

Chapter 6 EOT Crane For Power House & GIS Hall

7.	Vertical Travel Reach of Crane Hook from the GIS Hall Floor level EL.1633.50 to Upper most position of hook	To be finalized during detailed engineering.	
8.	Position of Hook from Rail C/L	U/stream	D/stream
		7 800 mm	7 800 mm
9.	Clearance from inside of end wall on		
	1. Cable Duct End	7 3000 mm	
	2. MAT End	7 3000 mm	
10.	Runway, travel lengths		
	1. Gantry rail level	EL 1638.50 m	
	2. Length of runway	31 m	
	3. Trolley travel length	Max. Feasible for specified crane Span, shall ensure specified Hook reaches.	
11.	Distance from rail C/L to nearest side travelling obstruction		
	1. Up-stream	7 400 mm	
	2. Down-stream	7 400 mm	
12.	Distance from the crane bridge end to nearest side travelling obstruction		
	1. Up-stream	7 200 mm	
	2. Down-stream	7 200 mm	
13.	Means for Micro speed for Inching operation of lifting Hook	Step-less speed control	
14.	Clearance of GIS Hall crane from ceiling (nearest overhead obstruction at ends)	500 mm approx	

*All the data given above for EOT cranes are tentative and will be finalized during detailed design. Bidder is requested to verify the data.

6.4 Standards

The crane and its components shall be designed, manufactured and tested in accordance with applicable latest version of Indian Standards or International Standards. List of some of the relevant major standards is given below.

Chanju III HEP

000270

1.	BIS - 210	Grey Iron castings.
2.	BIS - 302 /BS - 2266	Specifications for steel wire ropes for general Engineering purposes.
3.	BIS - 325 /BS - 2960	Three phase induction motors.
4.	BIS - 466/BS - 3177	Code of Practice for electric overhead travelling Crane and gantry crane other than steel work crane.
5.	BIS - 800	Code of practice for general construction in Steel.
6.	BIS - 807 /BS - 2573	Code of practice for design, manufacture, erection And testing (Structural Portion) of crane and hoists.
7.	BIS - 1030	Carbon steel castings for general engineering purposes.
8.	BIS - 1363 (Part 1- 3)	Hexagon head bolts, screws & nuts of product grade C.
9.	BIS - 1364 (Part 1- 5)	Hexagon head bolts, screws & nuts of product grade A & B.
10.	BIS - 1875	Carbon steel billets, bloom, slabs and bars for forgings.
11.	BIS - 2062	Steel for general structural purposes.
12.	BIS - 2762	Wire rope slings and sling legs.
13.	BIS - 3017 /BS - 5749	Forged Ramshorn hooks.
14.	BIS - 3815	Point hooks with shanks for general engineering purpose.
15.	BIS - 4460 (Part 1- 3)	Gears - spur & helical gears – calculation of Load capacity.
16.	BIS - 6938	Code of Practice for design of rope drum and chain hoists for hydraulic gates.
17.	BIS - 13947 (Part 4)	Contactors and motor starters – Electromechanical contactors & motor Starter.
18.	IS - 14130 : 1994	Hydraulic Lifting Table – Specification

6.5 Requirements of Characteristics

Crane shall be capable of raising, lowering, holding and transporting the rated load without any damage to or excessive deflection of any crane structural frames.

Following tolerances shall be maintained in the operation of the crane:

- (1) Smooth control of vertical movement in inching mode to within 1 mm for

Chanju III HEP

000271



Chapter 6 EOT Crane For Power House & ~~GIS Hall~~

handled by the main hook of the crane and 3 mm for loads to be handled by the auxiliary hook of the crane with hook carrying rated load at a time with hoist brakes properly adjusted for normal operation.

- (2) Control of bridge and trolley motion to be within 10mm.
- (3) The motor RPM not to exceed 105% of the synchronous RPM while lowering the rated load.
- (4) The vertical deflection of the main girders caused by the rated load plus all deadloads not to exceed 1/900 of the cranespan.

6.5.1 Hook Reaches and Crane Clearances

- (1) Limits of travel of the hoist of the crane are specified in the above clause for compliance by the supplier.
- (2) A distance of 650 mm for P.H. cranes and 400 mm for GIS hall crane from the CL of the rails to the wall faces has been envisaged on either side in the arrangements. It is assumed that with this distance it shall be possible to provide a clearance of about 300 mm & 200 mm between cranes extreme points and the walls on either side for Powerhouse and GIS crane respectively. However, the actual dimension will be finalized during detail engineering. It is expected that with this distance it shall be possible to provide a clearance of about 200 mm between trolley's extreme end points and the walls on either side. This clearance shall be ensured by the Bidders.
- (3) **Micro Speed (Inching Motion) & Acceleration**
 - a) Normal speeds for hoisting cross travel and long travel shall be as indicated in clause 6.3.1 above.
 - b) Crane shall also have provision for raising and lowering of the loads at reduced speed (inching) of 1/10th (one tenth) of the normal speeds in both main and auxiliary hoist capacities.

(4) Arrangement of Operator's Cabin

In respect of the operator cabin of the crane, it shall be fitted on the downstream side of the Power House.

