	2.5.1.1.b	Vendor to confirm	
DSL.1.6.12	Arrangement drawing with the offer	2.5.1.1.b	Vendor to confirm	
DSL.1.7	***Taut wire loop type***	2.5.2		
DSL.1.7.1	Bracket size	2.5.2.1a	Vendor to specify	
DSL.1.7.2	Bracket material	2.5.2.1a	Vendor to specify	
DSL.1.7.3	Provision of end hook	2.5.2.1b	Vendor to confirm	
DSL.1.7.4	Reel insulator	2.5.2.1c	Ceramic	
DSL.1.7.5	Tieing arrangement	2.5.2.1c	Nylon rope/leather belt	
DSL.1.7.6	Steel wire rope	2.5.2.1d	IS 2266/Mini 6mm dia	
DSL.2.0	**DSL system for Cross Travel**	2.5		
DSL.2.1	Travel length - Wire / Cable trolley	Annexure-I		

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
DSL.2.2	Type	e trolley/Taut wire loop		
DSL.2.3	Cable length - Fixed cable			
DSL.2.4	Cable length - Tailing cable			
DSL.2.5	Cable size & rating			

DSL.2.6	***Cable tolley type***	2.5.1		
DSL.2.6.1	Type of trolley	2.5.1.1.b	4 - wheeled type	
DSL.2.6.2	Material of construction	2.5.1.1.b	Vendor to specify	
DSL.2.6.3	Diameter of trolley wheel	2.5.1.1.b	Mini dia 40 mm	
DSL.2.6.4	Type of Bearing used		Double seal roller/ball	
DSL.2.6.5	Make of bearing used		FAG/SKF/Tata/NBC	
DSL.2.6.6	Trolley track	2.5.1.1.a	Tee track/Auxiliary girder	
DSL.2.6.7	Loop size	2.5.1.1.b	Vendor to specify	
DSL.2.6.8	Link chain size / diameter	2.5.1.1.b	Vendor to specify	
DSL.2.6.9	Pitch between two cable trolleys	2.5.1.1.b	Vendor to specify	
DSL.2.6.10	Supply of Earthing conductor	2.5.1.1.b	Vendor to confirm	
DSL.2.6.11	Provision of suitable supports	2.5.1.1.b	Vendor to confirm	
DSL.2.6.12	Arrangement drawing with the offer	2.5.1.1.b	Vendor to confirm	
DSL.2.7	***Taut wire loop type***	2.5.2		
DSL.2.7.1	Bracket size	2.5.2.1a	Vendor to specify	
DSL.2.7.2	Bracket material	2.5.2.1a	Vendor to specify	
DSL.2.7.3	Provision of end hook	2.5.2.1b	Vendor to confirm	
DSL.2.7.4	Reel insulator	2.5.2.1c	Ceramic	
DSL.2.7.5	Tieing arrangement	2.5.2.1c	Nylon rope/leather belt	
DSL.2.7.6	Steel wire rope	2.5.2.1d	IS 2266/Mini 6mm dia	
COM.0.0	**Common to UHC & TWH**			
COM.I.1	**Brakes**	2.4.8		
COM.I.2	Type	2.4.8	ElectroMech friction shoe type/ Disc type/ Electromagnetic disc type/ Electro hydraulic thruster brake	
COM.I.3	Shoe Material	2.4.8	Vendor to specify	
COM.I.4	Make	2.4.8	Vendor to specify	
COM.I.5	Slip to speed	2.4.8	Vendor to specify	
COM.2.0	**Shaft**	2.4.6		
COM.2.1	Material	2.4.6	Vendor to specify	
COM.2.2	Hardness	2.4.6	175-250 BHN	
COM.2.3	Tensile strength		60 kg/mm ²	
COM.2.4	UT test	Dia>50 mm	ASMEVIII/Div 2	
COM.3.0	**Gears / Pinions**	2.4.4		
COM.3.1	Material	2.4.4	IS 3681/ BS 970	
COM.3.2	Hardness-Pinion (LT&CT)	2.4.4	250 BHN min.	
COM.3.3	Hardness-gears (LT&CT)	2.4.4	215 BHN min.	
COM.3.4	Hardness-Pinion (hoist)	2.4.4	285-300 BHN	

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
COM.3.5	Hardness-gears (hoist)	2.4.4	250 -265BHN	
COM.3.6	BHN difference - gear < pinion	2.4.4	35 BHN Min.	
COM.3.7	Type (for LT & CT)	2.4.4	Spur/Helical	
COM.3.8	Type (for hoist)	2.4.4	Spur/Helical	
COM.3.9	Lubricant details	2.4.4	Vendor to specify	
COM.3.10	Trade name	2.4.4	Vendor to specify	
COM.3.11	Quantity/Peiodicity	2.4.4	Vendor to specify	
COM.3.12	LPI/MPT tests	2.4.4	Vendor to specify	
COM.4.0	**Fasteners**	2.5.2.1g		
COM.4.1	Grade	2.5.2.1g	Precision/high tensile	
COM.4.2	Galvanising	2.5.2.1g	As per IS	
COM.4.3	Special bolts/fasteners	2.5.2.1g	Details in drawing	
COM.5.0	**Controls/Interlocks-UHC&TWH**	2.7.0		
COM.5.1	Type of control cabinet	2.7.0	Wall mounting	
COM.5.2	Location of control cabinet	2.7.0	Vendor to specify	
COM.5.3	Control power supply	2.7.0	110VAC/50Hz	
COM.5.4	Control cabinet & Pendent enclosure	2.7.0	IP 55 as per IS13947	
	Push Button	2.9.3	Siemens/ L&T/ GE/ Telemechanic/ BCH/ Technic	
COM.5.5	Control wiring diagram	2.7.0	To be enclosed	
COM.5.6	Relays	2.12.1	Siemens/BCH/L&T/ GE/Telemechanic	
COM.5.7	Tranformers	2.12.2	SE/Kappa/Ind coil/ JE/ Vikas/ Logicstat	
COM.5.8	Motors	2.12.3	NGEF/Kirloskar / Siemens/Crompton greaves/ Bharat Bijlee/ Autolec/ GEC/ Alstom	
COM.5.9	Limit switches	2.12.4	BCH/Omron/Nucon/ Festo/ Siemens/ Kaycee/ EMM/ SOC	
COM.5.10	Power & control cable	2.12.5	CMI Ltd/Delton cables/ Fixwell/ Pushincords/ Asian cablews/ Cable corporation of India/ Finolex/ Incab/Universal/ PolycabCCI	
COM.5.11	Cabling	2.10		
COM.5.12	Code	2.10	IS 694 / IS 9968	
COM.5.13	Power cable	2.10	Copper PVC flexible / Elastomer insulated flexible	
COM.5.14	Power cable - conductor size	2.10	Vendor to specify	
COM.5.15	Control cable	2.10	Armoured	

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
COM.5.16	Control cable - conductor size	2.10	Vendor to specify	
COM.5.17	Provision of spare cores	2.10	20 % spare cores	
COM.5.18	Internal wiring	2.10	Vendor to confirm	
COM.5.19	Painting	2.10	Vendor to confirm	
COM.6.0	**Painting**	4.18	Annexure II	
COM.6.1	Vendor's Compliance of painting		Vendor to confirm	
COM.6.2	Colour scheme		Vendor to confirm	
COM.6.3	Vendor's Compliance of colour scheme		Vendor to confirm	
COM.7.0	**Packing**	4.0		
COM.7.1	Vendor's Compliance of packing		Vendor to confirm	
COM.8.0	**Inspection & Testing**	4.0		
COM.8.1	Vendor's Compliance of above		Vendor to confirm	
COM.9.0	Load test at site /vendor supervision	5.9.2	Vendor to confirm	
COM.10.0	**Drawings**	3.3.9		
COM.10.1	Drawings shall be made in AUTOCAD	3.3.9	Vendor to confirm	
COM.10.2	Drg BOM to match with packing slip	3.3.9	Vendor to confirm	
COM.10.3	Drawing CD to be submitted	3.3.9	Vendor to confirm	
COM.11.0	**Guarantee**	9.0	18 / 24 months	
DATA SHEET - AC MOTORS (Non-Flame proof)				
Attach separate data sheet for each motor under supply				
MO.1	Application			
MO.2	Manufacturer			
MO.3	Type, frame size & degree of protection			
MO.4	Rated output in Kw & rated speed			
MO.5	Full load current			
MO.6	Full load efficiency & power factor			
MO.6.1	Duty cycle			
MO.7	Rated torque			
MO.7.1	Starting current			
MO.8	Starting torque in % of full load torque			
MO.9	Pull up torque in % of full load torque			
MO.10	Pull out torque in % of full load torque			
MO.11	No load starting time			
MO.12	Stator winding connection			
MO.13	Type & no. of terminals brought out			
MO.14	Resistance / phase			
MO.15	Qty. & power consumption of space heaters			