6.6 Requirements for Design & Construction

6.6.1 General

The crane shall conform to all the requirements of BIS-3177/BIS-466 and BIS-807 or equivalent international standard.

6.6.2 Crane Bridge Girders

The crane bridge, made of two (2) girders box type construction, reinforced with stiffening ribs, supported on end trucks, shall be designed to safely carry the full rated load without undue vertical or lateral deflection or vibration. The design shall

Chanju III HEP

000272

Chapter 6 EOT Crane For Power House & GIS Hall

that girder vibrations are quickly dampened to within 1 mm in 4 seconds. However, in case of GIS Hall Crane, the crane bridge shall be a single bridge construction. The bridge shall be designed taking into consideration the specified transport and handling limits in regard to size and weight of packages. Accordingly, the bridge shall be sectionalized into suitable but minimum number of sections within the transport constraints and also of need of field erection & handling.

The joints between the sections shall be spliced and shall be made by most appropriate method. Most appropriate design shall be adopted for the spliced joints between the sections.

The bridge shall have the following provisions:

- (1) Welded end-stop of steel to act as stoppers for trolley/crane.
- (2) Heavy rails for trolley consisting of suitable square bar of manganese alloy steel, continuously welded to one corner at each main girder.
- (3) Large gusset and skew plates with interference fit bolts at girder ends to connect to the end trucks to maintain a square rigid structure secure against shock & skewing of crane on the track.
- (4) Suitable number of guide rollers for guiding trolley wheels on rail track.

6.6.3 Trucks (End Carriages)

The trucks of box type construction with openings at each end for receiving the long travel wheels, driving as well as idle. The girders supported on them. These shall be fabricated or bolted structure of steel and shall have adequate strength and stiffness. The ends of the trucks shall be shaped to form a hood over the truck wheels extending beyond them to receive the track (rail) sweeps and bumpers. The trucks shall be arranged so that wear may be compensated in order to maintain the drive gear in proper mesh. The size of the journals shall be ample to carry the rated capacity load at specified speed without excessive heating during continuous operation. Wheel assembly shall be mounted on L-type bracket and shall be so arranged that replacement of any wheel can be achieved from the side without undue difficulties. The supplier shall furnish the technical details of jacks to be supplied.

6.6.4 Wheels

The bridge shall be carried on at least 8 (eight) wheels, 4 (four) on each side, for power house cranes and 8 (eight) wheels, and four nos. of wheels for GIS Hall crane, suitably mounted on trucks and designed so as to distribute the load equally on truck beams & wheels. The wheels shall meet the following requirements:

The wheels shall meet the following requirements:

- (a) Double flanged type with treads machined and ground to size.
- (b) Turned, bored and ground to true and uniform diameters concentrically.
- (c) Made of cast steel or forged steel and heat treated. Cast iron wheels are not

Chanju III HEP

000273

Page 8

acceptable.

- (d) Equalized in pairs or individually as necessary.
- (e) Flanges tapered and radi used to prevent jump over/derailment.
- (f) Tread width to have proper clearance, and to be of sufficient size to withstand maximum static and moving/rolling loads. The BHN of hardness of wheels shall be atleast 50 points more than the BHN of rails.
- (g) All wheels for trolley and Bridge shall be identical for interchange ability.

The design of the wheel truck assembly shall be such as would allow the wheels to adjust themselves to irregularities of the runaway within allowable limits.

6.6.5 Wheel Axles

The wheel axles shall be in accordance with following:

- (a) Made of forged carbon or alloy steel.
- (b) Accurately turned ground and polished at the positions fitting into wheels.
- (c) Suitable interference fit with the wheels.
- (d) Driving wheel axles to be keyed, in addition to interference fit.

6.6.6 Wheel Axle Bearings

The wheel bearings shall be interchangeable, easily removable type & shall comprise the Bearing housings/journals fitted into truck bodies and anti-friction roller bearings with high pressure grease lubrication.

6.6.7 Trolley

The trolley shall be made as a welded frame of structural steel and shall be designed and fabricated in accordance with the following:

- (a) Provision of adequate bracing to withstand vertical, lateral and torsional strains.
- (b) Properly machined to mount within permissible alignment tolerance the drum, wheels, axles and motor- gear box drive system for hoisting and cross travel.
- (c) Provision of heavy duty roller bearings, for trolley wheels & winding drum, with bearing caps and fittings for pressure lubrication.
- (d) Double end resilient or spring buffers at bottom of trolley frame on each side to register against stops at each end of the bridge.
- (e) A provision of strong point to fit/receive a device to lift the heaviest parts of the trolley viz. the drum and drive for maintenance without any external place for anchoring the hooks or need for any other co-structural attachment.

6.6.8 Operator Cabins

The cabin of structural steel frame shall be designed and constructed in accordance with the following requirements

All the controls shall be housed inside the cabin.

- (a) Enclosed type for indoor service having adequate working space for operation and maintenance with sufficient ventilating type windows which also allow the operator to have clear view of alloperations.
- (b) Adequately braced to the crane so as not to sway, swing, or shake.
- (c) Floor of steel plates securely connected to the frame and covered with matting.
- (d) Located on the upstream / downstream (as finalised during detail Engineering) for the crane of the Power House and suspended from their outside girders. The GIS Hall crane shall have no cabin.
- (e) Railing on all open sides, a ladder for access to the crane bridge walkway, a CO₂ portable fire extinguisher.
- (f) A cut-off switch near the cabin for disconnecting the incoming power supply before entering or leaving the cabin, for operator safety.
- (g) Foot operated rotary alarm gong atleast 300 mm in dia meter.
- (h) Provision of suitable electrical flood lights shall be kept in the cabin.

6.6.9 Walkways and Ladders

In power house, Ladders, stairs, platform, walkways, hand holds, railings etc., necessary to give safe access to and movement in the cage, bridge drive and trolley drive mechanisms and all other components of the crane needing inspection, maintenance and repair shall be provided. The contractor shall also be responsible to provide stairways access to the operator cabin & maintenance cage of EOT Crane from the service bay.

6.6.10 Hydraulic Lifting Table

In the power house, a Static type hydraulic lifting table consisting of elevating platform, base frame, and scissor type mechanism connected with elevating platform and base frame shall be provided by the contractor. The hydraulic lifting table shall be mounted at suitable location on trolley of EOT crane so as to be suitable for working on the crown of P/H. The actual design, size and capacity of the platform shall be finalized during detail engineering.

In the GIS Hall, a Mobile type hydraulic lifting table consisting of elevating platform, base frame, scissor type mechanism connected with elevating platform and base frame suitable for working on the crown of GIS Hall shall be provided by the contractor. The platform shall be of capacity 500 kg, size 1300 mm x900mm.

For the design and specifications, material, performance tests, safety con



Chanju III HEP



Page 10

000275

IS 14130:1994 shall be referred to.

6.6.11 Safety Guards

Appropriate and effective safety guards, encasements, and covers shall be provided for various rotating components and for live electrical conductors of the crane as below:

- (a) For gears, chain drives: Encasements.
- (b) For revolving shafts & coupling Guards for full lengths.
- (c) For sheaves of hook block and rope: Guards to prevent trapping of hand and to prevent rope from dismounting from sheave grooves even if rope slackening develops.
- (d) For openings in foot and cat walk floorings and other inspection platforms Covers of lockable type.

6.6.12 Safety Lugs

Suitable safety lugs shall be provided to contain the movement of the crane during an earthquake. Rail clamps to keep the crane in secure condition while not in operation shall also be provided.

6.6.13 Name Plate

The crane shall have permanent main nameplates affixed to each side of the crane, so as to be clearly legible from the floor, showing the name of the manufacturer and the rated capacity. In addition, each hoist shall have its rated capacity clearly marked on its block.

6.6.14 Bridge Travel Mechanism

The mechanism shall comprise two (2) independent electric motors and totally enclosed speed reduction helical gear units, one (1) for each end of the bridge, to drive the preside four (4) bridge wheels and shall ensure equal speed to prevent slipping action between drives.

The gear motors shall be keyed directly to the extended wheel shafts.

The bridge motion shall be free from vibrations and rocking and jerk less under all conditions of operations and the crane structure shall not have any tendency to get out of line.

The coupling for the shafts of motors, gear units and wheels shall be of safety flange type accurately faced and turned and shrunk into place with taper flush keys.

6.6.15 Trolley Travel Mechanism

This mechanism shall comprise of two (2) electric motors and totally enclosed speed reduction gear units, one (1) for each end of the trolley to drive two (2) trolley wheels/side designed to ensure equal speed and steady motion, free from vibrations and rocking.



Chanju III HEP



6.6.16 Hoisting Mechanism

The hoisting mechanism provided and mounted on the crane trolley shall comprise motors, speed reduction gear units for normal speed, drum, brakes, lifting tackles and hooks, hoisting rope and slings.

(1) Hoist drive for normal speed

Hoist machinery shall consist following items.

- a) Motor
- b) Brake
- c) Gear Box
- d) Rope Drum
- e) Wire Rope
- f) Snatch Blocks

The hoist shall be driven by a motor through speed reduction gear units for normal speed of the hoist and shall be complete with brakes and retarding devices.

(2) Hoist drive for micro speed (Inching)

Gradual and very slow, accurate and controlled operation will be required to place the generator rotor and other heavy equipment very gently. The hoist shall have such provision by means of step-less, frequency converter speed control system, enabling control of the vertical motion of the hoist within 1 mm.

The hoist machinery and lifting tackle for both hoists shall be arranged so that the center of lift does not shift in any direction throughout the full lift of the hoist. Fat angle of not exceeding 3-4 degree shall be ensured for rope reeving/transfer to pulleys/sheaves from the hoist drum.

6.6.17 Winding Drum

The winding drum shall have machined grooves to receive the full hoisting rope without overlapping. The drum shall be of such size that there will be not more than one layer of rope on the drum when the rope is in fully wound position and its length shall be such that each lead of rope has a minimum of two & half (2.5) full turns on the drum when the hook is in its lowest position and one spare groove for each rope lead off the drum when the hook is at its highest position. The drums shall be designed to withstand the maximum compressive stresses and local bending stresses in the drum at the grooves when the rope is wound on. The ratio of rope diameter to drum diameter shall be less than 40.