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
MO.16	Gland size for space heaters			
MO.17	Cable entry			
MO.18	Cable gland - Double compression			
MO.19	GD^2 of motor			
MO.20	Total weight of motor			
MO.21	Anticipated bearing life			
MO.22	Method of connection to driven equipment			
Drawings/Documents to be furnished along with the offer				
D.1.0	Drawings/documents	6.1.0	3 sets of each items	
D.1.1	GA / Assy. of Cranes	3.1.1	Vendor drawing number	
D.1.2	GA / Assy of Hoists	3.1.1	Vendor drawing number	
D.1.3	GA / Assy for DSL system	3.1.1	Vendor drawing number	
D.1.4	Electrical Wiring / Circuit diagram	3.1.2	Vendor drawing number	
D.1.5	Technical specification of system	3.1.6	Vendor to specify	
D.1.6	Exclusion list	3.1.8	Vendor to specify	
Drawings/Documents to be furnished after award of contract				
(Vendor to confirm the submission of the following documents)				
D.2.0	Drawings/documents	3.2		
D.2.1	Quality plan for Purchaser's approval	3.2.1		
D.2.2.0	Dimensional drawing with BOM for:	3.2.2	Purchaser's approval	
D.2.2.1	Under hung crane		Purchaser's approval	
D.2.2.2	Trolley with Hoist		Purchaser's approval	
D.2.2.3	Down shop leads		Purchaser's approval	
D.2.2.4	Cable trolley		Purchaser's approval	
D.2.2.5	Control panel		Purchaser's approval	
D.2.2.6	Wiring diagram		Purchaser's approval	
D.2.3	Data sheet for cranes & hoists		Purchaser's approval	
D.2.4	Calculation for the following:	3.2.4		
D.2.4.1	Hoist & Travel motor power	3.2.4.1	Purchaser's review	
D.2.4.2	Brake torque for each drive	3.2.4.2	Purchaser's review	
D.2.4.3	Brake selection for each drive	3.2.4.2	Purchaser's review	
D.2.4.4	Main hoist rope selection	3.2.4.3	Purchaser's review	
D.2.4.5	CT/LT wheel load details	3.2.4.4	Purchaser's review	
D.2.4.6	CT/LT wheel load dia selection	3.2.4.4	Purchaser's review	
D.2.5	Details of gear box		Purchaser's review	
D.2.6	Details of Hooks		Purchaser's review	
D.2.7	Details of couplings		Purchaser's review	
D.2.8	Performance certificate		Purchaser's record	
D.2.9	O&M manual to contain the following:	3.3.9.3		
D.2.9.1	Storage details	3.3.9.4	Vendor to confirm	
	Installation procedure	3.3.9.4	Vendor to confirm	
	Erection procedure	3.3.9.4	Vendor to confirm	

Vendor Name :
Signature :
Date :

Project :
Enquiry No.:
P.O.No. Date:

Description of the item:

Ref no	Description	Spec clause no	As per spec	As quoted
	Drawings	3.3.9.4	Vendor to confirm	
	Lubrication schedule	3.3.9.4	Vendor to confirm	
	Spares list	3.3.9.4	Vendor to confirm	
	Motor data sheet	3.3.9.4	Vendor to confirm	
	Operation & trouble shooting	3.3.9.4	Vendor to confirm	
	No of copies	3.3.9.4	26 copies	
	CDs copied with drawings	3.3.9.5	Vendor to confirm	
Test certificates to furnished along with the supply				
(Vendor to confirm the submission of the following documents)				
TC.1.0	**Test certificates**	3.3		
TC.1.1	Physical/Chemical,NDE,Hardness	3.3.1	Vendor to confirm	
TC.1.1.1	Trolley wheel	3.3.1	Vendor to confirm	
TC.1.1.2	Crane wheel	3.3.1	Vendor to confirm	
TC.1.1.3	Wire rope	3.3.1	Vendor to confirm	
TC.1.1.4	Pulley	3.3.1	Vendor to confirm	
TC.1.1.5	Hooks	3.3.1	Vendor to confirm	
TC.1.1.6	Gears & Pinions	3.3.1	Vendor to confirm	
TC.1.1.7	Shafts	3.3.1	Vendor to confirm	
TC.1.2	TWHoist load test	4.3	Vendor to confirm	
TC.1.3	Brake test for LT/CT/Hoist	4.4	Vendor to confirm	
TC.1.4	Testing of torque/limit switch	4.5	Vendor to confirm	
TC.1.5	Over load relay test	4.6	Vendor to confirm	
TC.1.6	Alignment test	4.7	Vendor to confirm	
TC.1.7	Crane load test	4.11	Vendor to confirm	
TC.1.8	Hook type & load test	4.13.2	Vendor to confirm	
TC.1.9	Deflection test for crane	4.14.2	Vendor to confirm	
TC.1.10	Cross travel movement test	4.9	Vendor to confirm	
TC.1.11	Dimensional checks		As per approved QP	
TC.1.12	Wire rope load test	4.2	Vendor to confirm	
TC.1.13	NDT as per Quality plan & Specification		Vendor to confirm	
TC.1.14	Material test certificates		Vendor to confirm	
TC.1.15	Insulator test on electrical circuit	4.16.1	Vendor to confirm	
TC.1.16	Functional test/power&control circuit	4.16.3	Vendor to confirm	
TC.1.17	High volt test on electrical circuit	4.16.4	Vendor to confirm	
TC.1.18	Motor routine, type & weather protection TCs.	4.16.5	Vendor to confirm	
TC.1.19	Control panel & Pendent I R, HV & physical inspection record and weather protection TC.	4.16.7	Vendor to confirm	

Vendor Name :
Signature :
Date :

Annexure – IV Hoist Motor Data Sheet

MOTOR DATASHEET		
PROJECT	2X660MW MAITRRE SUPER THERMAL POWER PROJECT	
PO REFERENCE		
SNO	**DESCRIPTION**	**VALUE**
A.	**GENERAL**	
1.	Manufacturer & Country of origin.	
2.	Equipment driven by motor	
3.	Motor type	
4.	Quantity	
B.	**DESIGN AND PERFORMANCE DATA**	
1.	Frame size	
2.	Type of duty	
3.	Type of enclosure /Method of cooling/ Degree of	
4.	Applicable standard to which motor generally	
5.	Efficiency class	
6.	Type of mounting	
7.	Direction of rotation as viewed from DE END	
8.	Standard continuous rating at 40 deg. C. ambient temp. as per Indian Standard (KW)	
9.	Derated rating for specified normal condition i.e. 50 deg. C ambient temperature (KW)	
10.	Maximum continuous load demand of driven	
11.	Rated Voltage (volts)	
12.	Permissible variation of :	
	a. Voltage (Volts)	
	b. Frequency (Hz)	
	c. Combined voltage and frequency	
13.	Rated speed at rated voltage and frequency(RPM)	
14.	At rated Voltage and frequency:	

Vendor's Name
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with date

	a. Full load current	
	b. No load current	
15.	Power Factor at	
	a. 100% load	
	b. No load	
	c. Starting.	
16.	Efficiency at rated voltage and frequency,	
	a.100% load	
	b. 75% load	
	c. 50% load	
17.	Starting current (amps) at	
	a. 100 % voltage	
	b. 85% voltage	
	c. 80% voltage	
18.	Minimum permissible starting Voltage (Volts)	
19.	Starting time with minimum permissible voltage	
	a. Without driven equipment coupled	
	b. With driven equipment coupled	
20.	Safe stall time with 100% and 110% of rated voltage	
	a. From hot condition	
	b. From cold condition	
21.	Torques :	
	a. Starting torque at min. permissible voltage(kg-mtr.)	
	b. Pull up torque at rated voltage.	
	c. Pull out torque	
	d. Min accelerating torque (kg.m) available at lowest permissible starting voltage	
	e. Rated torque (kg.m)	
22.	Stator winding resistance per phase (ohms at 20 Deg.C.)	

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with date

23.	GD^2 value of motors	
24.	No of permissible successive starts when motor is in hot condition	
25.	Locked Rotor KVA Input	
26.	Locked Rotor KVA/KW	
27.	Vibration limit :Velocity (mm/s)	
28.	Noise level limit (dBA)	
C.	**CONSTRUCTIONAL FEATURES**	
1.	Stator winding insulation	
	a. Class & Type	
	b. Winding Insulation Process	
	c. Tropicalized	Yes
	d. Temperature rise over specified maximum ambient temperature of 50 deg. C	
	e. Method of temperature measurement	
	f. Stator winding connection	
2.	Main Terminal Box	
	a. Type	
	b. Location(viewed from NDE side)	
	c. Entry of cables(bottom/side)	
	d. Recommended cable size(To be matched with cable size envisaged)	
	e. Fault level (MVA),Fault level duration(sec)	
	f. Cable glands & lugs details (shall be suitable for power cable)	
3.	Type of DE/NDE Bearing	
4.	Motor Paint shade	
5.	Weight of	
	a. Motor stator (KG)	
	b. Motor Rotor (KG)	
	c. Total weight (KG)	
D.	**List of accessories.**	
1.	Grounding pads	
	i) No and size on motor body	

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	ii) Nos on terminal Box	
2.	Any other fitments	
E.	**List of curves.**	
1.	Torque speed characteristic of the motor	
2.	Thermal withstand characteristic	
3.	Starting. current Vs. Time	
4.	Starting. current Vs speed	
5.	P.F. and Efficiency. Vs Load	

Vendor's Name
Signature & Seal
with date

5.0 PROJECT RELATED INFORMATIONS

Project Name : MAITREE SUPER THERMAL POWER PROJECT 2 X 660 MW (1725-1726)

Enquiry No. / P.O.No. :

Sl.No.	Description	Specification	Vendor Confirmation Yes / No
5.1	Hoist, Crane & DSL Parameter	Refer Annexure-I	
5.2	Painting schedule	As per BHEL specification	
5.3	Power & Control cable code	As per ISO standard	
5.3.1	Power supply	415V, AC, 3PH, 50HZ	
5.3.2	Control supply	110V, AC , 50 HZ	
5.4	Commissioning Spares	Vendor to specify	
5.5	2 Years recommended spares	Vendor to specify	
5.6	Data Sheet	(Annexure-III) Vendor to submit	
5.7	G.A.Drawings (for hoists, cranes, DSL, Wiring diagram, pendant etc.)	Vendor to submit	
5.8	Special contract requirement for codes & standards Refer clause 2.2 & Annexure III for Codes & Standards:	Codes & standards shall be as per International standard. No Indian Standard Specification and Indian Standard materials shall be used for this contract except for following: ASME SAIS2062; IS 1363; IS 1364; IS 1366; IS 1367; IS 2269; IS 15629; IS 6688; IS 549; IS 2016; IS 2393; IS 3063; IS 5370; IS 6689 Vendor to specify in annexure III international standards, which they are following.	
5.9	Special Contract requirement	Refer B0.6.17.10 (Page B0-138 to B0-139). Hoist speed shall be 1.5-4.0 MPM instead of 6.0MPM.	
5.10	Motor Data Sheet	(Annexure-IV) Vendor to fill and submit after PO	
5.11	Type of motor	3Phase -Squirrel Cage	

Note: 1. Deviation in the above requirements shall reject the offer.
2. If required, please add more sheets.