6.6.18 Lifting Tackles & Hooks

The lifting tackles shall consist of a safety type lower pulley block, hook block, necessary sheaves and flexible steel wire rope. The lower block shall be a heavy steel housing to support the sheaves and hook.

Sheaves shall be made of cast steel and shall be machine grooved to a depth of not less

than one and a half (1.5) times the diameter of the rope. The groove shall be finished smooth and shall be free from surface defects likely to injure the rope. The sheaves shall be provided with guards to retain the rope in grooves and other requirements of sheaves shall be as per approved relevant standards.

The swivelling hook shall be of forged steel and mounted on ball thrust bearings and protective skirt shall be provided to enclose the bearings.

The main hook shall be of the Ramshorn type conforming to latest version of relevant standards (BIS-5749) and the auxiliary hook shall be of shank type conforming to BIS 15560 or latest Version.

6.6.19 Hoisting Ropes, Slings and Reeving System.

The factor of safety for the hoisting ropes shall be not less than six (6). The rope system shall be equalized and arrangements entailing reverse bends shall be avoided as far as possible. For P/H crane, the rope of suitable length so that MIV and runner assemblies can be handled at their respective location. For GIS hall crane, the rope of suitable length so that GIS assemblies/ packages can be handled at the transformer cavern floor level.

The offer shall include requisite wire rope slings of suitable lengths having a safety factor of not less than six (6) while lifting specified load with the angle formed at the hook not less than 90 degrees. A minimum of three pairs shall be provided for different loads up to the rated capacity of main hoist for the crane under scope of supply. The slings shall be suitable for use with hoist.

Each sling shall have a ring at one end and a ring or a hard eye at the other, with matching shackle for the hard eye. Sling rings are to be suitably proportioned to fit on the crane hook.

A wall chart shall be provided showing the maximum safe lift of the slings individually and in pairs at various angles. Each sling and shackle shall have a permanent fixed label on which is stamped the maximum safe lift at 90 degree spread. A storage rack each for safe keeping of the slings separately for each of the three categories of EOT crane shall also be supplied.

6.6.20 Brakes

The brakes for various motion drives shall be as per BIS-3177/BIS-466 or any other international standards. The following type of brakes shall be provided for the various crane drives: -

(1) Bridge Travel

- (a) Main braking by means of frequency speed control of motors down to zero (0) (regenerative braking).
- (b) Automotive DC electro-magnetic brake for each motor drive
- (c) Foot actuated hydraulically operated brakes for wheels on both sides of bridge



Chanju III HEP



000278

Chapter 6 EOT Crane For Power House & GIS Hall

of double (2) brake discs.

Changes if any shall be finalised during detail engineering.

(2) Trolley Travel

- (a) Main braking by means of frequency speed control of motors down to zero (0) (regenerative braking).
- (b) Automatic DC electro –magnetic brake for each motor drive.
- (c) Automatic Electro –Hydraulic thrusters brake.

(3) Hoisting Motion for Main Hoist

- (a) Main braking by means of frequency speed control of motors down to zero (0) (regenerative braking).
- (b) Automatic DC electro –magnetic brake for each motor drive.
- (c) Automatic Electro –Hydraulic thrusters brake.

(4) Hoisting Motion for Auxiliary Hoist

- (a) Main braking by means of frequency speed control of motors down to zero (0) (regenerative braking).
- (b) Automatic DC electromagnetic brake for each motor drive.
- (c) Automatic Electro-Hydraulic thruster brake or double brake discs.

The electromagnetic brakes shall be of DC type complete with rectifier equipment to convert the available AC 230V, 50 Hz supply. The electro-hydraulic thruster brakes shall be of AC type.

The operating solenoids of the DC Electro-magnetic brakes shall release the brakes on energization and shall automatically apply all the brakes immediately in the event of stoppage, interruption or failure of electrical power supply. The brakes shall also apply immediately on operating the emergency stop push button or switch, irrespective of controller position.

The DC Electro-magnetic brakes shall be of spring set shoe type equally effective in both directions of rotation. The springs for the Electro-magnetic brakes shall be of compression type and shall have adequate factor of safety.

The brake system shall have the following provisions: -

- (i) Locking device in the brakelever.
- (ii) Means for adjustment to compensate for wear of the shoes/discs.
- (iii) Emergency stop pushbuttons

The wearing surfaces of all brake drums shall be machined and shall be cylindrically smooth and free from defects. The brake lining shall be effectively and permanently secured to the brake shoes during the effective life of the lining and shall be protected from water, grease, oil and other adverse effects. The brake pedals in case of foot operated brakes shall have non-slip surfaces and it shall be possible to apply the foot

Chanju III HEP

000279

brakes with a force up to 25 kg.

All the brakes shall have adequate capacity. The brakes for hosting when applied shall arrest the motion and sustain the load up to the test load at any position of the lift. Provision shall be made to control with safety, the lowering of any load up to the test load.

Brakes in other motions shall be capable of bringing the relevant motions of the fully loaded crane safely to rest in the shortest possible time with least possible shock and shall arrest the motion under all other service conditions.

The various brakes shall be designed to exert, the torque equal to 1.5 times the full load torque of motors.

The brake torques may be increased if considered necessary by the supplier in order to ensure proper and safe application of the brakes. All Electro-magnetic brake coils shall have continuous rating.

Each brake of travel motions shall be equipped with manual disconnect lever which will allow the brakes to be released without electrical power.

6.6.21 Gears

The gears and the gear trains for reduction of speeds of the motors for various motions of the crane shall be designed, manufactured/fabricated as per latest version of relevant standards/specification with following provisions:

- (1) Only spur and helical gears shall be used for speed reduction gearing. The tooth profiles are to be carefully designed as per relevant standards.
- (2) The gears having speeds higher than 500 rpm shall be of helical teeth type with active contact area case hardened to a depth of 0.2 to 0.3mm.
- (3) Shall be made of cast steel or forged steel and designed as per BIS-4460 for the specified crane duty.
- (4) Shall be totally enclosed in oil tight gear cases of welded fabricated steel.
- (5) Shall have Inspection covers on the top of the gear case for quick and easy inspection of gears and for adding oil in the gear case.
- (6) Adequate breathing and drainage facilities on all gear cases.
- (7) An oil level indicator.
- (8) Proper guards for uncased gears.
- (9) Markings of pitch line on all gears for facilitating erection.

6.6.22 Shaft

All shafts shall be designed and made in accordance with the following:

- (1) Material - High tensile rolled steel or forged steel.
- (2) Shaft diameter to take into account the provision of key slot & splines. Slot bottom

Chanju III HEP

000280

shall have proper radius.

- (3) Where needed designed with suitable shoulders / step-up diameter for carrying and fitting of gears, pinions and similar parts.
- (4) Provision of fillets of ample radius at all diametric changes in sections.
- (5) Designed to limit shaft deflection to within 1/3000th of the span between Bearings.

6.6.23 Bearings

- (1) All bearings shall be designed and provided in accordance with the following
- (2) Provide antifriction/roller, ball or bush (sleeve) journal type as applicable for components as per sound practice.
- (3) Bearings shall be located close to the points of loading and shall be easily replaceable type.
- (4) The bearing preferably shall be of self-lubricated type.
- (5) Bearings at shaft ends shall be sealed appropriately so as to be drip proof in case of oil lubrication.
- (6) In case of grease lubrication type, open ends of bearings to be appropriately sealed with grease retainers.

6.6.24 Lubrication Arrangement of Bearings

Provision shall be made for lubricating all bearings including ball and roller bearings by a pressure gun. All lubrication nipples shall be readily accessible. Ball and roller bearings shall be packed with grease during initial assembly. Where access to a bearing (e.g. end carriage wheels) for lubricating purpose is difficult, provision shall be made for remote lubrication through copper or brass piping of ample size. Gear trains, sleeve bearings etc. shall be provided with oil lubrication. Gear trains shall be run in oil baths. High pressure grease guns shall be supplied with the crane. The crane shall be handed over completely lubricated with approved oils and grease in the presence of Purchaser maintenance crew. The Contractor shall furnish details of the lubricants such as the quantities and specifications etc. to enable Purchaser to procure the lubricants for stock. The contractor shall supply a lubricating chart indicating points to be lubricated and frequency of lubrication.

Specification and details of lubricants shall be furnished by supplier. The brands of oil/grease used above shall be stated in the bid.

6.6.25 Sheaves

Rope sheaves shall be of cast steel or welded steel construction with machined rope grooves. Sheave grooves shall be smooth and free from surface defects which could cause rope damage. The cross sectional radius at the bottom of the groove shall be such as to form a close fitting saddle for the size of rope used, and the sides of the groove shall be tapered outward to facilitate entrance of the rope into the groove.



Chanju III HEP



000281

corners shall be rounded, and the rims shall run true about the axis of rotation.

The sheave pins shall be made of annealed carbon or alloy steel (except as otherwise specified). All revolving sheaves shall be equipped with standard replaceable roller bearings with dust seals. The load sheave rpm at full rated speed shall be used to size all sheave bearings. Each sheave shall be lubricated by an individual grease fitting. All revolving sheaves shall be statically balanced.

Drums, sheaves, bottom blocks, and hoisting rope shall be designed so that when raising or lowering no crossover reeving will occur. Idler sheave arrangements shall be designed to minimize any twist in the rope.

6.6.26 Couplings

Couplings shall be of the flanged type with recessed bolts or suitable guards. Couplings shall be designed so that their strength equals the shaft strength and shall be of the flexible, spacer, or geared type.

6.6.27 Bolts & Nuts

Bolts and nuts for mechanical equipment shall be supplied as per relevant standards and specification. Nuts shall be secured by effective lock-nuts or other approved locking devices.

6.6.28 Drip Pans and Covers

All bearings and gear cases shall be made oil tight. Suitable drip pans shall be provided to collect oil and grease which may drip from bearings, gear cases and other components of the crane. In case drip proof arrangement is not possible, means for cleaning the drip pans shall be available.

Dust covers shall be provided where necessary to protect sliding and rotating parts and to prevent dust from mixing with the lubrication.