The crane and crab running wheels shall be made of cast or forged steel and shall have double flanges. The wheels should have rolling bearings lubricated for life.

For cranes used for the removal and installation of pump rotors in vertical pumps (e.g. cooling water pumps), it is important to ensure that there is no lateral drift of the hook during lifting and lowering.

All cranes shall be equipped with pendant control units. The pendant control units shall be suspended on the bridge so that they can travel along it independently of the crab.

All pendant control panels shall be fitted with rocker-type or push-button switches for the crane functions. A key switch and an emergency stop switch shall also be provided on each panel. Additional switches or push buttons shall be provided as required.

The crane and crab drives are to be designed as two-corner drives with electric gear motors. 2 (two) motors are to be provided for the crane drives. The crab drives may consist of one motor and universal joint shaft.

All travelling and traversing drives are to incorporate pole-reversible squirrel-cage gear motors with sliding armature and brake.

The lifting gear may consist of standard electric hoists with sliding armature motor and cone brake or disc brake.

The precision speed control shall be provided for all crane and lifting gears.

Speeds for cranes shall be as below:-

- For TG hall crane-
  - Main hoist - 1.6 m/min (creep speed 0.16 m/min thro VFD)
  - Aux hoist - 7.5 m/min (creep speed 0.75 m/min thro VFD)
  - CT - 15 m/min (creep speed 1.5 m/min thro VFD)
  - LT - 30 m/min (creep speed 3.0 m/min thro VFD)
- For other cranes-
  - Main hoist - 3 m/min
  - CT - 10 m/min
  - LT - 10 m/min.

B0.6.17.10 Hoists

~~Hoists shall be provided throughout the entire installation where machines or other components provided under this contract are to be installed, removed, repaired, serviced or transported and these parts are not in the working area of a crane (refer also to the individual technical subsections of this specification).~~

~~The final number of hoists to be supplied will be proposed by the Contractor, according to the requirements of the equipment. The Contractor has to include in his offer the number of hoists for the whole Plant. Any necessary change of hoists must not lead to any price change of the contract price.~~

The hoists used shall be standard production hoists.

The hoists shall be designed and calculated in accordance to applicable standards.

The nominal carrying capacity of the hoists and of their attachment points shall be such that the heaviest object to be lifted can be transported with safety.

For electric hoist, trolley travel speed and hoist speed shall be 15 m/min and ~~6 m/min~~ respectively.

Manual hoists shall take the form of chain tackle blocks with load and drive chains. The crabs shall be fitted with a drive also operated by a chain. The runways shall be designed according to approved standards.

Electrically driven hoists and crabs shall be equipped with squirrel-cage motors. An inching control shall be provided on all electrically driven hoists and crabs.

The crab power supplies shall be in the form of sheet-steel-enclosed safety power tracks, which can be easily bent to follow the form of the hoist runways.

Electrical switchgear and control gear shall be mounted directly on the hoists in cabinets.

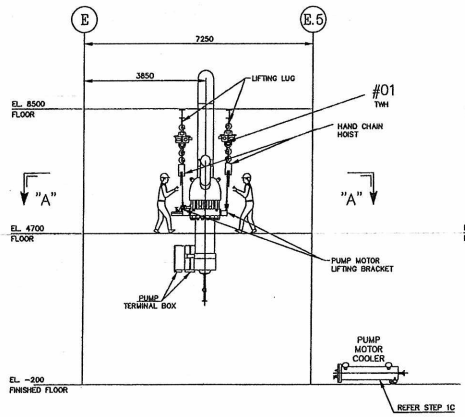
The electric hoists shall be operated by pendant control units fitted with pushbutton or rocker-type switches, which shall be fixed to the hoists in such a way that safe operation is guaranteed.

The control panels shall be equipped also with a key-operated switch and a mushroom-shaped emergency "off" switch.

Limit switches shall be fitted to all lifting and travel gear.

The electrically operated hoists shall be installed in a permanent location.

~~Where hoists are not easily accessible by simple means such as ladders or mobile scaffolds, maintenance platforms with means of access shall be provided.~~



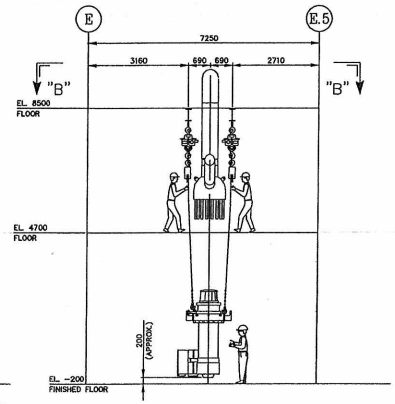
ELEVATION VIEW – STEP #1

(LOOKING SOUTH)

(1A). DISCONNECT POWER SUPPLY AND STARTER BEFORE COMMENCING ANY WORK ON MOTOR.

(1B). DISCONNECT ALL THERMOCOUPLE AND DIAL THERMOMETER TO MOTOR.

(1C). REMOVE PUMP MOTOR COOLER AND ALL PIPING ASSOCIATED WITH IT TO PREVENT DAMAGE TO IT AND TO MAKE CLEARANCE FOR REMOVAL OF MOTOR.



ELEVATION VIEW – STEP #2

(LOOKING SOUTH)

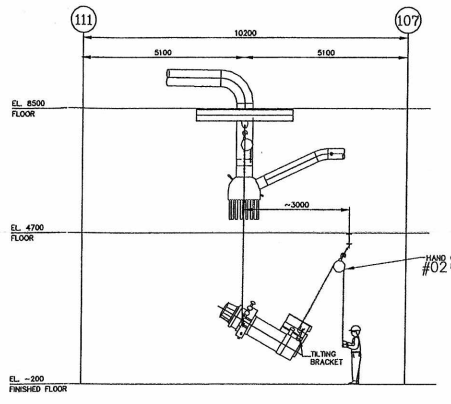
(2A). ATTACH 2 (TWO) SCREW PIN ANCHOR SHACKLES TO THE LIFTING BRACKETS ON THE MOTOR BODY TO ALLOW ATTACHMENT OF THE HOIST HOOKS.

(2B). ATTACH 2 (TWO) HAND CHAIN HOISTS TO THE LIFTING LUGS AND SHACKLES ON LIFTING BRACKETS ON MOTOR BODY.

(2C). MAKE HOIST AND CHAIN SLING TAUT, SO THAT THERE IS NO SLACK IN THEM. THEN REMOVE NUTS FROM PUMP CASE AND MOTOR BODY BOLTS.

(2D). BEGIN TO LOWER THE PUMP MOTOR BODY BY THE CHAIN HOISTS SIMULTANEOUSLY AND VERY SLOWLY AS TO AVOID DAMAGING THE BOLT THREADS AND THE PUMP IMPELLER.

(2E). AFTER THE PUMP IMPELLER HAS CLEARED THE PUMP CASE VOLUTE, CONTINUE TO LOWER THE MOTOR BODY STRAIGHT DOWN TO GRADE, STOPPING ~200MM ABOVE GRADE AS TO AVOID DAMAGING MOTOR TERMINAL BOXES.

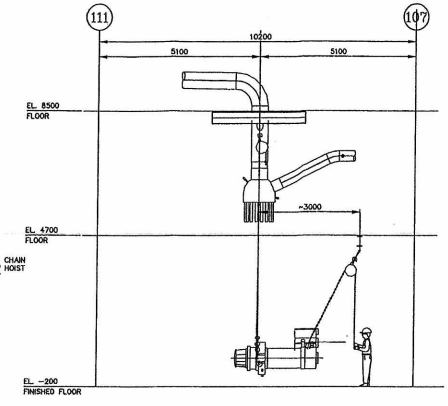


ELEVATION VIEW – STEP #3

(LOOKING WEST)

(3A). ATTACH 2 (TWO) SCREW PIN ANCHOR SHACKLES TO TILTING BRACKET TO ALLOW ATTACHMENT OF THE HOIST HOOK.

(3B). CONTINUE TO LOWER THE MOTOR ASSEMBLY DOWN VERY SLOWLY, WHILE SIMULTANEOUSLY LIFTING THE LOWER PORTION, BY MEANS OF THE TILTING BRACKET TO A HORIZONTAL POSITION.

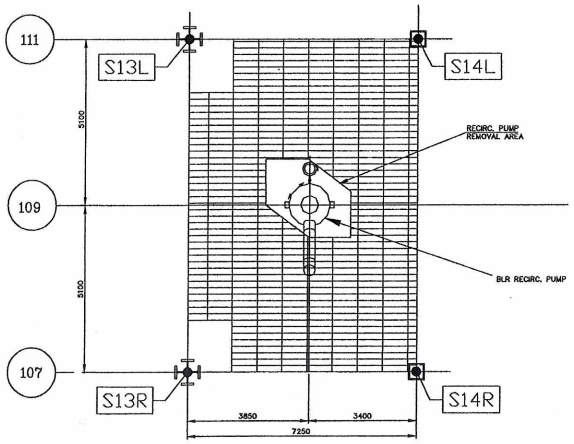


ELEVATION VIEW – STEP #4

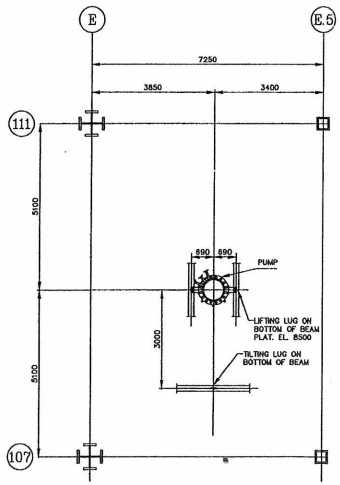
(LOOKING WEST)

(4A). IN A HORIZONTAL POSITION, LOWER THE MOTOR ASSEMBLY ONTO APPROVED DOLLIES AND SAFELY SECURE PUMP MOTOR BODY TO MAKE READY FOR LATERAL TRANSPORT.

COMPONENT WEIGHTS		PUMP DETAILS
ITEM	WEIGHT (Kg.)	
PUMP CASE + MOTOR	10400	
PUMP MOTOR	7900	MAKE: TORISHIMA MODEL: HLAV250-360/1K
PUMP COOLER	1500	
PUMP MOTOR + COOLER (MAXIMUM HANDLED WEIGHT)	9400	



PLAN VIEW "AA" STEP #1
GRATING AT EL. 4700



PLAN VIEW "BB" STEP #2

NOTES:-

1. REFERENCE DRAWINGS
   - A. GA OF BOILER SIDE ELEVATION ------- 0-00-022-77271 (MAITREE-00-UH-TL-150026-TRY)
   - B. GA OF BOILER FRONT ELEVATION – SEC "F-F" -----0-00-022-77277 (MAITREE-00-UH-TL-150028-TRY)
   - C. FLOOR PLAN AT EL. 4700 -----0-00-021-77255 (MAITREE-00-UH-TA-150158-TRY)
2. ALL WORK DONE ON PUMP MOTOR SHOULD BE PERFORMED BY QUALIFIED PERSONNEL WHO HAVE READ AND UNDERSTOOD ALL INFORMATION PER MANUFACTURER'S REQUIREMENTS IN THE INSTALLATION, MAINTENANCE AND TECHNICAL DATA MANUAL.
3. POWER SUPPLY REQUIRED:
   POWER SUPPLY POINT 1M ABOVE OPERATING FLOOR AT COLUMN S13L SHALL BE PROVIDED BY BHEL-PEM. (SUPPLY RATING: 415VAC, 50HZ.)
4. NOTES TO VENDOR
   - A. SUPPLIER'S SCOPE STARTS FROM CUSTOMER'S POWER SUPPLY POINT.
   - B. VENDOR ITEMS :-
     - I. POWER SUPPLY CABLE FROM SUPPLY POINT TO THE EQUIPMENT.
     - II. SWITCH FUSE UNITS AND ALL ELECTRICAL ITEMS FROM POWER SUPPLY POINT
     - III. ELECTRICALLY OPERATED LUG MOUNTED HOIST WITH CHAIN PULLEY BLOCK
       CAPACITY : 12.0TONS; LIFT : 6.5 M.
       (LUG MOUNTED ELECTRIC HOIST CAPACITY : 12.0TONS; LIFT : 6.5 M. 2 Nos. per Pump &
       CHAIN PULLEY BLOCK CAPACITY (CPB) : 12.0TONS LIFT: 1.00M :2 Nos. per Pump)
       BOTH THE LUG MOUNTED HOISTS ARE TO BE INTERCONNECTED BY A SINGLE CONTROL PANEL FOR TANDEM OPERATION
     - IV. MANUAL HAND CHAIN HOIST; CAPACITY:12.0 TONS, LIFT: 4.0 M.
     - V. 3 NOS. LUGS DESIGNED TO SUPPORT LOADED HOIST AND SUITABLE TO BE WELDED AT SITE (2 FOR ELECTRIC HOIST & 1 FOR MANUAL HAND CHAIN HOIST.)
5. MAXIMUM LOAD TO BE HANDLED : 9.4 TONS (WITH TWO HOISTS)
6. PROVIDE CLEAR SPACE FOR LOWERING CIRCULATING PUMP MOTOR UPTO THE GROUND LEVEL AS PER THE SPACE EAR-MARKED WITHOUT ANY INTERFERENCE AND ENCROACHMENTS..
7. QUANTITY FURNISHED IN BILL OF MATERIAL IS FOR ONE BOILER ONLY.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	SYD	DRAWING NUMBER	VEN NO / MAT NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT	UNIT WEIGHT / QUANTITY	GS	ZONE
	02	MANUAL HAND CHAIN HOIST CAP. 12T, LIFT 4.0M				SUB-DELY		L	250.000 / 1		
	01	LUG MOUNTED HOIST-ELEC., CAP:12T,LIFT : 6.5M W/DPB.				SUB-DELY		L	1700.000 / 2		

	DATE	ALTERED	CHECKED	APPROVED	NOTE
01					

PROJECT: 2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT
RAMPAL, BANGLADESH
(EPC MAIN PLANT PACKAGE)

OWNER: BANGLADESH - INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

DEVICE CONSULTANT: FICHTNER
M/s FICHTNER GmbH & Co KG, Stuttgart, GERMANY

BHARAT HEAVY ELECTRICALS LIMITED
BOILER PLANT UNIT, TIRUCHIRAPALLI-620014
EQUIPMENT : STEAM GENERATOR

SCALE: 1:55
SHEET: 1 OF 1

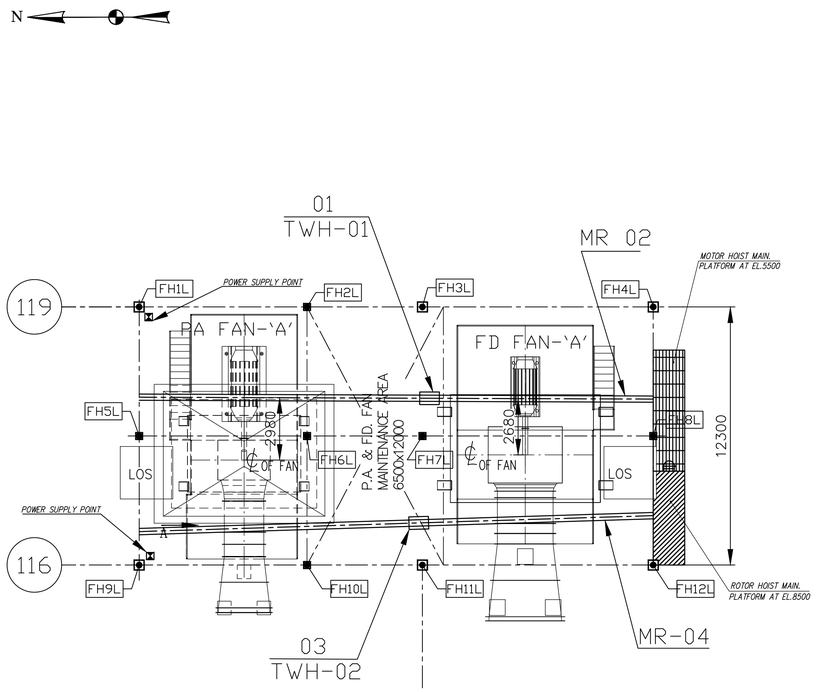
	DATE	NAME
DRAWN BY	01.06.2016	AJEET
DESIGN BY	01.06.2016	N FAZIL
CHECKED BY	02.06.2016	VS NAIK
APPROVED BY	04.06.2016	DS KUMAR
SUPERSEDES:		
SUPERSEDED BY:		
SYSTEM:	HANDLING SYSTEM	

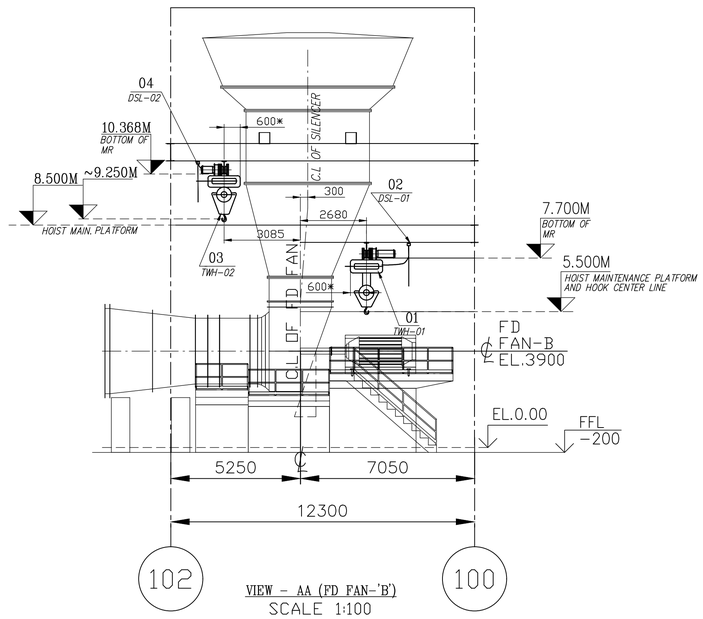
TITLE: BOILER WATER RECIRC. PUMP MOTOR HANDLING ARRANGEMENT

SIZE: A0 | PROJECT NO.: | FILE:
DRAWING NO.: MAITREE-00-DHG-LU-150054-TRY
ANNEX:

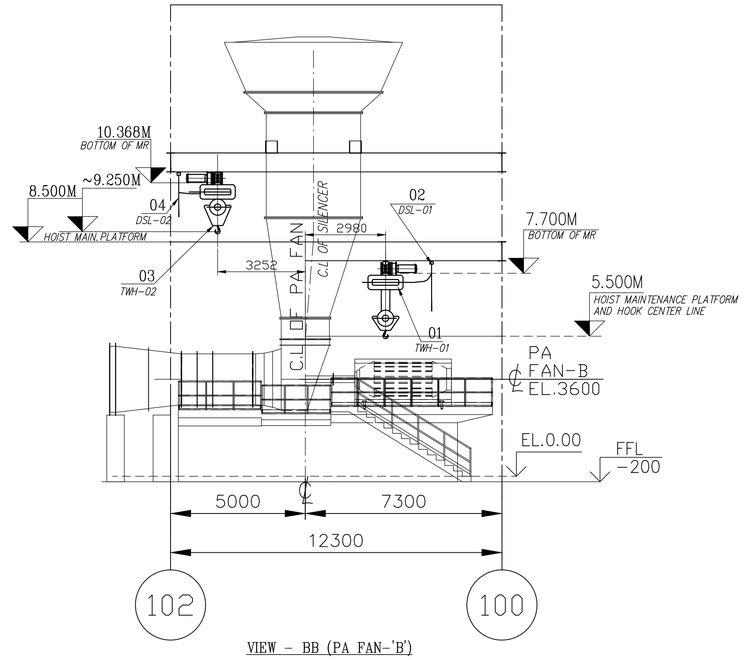
ALL DIMENSIONS ARE IN MILLIMETERS
PROJECTION
BHEL DRAWING NO.: 0-99-300-40373
REV.: 00

THIS DRAWING IS THE PROPERTY OF BHEL AND IS LOANED SUBJECT TO THE AGREEMENT THAT IT WILL NOT BE COPIED, LENT OR DISCLOSED TO A THIRD PARTY OR OTHERWISE MISUSED EXCEPT AS AUTHORISED BY BHEL IN WRITING.

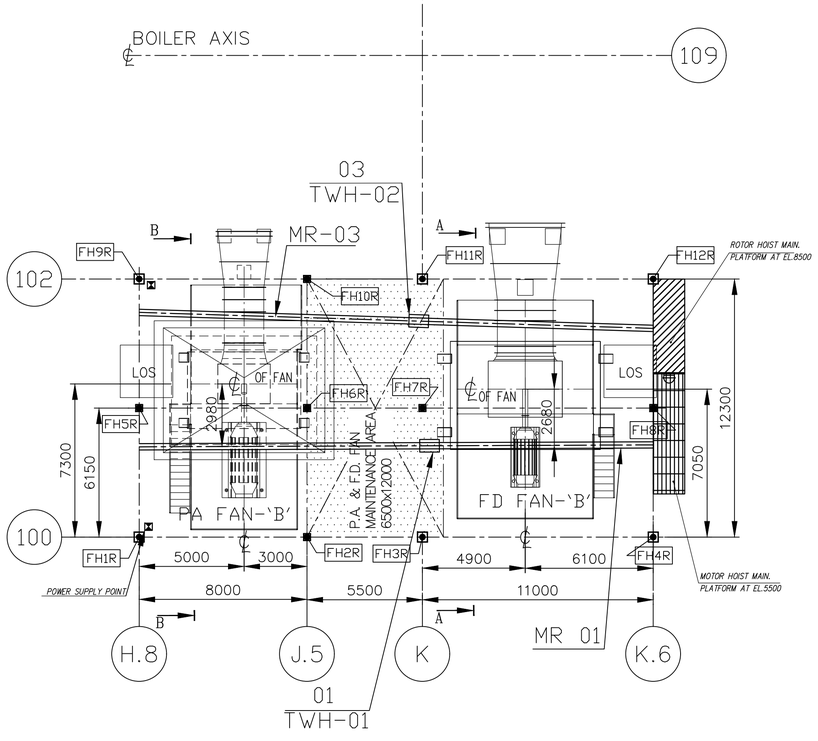




VIEW – AA (FD FAN-'B')
SCALE 1:100



VIEW – BB (PA FAN-'B')
SCALE 1:100



NOTES: –

A. REFERANCE DRAWINGS:

01. LAYOUT OF COLD AIR DUCT–SEC AIR DUCT TO AIR HEATER ..... (0–00–020–77285)
02. LAYOUT OF COLD AIR DUCT–COLD PRI. AIR DUCT TO MILLS ..... (0–00–020–77284)
03. GENERAL ARRANGEMENT OF PA FAN–PAF 19/11.8–2 ..... (1–00–100–29145)
04. SILENCER ARRANGEMENT OF PA FAN–PAF 19/11.8–2 ..... (2–00–100–30223)
05. GENERAL ARRANGEMENT OF FD FAN–FAF 26.6/12.5–1 ..... (1–00–098–29143)
06. SILENCER ARRANGEMENT OF FD FAN–FAF 26.6/12.5–1 ..... (2–00–098–30222)

B. TROLLEY WITH HOISTS ARE ELECTRICALLY OPERATED.

C. WEIGHT INDICATED IN THIS DRAWING FOR ITEMS 01 THRU' 04 ARE APPROXIMATE FOR DESIGNING STRUCTURAL PARTS.

D. QUANTITY FURNISHED IN THE BILL OF MATERIAL IS FOR ONE BOILER ONLY.

E. MR–01 TO MR–04 ARE TO BE RELEASED BY SUPPORTING STRUCTURES / BHEL–TRICHY

NOTES TO PEM–BHEL/NEW DELHI: –

1. POWER SUPPLY POINTS (⋈) ONE METER ABOVE GROUND LEVEL – TO BE PROVIDED BY PEM–BHEL/NEWDELHI.
2. POWER SUPPLY POINTS AT COLUMNS FH1L,FH1R, FH9L & FH9R
3. POWER SUPPLY REQUIRED RATING AT COLUMN FH1R/L : 415V AC; 3 Phase; 50Hz.
4. POWER SUPPLY REQUIRED RATING AT COLUMNS FH9R/L : 415V AC; 3 Phase; 50Hz.

NOTES TO VENDOR

1. SUPPLIER'S SCOPE STARTS AT CUSTOMER'S POWER SUPPLY POINT.
2. DIMENSIONS MARKED WITH '*' SHOULD BE STRICTLY MAINTAINED.

3. VENDOR ITEMS

A. FIXED POWER CABLE AND TRAILING CABLE
B. DSL TRAILING CABLE SYSTEM – CABLE TROLLEY – COMPLETE SET.
C. SWITCH FUSE UNITS AND ALL ELECTRICAL ITEMS FOR TWH FROM POWER SUPPLY POINT.
D. TROLLEY WITH HOIST – CAPACITY 20.0/5.0 TONS; LIFT: 6.0/9.25M.

LEGEND: –

MR–01 & MR–02– MONORAIL FOR PA & FD FAN MOTOR ..... QTY. TWO Nos. LENGTH : 24.500M.
MR–03 & MR–04 – MONORAIL FOR PA & FD FAN ROTOR ..... QTY. TWO Nos. LENGTH : 24.512M.
TWH–01 – TROLLEY WITH HOIST PA &FD FAN MOTOR··· CAP. 20.0T; LIFT: 6.000M
TWH–02 – TROLLEY WITH HOIST PA &FD FAN ROTOR··· CAP. 5.0T: LIFT: 9.25M
DSL–01 – DSL FOR PA&FD FAN MOTOR LENGTH : 24.500M.
DSL–02 – DSL FOR PA&FD FAN ROTOR··· LENGTH : 24.512M.

Max Load to be Handled (kgs)	
P.A. FANS MOTORS	15500
P.A. FANS ROTORS	3800
F.D.. FANS MOTORS	11500
F.D.. FANS ROTORS	3200

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P / UNIT / DI	UNIT WEIGHT / QUANTITY	GS / ZONE
	04	DSL–02–CABLE TROLLEY TYPE;LENGTH : 24.512 M.				SUB–DELY	ST	300.000	
							L	2	
	03	TWH–02 – ELEC.; CAP: 5T LIFT : 9.25 M.					ST	1000.000	
						SUB–DELY	L	2	
	02	DSL–01–CABLE TROLLEY TYPE;LENGTH : 24.500M.					ST	300.000	
						SUB–DELY	L	2	
	01	TWH–01– ELEC.; CAP: 20T LIFT : 6.0 M.					ST	2500.000	
						SUB–DELY	L	2	

NO	DATE	ALTERED	CHECKED	APPROVED	NOTE
02					
01					

PROJECT: 2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT
RAMPAL, BANGLADESH
(EPC MAIN PLANT PACKAGE)

OWNER CONSULTANT: FICHTNER — M/s FICHTNER GmbH & Co KG, Stuttgart,GERMANY

OWNER: BANGLADESH - INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

BHARAT HEAVY ELECTRICALS LIMITED
BOILER PLANT UNIT; TIRUCHIRAPALLI–INDIA–620014
EQUIPMENT : STEAM GENERATOR

SCALE: NA
SHEET: 1 OF 1

	DATE	NAME
DRAWN BY	11.04.2018	AJEET
DESIGN BY	11.04.2018	AJEET
CHECKED BY	11.04.2018	N FAZIL
APPROVED BY	11.04.2018	V S NAIK