6.6.29 Bumpers

Resilient / spring bumpers shall be attached to the bridge trucks and the trolley. The bridge shall have four bumpers one at each corner, arranged to meet the crane stops squarely. The trolley shall have two bumpers on each side placed to meet the track stops squarely at the end of the stops. The bumpers shall be capable to absorb safely the kinetic energy and shall be capable of bringing the crane and the trolley to a gradual stop when travelling at rated speed in either direction, when the power supply is suddenly cut-off and thus, eliminate excessive stresses and damage to any part of the crane.

6.7 Electrical Apparatus and Controls Of Crane

6.7.1 General

- a) Power House Crane shall normally be controlled from the floor by radio control. The crane shall also be controllable from a stand-by control station located at the crane.

Chanju III HEP

000282

Chapter 6 EOT Crane For Power House & GIS Hall

operator's cabin. This stand-by station shall be equipped with a complete set of lever type controls for temporary crane operation and shall provide reasonable visibility for the operator to permit safe temporary operation. The crane shall be provided with a control scheme selector switch located at the stand-by control station. This switch shall select between the radio control and the standby control scheme. Modes of operation shall be controllable by the radio control scheme.

- b) In case of GIS Hall crane, it shall be controlled by Pendant control system
- c) The radio control system shall provide all crane (P/H) motions with separate control levers.
- d) All crane motions (hoist, trolley, and bridge) shall be regulated by adjusting either the voltage and/or frequency of the motor electrical supply with a variable frequency drive device.
- e) Each crane shall be provided with control panel/desk located in the operator's cabin. The controls shall provide for individual independent control of cranes for all motions and various speeds up to normal speeds.

6.7.2 Control Levers and PushButtons

- a) For individual independent control (start, stop and motor speed selection) of each crane, suitable joysticks/control levers/push buttons shall be provided
- b) The controls shall provide for torque and precise speed control of the various motors in adequate numbers of steps (within the range of step less speed control) in both directions of motions.

6.7.3 Remote Radio Control and Pendant Control

A. Remote Radio Control

(a) General

- i. The operation of crane from machine hall and service bay floor at EL.1627.00 m. shall be made by remote radio control system. However, provision for control of the crane, operated individually from the floors immediately below the crane available during the progressive construction of the power house (including the lowermost floor) when subsequent floors have not been casted, shall also be possible by the above remote radio control system.
- ii. The equipment furnished shall provide for the complete radio control of all crane functions specified in following paragraphs.
- iii. Each radio controlled crane shall be equipped with a 100-W amber indicator lamp located beneath the centre of one of the bridge girders. This light shall be energized whenever the crane is in the radio control mode and the crane's master contactor has been energized.
- iv. Reliability, dependability, and ease of maintenance shall be prime



Chanju III HEP

000283



Chapter 6 EOT Crane For Power House & GIS Hall

considerations in the design and construction of all components and parts of the equipment, to ensure positive operation of the system under all conditions of dust, moisture, temperature, vibration, and electrical interference. Reduced maintenance requirements and long service shall be achieved through simplicity and use of conservatively rated, heavy-duty industrial type parts. The design of the equipment circuitry and application of components shall represent the state of the art.

- v. Wherever practicable, replaceable modules with reliable plug-in connections shall be used.
- vi. The system shall be designed so that no field tuning adjustments will be required when replacing a faulty module and shall permit a field change of the operating frequency by replacement of plug-in type components with minimum adjustment.
- vii. The radio control equipment shall be the type accepted by and shall conform to all applicable Government rules and regulations. The supplier shall perform a frequency search and shall file for operating license on behalf of the Owner.
- viii. Radio crane control equipment shall be of reputed make.

(b) Operation

- i. The following function shall be radio controlled:
 - Forward and reverse speed control of the bridge travel motion;
 - Right and left speed control of trolley (crane) travel motion;
 - Up and down speed control of each hoist motions;
 - On and off control of the lights on the underside of the crane bridge;
 - On and off control for the crane's alarmgong.
 - On and of control of the crane's mastercontactor.
- ii. The speed control of each motion shall provide for the direct radio step less control specified for that motion.
- iii. Steep less radio control shall be accomplished with a speed set point telemeter system utilizing pulse rate, pulse width, or other similar systems. The speed of a motion shall be a direct function of the control lever's position and shall preferably utilize a logarithmic scale for greater control of the slower speeds. A "jogging" system of controlling a motorized potentiometer or any other system, in which the control lever's position corresponds to acceleration rather than a speed, is unacceptable.
- iv. Control information shall be transmitted using digitally coded information. The radio control system shall allow simultaneous transmission of all crane functions. A means of checking and detecting error in the digital data

Chapter 6 EOT Crane For Power House & GIS Hall

stream shall be provided to prevent a misoperation of the crane. Radio interference signal shall not cause operation of any of the crane functions.