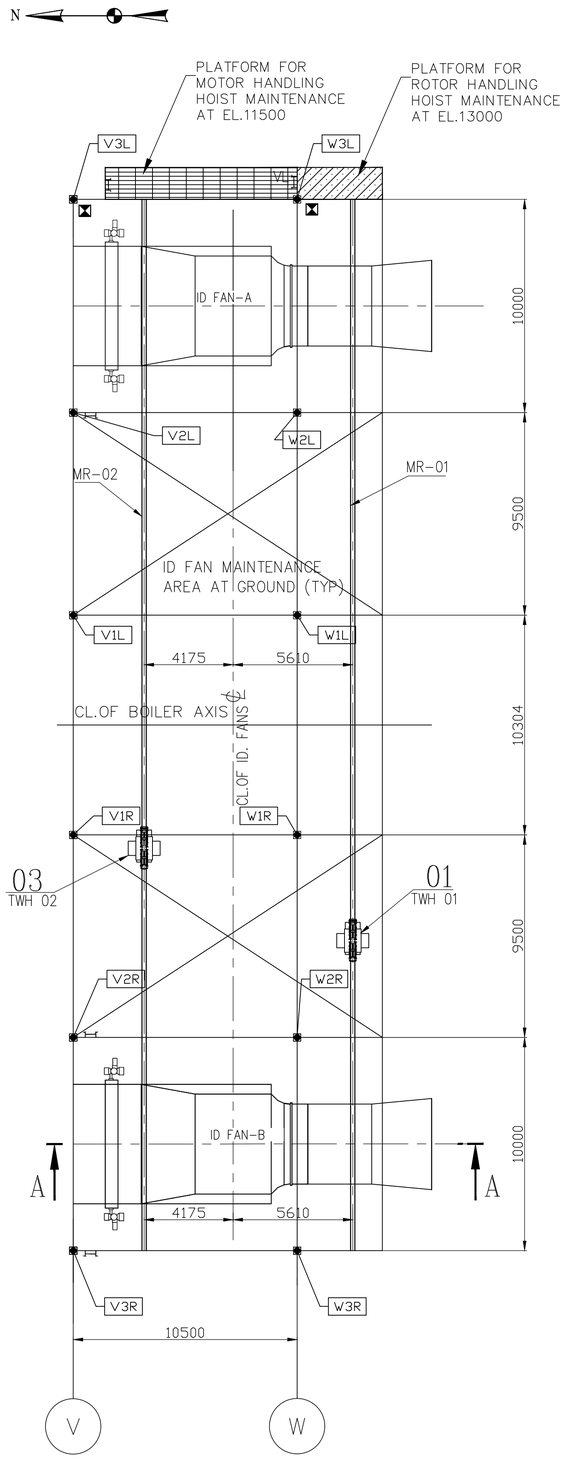
SUPERSEDES:
SUPERSEDED BY:
SYSTEM: FUEL OIL SYSTEM
ANNEX:

TITLE: PA & FD FAN HANDLING ARRANGEMENT

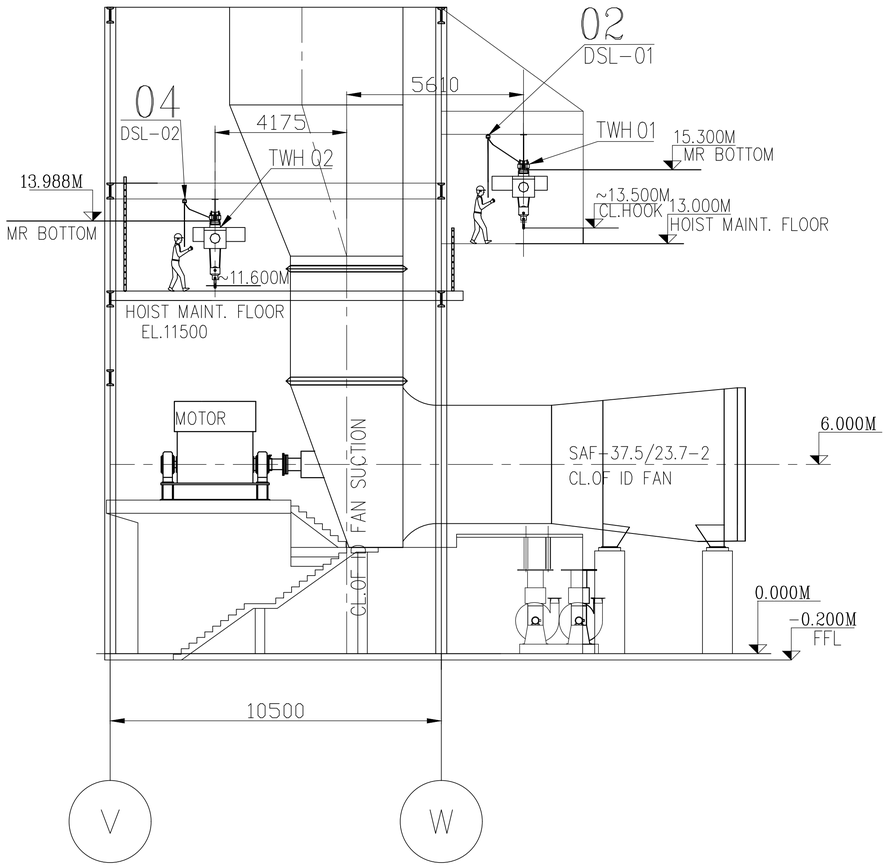
SIZE: A1 | PROJECT NO.: | FILE: | DRAWING NO.:

ALL DIMENSIONS ARE IN MILLIMETERS | BHEL CUSTOMERS NO.: 1725 & 1726 | BHEL DRAWING NO.: 1-99-100-40893 | REV.: 00

PROJECTION



SCALE 1:150



VIEW – AA

SCALE 1:100

NOTES: –

A. REFERENCE DRAWINGS:

01. LAYOUT OF INDUCED DRAFT SYSTEM – PLAN	.....	0-00-020-77281
02. LAYOUT OF INDUCED DRAFT SYSTEM – ELEVATION	.....	0-00-020-77280
03. GENERAL ARRANGEMENT OF ID FAN SAF37.5/23.7-2	.....	1-00-099-29144

B. TROLLEY WITH HOIST IS ELECTRICALLY OPERATED.

C. WEIGHT INDICATED IN THIS DRAWING FOR ITEMS 01& 03 IN B O M ARE APPROXIMATE FOR DESIGNING STRUCTURAL PARTS.

D. MR-01 & MR-02 ARE TO BE RELEASED BY SUPPORTING STRUCTURES / BHEL-TRICHY

E. FAN SHOWN IN THIS DRAWING IS SCHEMATIC ONLY. FOR DETAIL REFER FAN DRAWINGS.

MAXIMUM COMPONENT LOAD TO BE HANDLED

01. ID FAN MOTOR	.....	32000 Kg
02. ID FAN ROTOR	.....	15500 Kg

LEGEND: –

i) MR 01 – MONORAIL BEAM FOR ID FAN ROTOR HANDLING. LENGTH : =49.304M – QTY. ONE

ii) MR 02 – MONORAIL BEAM FOR ID FAN MOTOR HANDLING. LENGTH : =49.304M – QTY. ONE

iii) TWH-01 – TROLLEY WITH HOIST FOR ID FANS ROTORS – QTY. ONE, CAPACITY – 20 TONS, LIFT – 13.5 M.

iv) TWH-02 – TROLLEY WITH HOIST FOR ID FANS MOTORS – QTY. ONE, CAPACITY – 40 TONS, LIFT – 11.6 M.

v) DSL : DOWNSHOP LEAD

NOTES TO PEM-BHEL / NEW DELHI: –

1. POWER SUPPLY POINT (■)ONE METRE ABOVE GROUND LEVEL NEAR COLUMN V3L & W3L.
2. POWER SUPPLY REQUIRED RATING AT COLUMN W2L : 415V AC; 3 PHASE; 50Hz.
3. POWER SUPPLY REQUIRED RATING AT COLUMN V2L : 415V AC: 3 PHASE: 50Hz.

NOTES TO VENDOR: –

1. SUPPLIER'S SCOPE STARTS AT POWER SUPPLY POINT.
2. VENDOR ITEMS
   - A. FIXED POWER CABLE AND TRAILING CABLE
   - B. DSL TRAILING CABLE SYSTEM – CABLE TROLLEY & "Tee" TRACK TYPE – COMPLETE.
   - C. SWITCH FUSE UNITS AND ALL ELECTRICAL ITEMS FOR TWH FROM POWER SUPPLY POINT.
   - D. TROLLEY WITH HOIST – CAPACITY 40/20 TONS; LIFT:11.60/13.5M.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER			K/C/P			GS
	04	DSL-02-CABLE TROLLEY TYPE; LENGTH : 49.304M.			ITEM NO	MATERIAL CODE		UNIT	UNIT WEIGHT	
					VAR NO	SUB – DELY		DI	QUANTITY	
									700.000	
						SUB – DELY			1	
	03	TWH-02 – ELEC.; CAP:40T LIFT :11.60M.							6500.000	
						SUB – DELY			1	
	02	DSL-01-CABLE TROLLEY TYPE; LENGTH : 49.304M.							700.000	
						SUB – DELY			1	
	01	TWH-01 – ELEC.; CAP:20T LIFT : 13.500M.							3000.000	
						SUB – DELY			1	

02				
01				
DATE	ALTERED	CHECKED	APPROVED	NOTE

PROJECT: 2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT
RAMPAL, BANGLADESH
(EPC MAIN PLANT PACKAGE)

OWNER CONSULTANT: FICHTNER
M/s FICHTNER GmbH & Co KG, Stuttgart,GERMANY

OWNER: BANGLADESH - INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

BHARAT HEAVY ELECTRICALS LIMITED
BOILER PLANT UNIT; TIRUCHIRAPALLI-INDIA-620014
EQUIPMENT : STEAM GENERATOR

SCALE: NA
SHEET: 1 OF 1

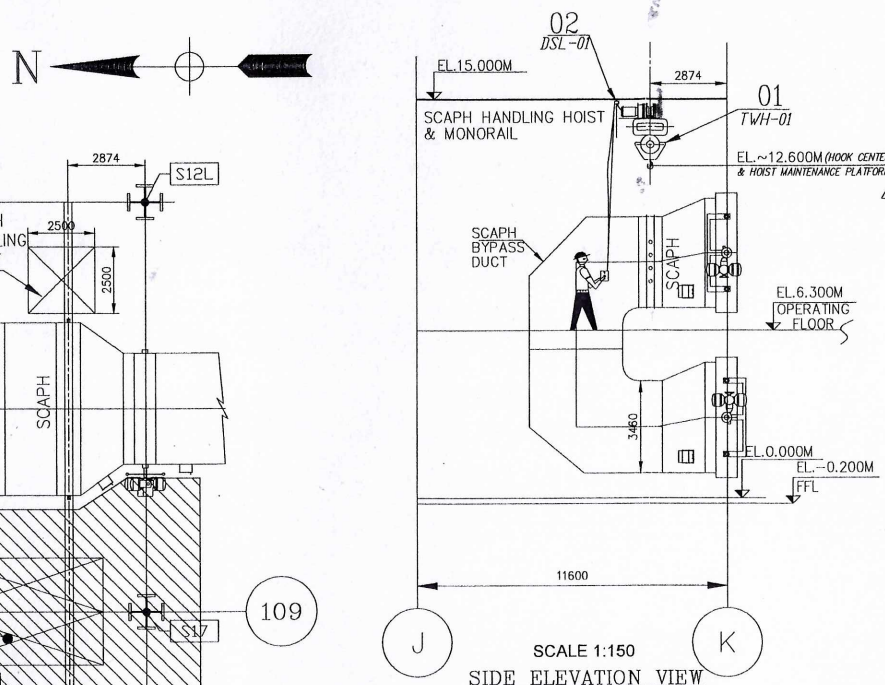
	DATE	NAME
DRAWN BY	10.04.2018	AJEET
DESIGN BY	10.04.2018	AJEET
CHECKED BY	10.04.2018	N FAZIL
APPROVED BY	10.04.2018	V S NAIK

SUPERSEDES:
SUPERSEDED BY:
SYSTEM: FUEL OIL SYSTEM
ALL DIMENSIONS ARE IN MILLIMETERS
PROJECTION
BHEL CUSTOMER NO.: 1725 & 1726

TITLE: ID FAN HANDLING ARRANGEMENT

SIZE: A1 | PROJECT NO.: | FILE:
ANNEX: | DRAWING NO.:
BHEL DRAWING NO.: 1-99-100-40894 | REV.: 00

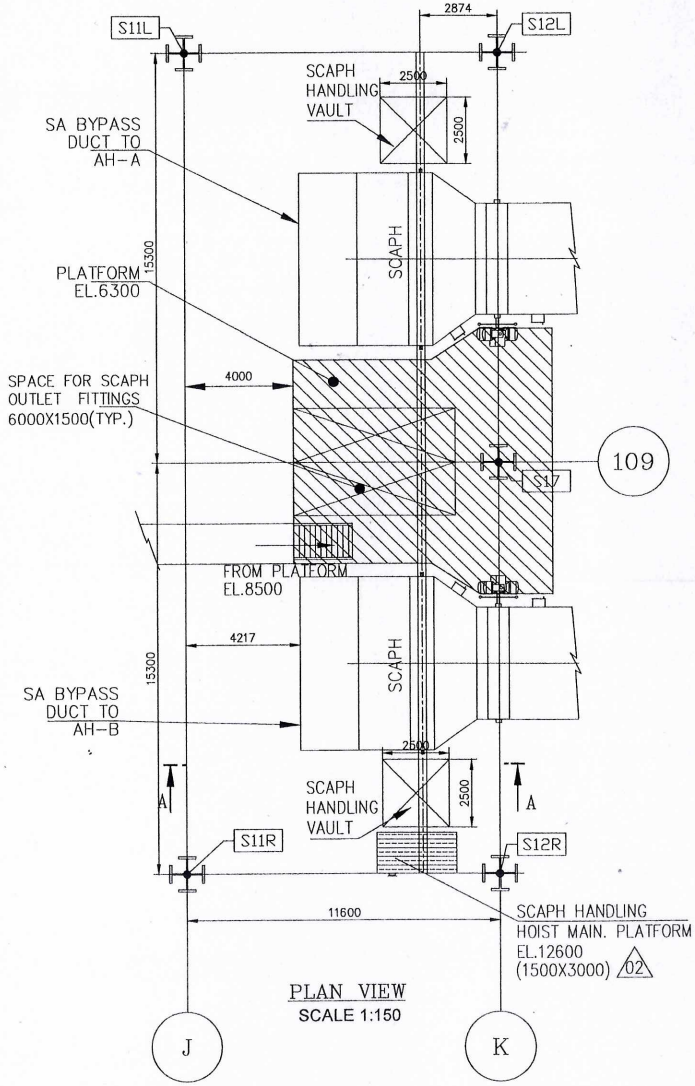
1-99-100-40895



SCALE 1:150

SIDE ELEVATION VIEW

VIEW-AA



PLAN VIEW

SCALE 1:150

NOTE - GENERAL:

01. REFERENCE DRAWINGS:
- A. GA OF BOILER SEC. SIDE ELEVATION ---- 0-00-022-77271 (MAITREE-00-UH-TL-150026-TRY-B)
- B. LAYOUT OF COLD SECONDARY AIR DUCTING ---- 0-00-020-77285 (MAITREE-00-HLA-LB-150036-TRY-01)
- C. FLOOR PLAN ARRGT. AT EL.6300 ---- 0-00-021-77295 (MAITREE-00-UH-TA-150158-TRY-01)
- 02 D. FLOOR PLAN ARRGT. AT EL.11500 --- 0-00-021-77297 (MAITREE-00-UH-TA-150160-TRY-02)

02. SCAPH SHALL BE HANDLED IN BLOCKS.

03. HANDLING SPACE IS TO BE CLEARED UPTO 0.00M LEVEL FROM 15.000M WITHOUT ANY INTERFERENCE / ENCROACHMENTS.

04. REFER LAYOUT DRAWING FOR ARRANGEMENT OF HOIST MAINTENANCE / ACCESS PLATFORM.

LEGEND

A. TWH-01 -TWH FOR SCAPH HANDLING CAP.2.5T;LIFT: ~12.600 M.

B. DSL-01 -DSL FOR SCAPH HANDLING - CABLE TROLLEY TYPE--LEN. 30.600M.

C. MR-01 - MONORAIL LENGTH : 30.600M.- 1 No.

MAXIMUM WEIGHT TO BE HANDLED:~ 2000Kg

NOTES TO PEM / DELHI

A. POWER SUPPLY POINTS ARE TO BE PROVIDED AT 1.500M ABOVE GROUND FLOOR AT COLUMN S17

B. POWER SUPPLY REQD. RATING 415V AC; 3 PHASE, 50Hz.

NOTES TO VENDORS:

A. SUPPLIER'S SCOPE STARTS AT POWER SUPPLY POINT.

VENDOR ITEMS:

A. FIXED POWER CABLE & TRAILING CABLE SYSTEM.

B. DSL TRAILING CABLE SYSTEM. CABLE TROLLEY & "Tee" TRACK TYPE --COMPLETE.

C. SWITCH FUSE UNITS & ALL ELECTRICAL ITEMS FOR TWH FROM CUSTOMER'S POWER SUPPLY POINT.

D. TROLLEY WITH HOIST - CAP.2.5 TONS; LIFT ~12.600M

ALL ELEVATIONS ARE WITH RESPECT TO FFL OF TG BUILDING (+) 0.0m, WHICH CORRESPONDS TO RL (+) 5.6m. FFL OF BOILER AREA IS 200mm BELOW FFL OF TG BUILDING.

VARIANT NUMBER / ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	QTY/A / QTY/B	UNIT WEIGHT / QUANTITY	CS	ZONE
02	DSL-CABLE TROLLEY TYPE LENGTH:30.600M				SUB-DELY	ST	360.000		
						L	1		
01	TWH - ELEC. CAP.2.5T;LIFT:12.6M				SUB-DELY	ST	900.000		
						L	1		

02	28.09.18	A.JEET	N FAZIL	V.S NAIK	HOIST MAINTENANCE PLATFORM EL. UPDATED BASED ON FLOOR PLAN AT EL.6300 & 12600 DRG.
01	31.07.18	A.JEET	N FAZIL	V.S NAIK	SCAPH VAULT DIMENSION SHOWN TO REFLECT CUSTOMER COMMENTS.
	DATE	ALTERED	CHECKED	APPROVED	NOTE

PROJECT: 2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT RAMPAL, BANGLADESH (EPC MAIN PLANT PACKAGE)

OWNER CONSULTANT: FICHTNER — M/s FICHTNER GmbH & Co KG, Stuttgart, GERMANY

OWNER: BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

BHARAT HEAVY ELECTRICALS LIMITED — BOILER PLANT UNIT, TIRUCHIRAPALLI-INDIA-620014 — EQUIPMENT : STEAM GENERATOR

SCALE: 1:150 | SHEET: 1 OF 2

	DATE	NAME
DRAWN BY	18.04.2018	A.JEET
DESIGN BY	18.04.2018	A.JEET
CHECKED BY	18.04.2018	N FAZIL
APPROVED BY	18.04.2018	V S NAIK
SUPERSEDED:		
SUPERSEDED BY:		