(c) Safety

- i. The complete control systems shall be designed to provide maximum safety for personnel, crane equipment, adjacent structures, plant equipment, and material being conveyed. The equipment shall comply with all laid down safety requirements applicable to this class of equipment.
- ii. Control signal combinations shall be designed for safe operation so that uncommanded operation of the crane cannot result from stray or transient control signals or from extraneous natural or man-made sources of radio frequency interference.
- iii. The system shall be designed "fail safe". Failure of electronic components or normal aging beyond specific limits shall result in stopping all crane motions. Crane motions shall also stop when any crane receiver is out of the range of its transmitter.
- iv. A "dead man" feature, consisting of self-centring control levers and safety cut-off switches, shall be built into the control transmitters to cause all crane motions to stop if the operator releases pressure on the corresponding control lever or if he accidentally trips, or fall or drop the transmitter.
- v. Shock conditions or vibration encountered on the cranes shall not defeat the safe operation of the receiver units.
- vi. All control devices shall be designed to facilitate safe manipulation by an operator whose attention is normally directed toward the crane under his control. All control levers shall operate in the manner specified in "Control Levers and Pushbuttons".
- vii. The crane control system shall be designed to provide nearly instantaneous operation of all crane motions and functions in response to master control settings.
- viii. Operating frequencies shall be selected to be free from interference from other radio frequencies used in the vicinity.
- ix. An isolator fitted on the crane bridge which cannot be operated from the floor shall be provided to prevent inadvertent operation of the crane from the floor or radio remote control system while maintenance work is being carried out on the crane.
- x. Power supply to the crane shall be provided at 1 end of (down shop lead) DSL. TP isolator switch with indicating lamps shall be provided at these locations so that it can be operated from ground and power supply shall be cut-off immediately in case of any emergency conditions.

(d) Transmitters

- i. The transmitter shall be of light weight construction not exceeding 3 kg in weight (including battery) and shall be equipped with a belt or shoulder harness.
- ii. Transmitter control levers shall be furnished for all multi-speed crane motions and shall be spring return and guarded against false operations.
- iii. The transmitters shall be operated by compact, nickel-cadmium batteries capable of 8 hr of continuous operation without recharging. The battery shall form the part of transmitter system.
- iv. Battery chargers suitable for charging 2 sets of transmitter batteries simultaneously shall be furnished for either wall or shelf mounting. The battery chargers shall operate on 230 V, 50 Hz AC supply. Batteries and battery chargers shall be supplied in an amount as required to permit 24 hours per day, 7 days per week operation of the radio controllers.
- v. Radio control units designed and adjusted for use with one crane shall not be capable of controlling any other cranes at the site unless specifically readjusted for the purpose of controlling a different crane.
- vi. Transmitters shall be completely solid state.
- vii. All control functions shall use crystal controlled radio frequency signals.
- viii. Literature containing operating / maintenance details of transmitter & battery & charger shall be supplied with the system.

(e) Receivers

- i. Receivers shall be designed to respond only to signals from the transmitter control unit designed and adjusted for operating that specific receiver.
- ii. Receivers shall be shock-proof to resist vibration.
- iii. Receiving antennas shall be of rugged construction and shall be mounted under the crane bridge.
- iv. The receivers shall be completely solid state. All semi-conductors shall be silicon to the extent practicable.
- v. Failure of any electronic component shall result in "fail safe" operation bringing all crane motions to a halt. Uncommanded motions shall not be possible. Digital coding shall be designed to prevent inadvertent control actions.

(f) Intermediate Relays

- i. Intermediate relays shall be heavy-duty type with 10-A continuously rated contacts and shall be capable of withstanding inductive transient voltages resulting from crane control contactor operation. Surge suppression shall also be provided to protect receiver components from inductive transients.

voltages.

- ii. Intermediate relay panels shall be separately fused and provided with disconnect devices.

(g) Alarm Gong Operation

The crane shall have a radio control function to sound the alarm gong whenever the operator elects.

(h) Operating Distances

The crane shall be operated by radio control system from a minimum horizontal distance equal to the length of the crane's runway. It shall be operatable at this distance from the available floor immediately below the crane.

B. Pendant Control System

i. General

GIS Hall crane shall be controlled / operated by Pendant push button control from GIS floor.

ii. Pendant Control

Provision for control of the GIS Hall crane from the floor of the GIS Hall shall be made comprising pendant control switches of pressed push button type, which shall return to "OFF" position instantly on release. The pendant shall have one push button of lockable type for "OFF" function to enable cutting "OFF" the control power supply positively when the crane is not in use. The control push button station (pendant control) shall be suspended from the crane bridge on an electrical or spring type actuated cable drum, which permits the extension of the cable to allow the control from elevations 1627.00 m & 1633.30 m. The pendant sting push button control station shall be freely movable along the entire crane bridge. Height of the pendant push button from floor level should be adjustable to suit the operational requirements.

- iii. Provision of control at the crane from the floor of Power house by radio remote control which will also enable operation of cranes from other floors like generator floor, turbine floor etc. Radio control shall be provided for GIS also.

6.7.4 Motors

The crane shall be provided with motors for normal as well as creep speed for all motions.

All the motors shall be of ample capacity for the duties and speeds specified and shall conform to BIS-325/BIS-3177 or equivalent. The motors shall also meet the requirements as specified in BIS-325/BIS-3177 or equivalent. Motors shall be suitable for reversing, frequent accelerating and electro-hydraulic/DC braking. All motors shall be suitable for operation at 415V, 50Hz, 3 phase three wire system.