TITLE: SCAPH HANDLING ARRANGEMENT

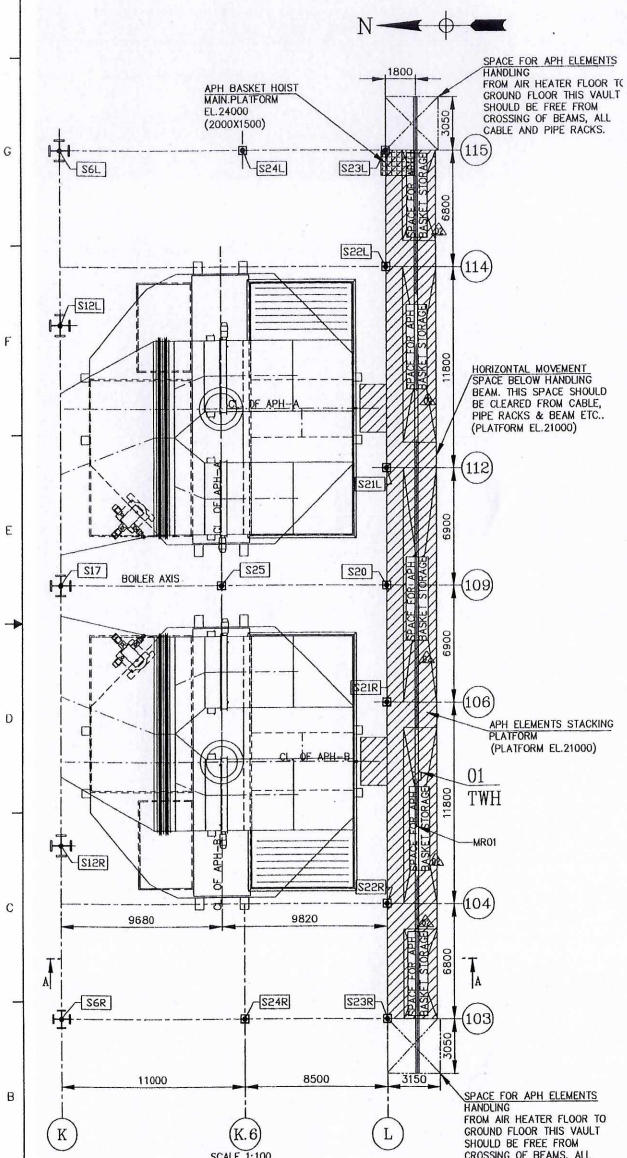
SIZE: A1 | PROJECT NO.: | FILE:

SYSTEM: MATERIAL HANDLING SYSTEM | ANNEX: | DRAWING NO.: MAITREE-00-HLD-LU-150033-TRY

ALL DIMENSIONS ARE IN MILLIMETERS | PROJECTION | MECL DRAWING NO.: 1-99-400-40895 | REV.: 02

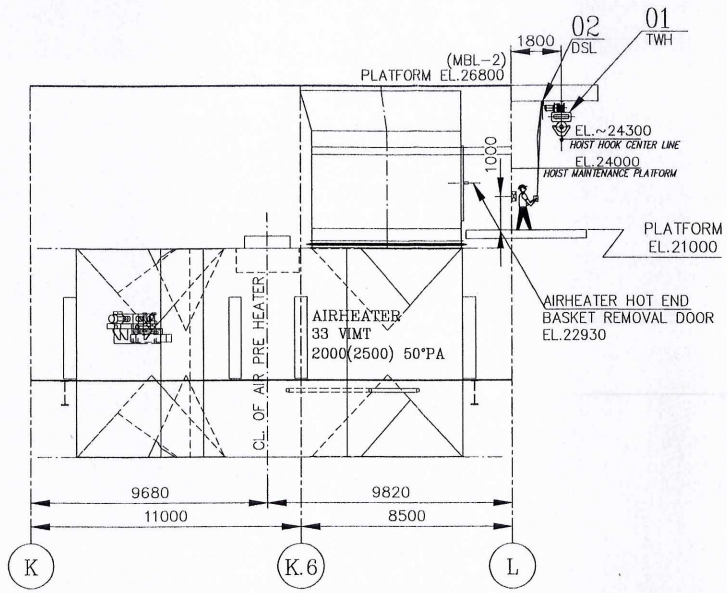
MECL DRAWING NO.: 1726 & 1726

1-99-400-40896



SCALE 1:100

PLAN VIEW



SCALE 1:100

SIDE ELEVATION VIEW

VIEW-AA

NOTES:-

A. REFERENCE DRAWINGS:

01.	LAYOUT OF FLUE GAS DUCTING	..... 0-00-020-77290 (MAITREE-00-HNA-LD-150040-TRY-01)
02.	FLOOR PLAN AT EL. 21000&EL.21700	..... 0-00-021-77300 (MAITREE-00-UH-TA-150163-TRY-01)
01.	FLOOR PLAN AT EL. 25000&EL.26800	..... 0-00-021-77301 (MAITREE-00-UH-TA-150164-TRY-01)
04.	GA OF BOILER (SECTIONAL SIDE ELEVATION)	..... 0-00-022-77271 (MAITREE-00-UH-TL-150026-TRY-B)

B. MONORAIL & MONORAIL SUPPORTS ARE TO BE RELEASED BY SUPPORTING STRUCTURES.
C. AIR HEATER ELEMENTS HANDLING SPACE ARE TO BE CLEARED UP TO GROUND LEVEL.
D. DIMENSIONS ARE TAKEN FROM THE REFERENCE DRAWINGS.
E. SIZE AND T O S ELEVATION FOR MONORAIL IS TO BE FURNISHED BY SUPPORTING STRUCTURES
F. QUANTITY INDICATED IN THE B O M IS FOR ONE BOILER ONLY.
G. MAXIMUM WEIGHT OF ELEMENT : 760 KG.
H. HANDLING ARRANGEMENT FOR REMOVING THE APH ELEMENTS FROM THE AIR PREHEATER SHALL BE PROVIDED BY BAP/RANIPET. BHEL/TRICHY SCOPE IS TO HANDLE THE ELEMENTS FROM 21.000M FLOOR TO GROUND LEVEL ONLY.

NOTES TO PEM / DELHI

1. POWER SUPPLY POINT TO BE PROVIDED AT ONE METER ABOVE 21.000M FLOOR
2. SUPPLY POINT AT COLUMN-S23 R/L
3. POWER SUPPLY REQUIRED RATING : 415V AC; 3 PHASE; 50Hz.

NOTES TO VENDORS

SUPPLIER'S SCOPE STARTS AT PEM-BHEL'S POWER SUPPLY POINT.

VENDOR ITEMS

A. FIXED POWER CABLE AND TRAILING CABLE
B. DSL TRAILING CABLE SYSTEM- CABLE TROLLEY WITH "Tee" TRACK.
C. SWITCH FUSE UNITS AND ALL ELETRICAL ITEMS FOR TWH FROM POWER SUPPLY POINT
D. TROLLEY WITH HOIST 1 NO. - CAPACITY 2 TONS; LIFT 24.300MTRS.

LEGEND

A. TWH-01 -TROLLEY WITH HOIST FOR APH HANDLING CAP.2T;LIFT: 24.300M.
B. DSL-01 -DSL FOR APH HANDLING - CABLE TROLLEY TYPE-LEN. 57.100M.
C. MR-01 - MONORAIL LENGTH : 57.100M.- QTY: 1 No.

ALL ELEVATIONS ARE WITH RESPECT TO FFL OF TG BUILDING (+) 0.0m, WHICH CORRESPONDS TO RL (+) 5.6m. FFL OF BOILER AREA IS 200mm BELOW FFL OF TG BUILDING.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER			A/C/P	UNIT	UNIT WEIGHT	GS ZONE
								ST	680.000	
	02	DSL-CABLE TROLLEY TYPE. LENGTH : 57.1M.			ITEM NO	MATERIAL CODE	SUB-DELY	L	1	
								ST	900.000	
	01	TWH - ELEC.; CAP:2T LIFT : 24.3M.			ITEM NO	MATERIAL CODE	SUB-DELY	L	1	
					VAR NO	MATERIAL SPECN		DI	QUANTITY	

03	26.11.18	A.JEET	N FAZIL	V.S NAIK	BHEL DRG. NO. CORRECTED AS 1-99-400-40896.
02	28.09.18	A.JEET	N FAZIL	V.S NAIK	DRAWING UPDATED TO REFLECT CUSTOMER COMMENTS.
01	31.07.18	A.JEET	N FAZIL	V.S NAIK	DRAWING UPDATED TO REFLECT CUSTOMER COMMENTS.
	DATE	ALTERED	CHECKED	APPROVED	NOTE

PROJECT: 2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT
RAMPAL, BANGLADESH
(EPC MAIN PLANT PACKAGE)

OWNER CONSULTANT: FICHTNER
M/s FICHTNER GmbH & Co KG, Stuttgart, GERMANY

OWNER: BANGLADESH - INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

BHARAT HEAVY ELECTRICALS LIMITED
BOILER PLANT UNIT, TIRUCHIRAPALLI-INDIA-620014
EQUIPMENT : STEAM GENERATOR

SCALE: 1:100
SHEET: 2 OF 2

	DATE	NAME
DRAWN BY	17.04.2018	A.JEET
DESIGN BY	17.04.2018	A.JEET
CHECKED BY	17.04.2018	N FAZIL
APPROVED BY	17.04.2018	V S NAIK
SUPERSEDES:		
SUPERSEDED BY:		

TITLE: APH ELEMENTS HANDLING ARRANGEMENT

SIZE: A1 | PROJECT NO.: | FILE:
SYSTEM: MATERIAL HANDLING SYSTEM | ANNEX: | DRAWING NO.: MAITREE-00-HLD-LU-150033-TRY
ALL DIMENSIONS ARE IN MILLIMETERS | BHEL DRAWING NO.: 1-99-400-40896 | REV.: 03
PROJECTION: | THIRD ANGLE PROJECTION

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