Chanju III HEP

000287

000287



Chapter 6 EOT Crane For Power House & ~~GIS Hall~~

The bearings shall have ample strength to withstand the heavy shocks and variations to which they will be subjected. Full technical particulars of each motor including the value of the locked motor current, breakdown torque etc. shall be given in the Tender. All electrical works shall conform to safety rules/practices.

Sr. no.	Feature	Description
1.	Motor Standards	As per BIS-325 and BIS-3177
2.	Capacity	Ample capacity to suit respective duties. Full load torque of motors shall be higher than the maximum load torque.
3.	Type and Enclosures	All motors will be of squirrel cage type to suit 415 V, AC, 3 phases, 50 Hz, four wire power supplies, totally enclosed. The motors shall be suitable for direct on line starting any hoisting/lowering rated load, even in event of frequency control system being out of order. Protection IP54 with fan cooling arrangement for power house. The type of starter for motors i.e. DoL or Star Delta shall be finalized during detail engineering.
4.	Variation of supply	Voltage: $\pm 10\%$, Frequency: $\pm 3\%$ Any combination values of voltage and Frequency variations within the above limits.
5.	Pull out torque	Not less than Two point two five (2.25) times the full load torque of motors at rated voltage and frequency.
6.	Insulation	Class - F
7.	Time rating	One (1) hour for all motors
8.	Temperature rating	Temperature rise not to exceed the limits as prescribed in BIS-325. Max. Temperature rise at full load measured by resistance method shall not exceed 60 °C over the maximum ambient temp. During operating time.
9.	Rated synchronous speed	To suit duty for various motions
10.	Over speed withstand	Two point five (2.5) times rated speed or capacity 2000 rpm whichever is less
11.	Space heaters	To be provided
12.	Motor bearing Roller type	Sealed to prevent grease leakage and entry of dust. Shall be of ample strength to withstand heavy shocks and vibration to which subjected under all conditions of operation
13.	Tests	Type & routine tests as per IS: 325. Copies of test reports to be furnished by the supplier
14.	Temperature rise	By resistance measurement method

Chanju III HEP

000288

Chapter.6 EOT Crane For Power House & GIS Hall

15.	Climate	The maximum temperature upto 45 degree C in summer and minimum upto - 10 degree C in winter is observed.
		fungus, vermin, and corrosion shall be provided
16.	General requirements	Sturdy and strong to withstand operational shocks and vibrations
17.	Terminal	Shall be arranged such that terminals are easily accessible for inspection and maintenance. Natural ventilation shall not be restricted

All motor shall be of 60 min (40 % CDF) rating.

6.7.5 Limit Switches

Limit switches for hoisting motion shall be spindle type, while for bridge and trolley motions, these shall be of lever/roller and proximity type with maintained contacts. The number of limit switches shall be as under for each crane:

Motion/ Travel	Travel	Raising	Lowering	Emergency 'Up' Limit
Main hoist	-	1	1	1
Auxiliary hoist	-	1	1	1
Bridge	2	Two- Way Self resetting type		
Trolley	2	Two- Way Self resetting type		
Mono rail	2	1	1	1

6.7.6 Load Cell System

The main and auxiliary hoists of the crane shall be equipped with a load cell system capable of measuring the load on their hooks. The load cell system shall measure loads from 0 to 130% of the hoists rated capacity with a precision of $\pm 5\%$ or better, between the effective and the indicated loads, for all loads between 0 and 130% of the rated load of the hoists. The load cell shall be of corrosion-resistant steel construction and shall be designed with a factor of safety of not less than four (4) at 130% of the rated hoists capacity, relative to the ultimate strength of the material. The load cell system shall operate from the crane's AC power supply and shall display the load on the hooks in tons through a 3-digit display or meter readout located at the stand-by station. The load cell system shall incorporate a capacity limiting feature which will prevent the crane from handling a load which exceeds a set point by stopping all crane motions. This point shall be adjustable for any load between 90% and 120% of the hoists rated capacity. Whenever this feature stops the crane, a flashing red light, visible from the floor beneath the crane, shall be energized, to indicate that the crane is overloaded.

6.8 Electrical Controls and Protection for Operation of crane

6.8.1 General

The crane shall be controlled from the operator's cage. The operator's cage shall be equipped



with a complete set of lever type controls for crane operation and shall provide reasonable visibility for the operator to permit safe operation. All crane motions (hoist, trolley, and bridge) shall be regulated by adjusting either the voltage and / or frequency of the motor electrical supply with a variable frequency drive device. The crane shall be provided with control panel / desk located in the operator's cabin. The controls shall provide for Individual independent control of crane for all motions and various speeds up to normal speeds.

6.8.2 Description of Frequency Control for Drive of Power House Crane

Equipment for controlling this drive shall be a multi drive system, with inverters in one cabinet. Each cabinet consists of one common rectifier with a common DC-bus, with inverters connected. This system will, in case braking energy is being supplied from one motor, supply the energy to the next motor connected to the DC-bus. If the braking energy exceeds the energy used by the other inverters, a braking chopper will open, and supply the energy to a braking resistor.

It is a vector controlled frequency converter, which means it can drive a motor through zero rev. at full torque. To achieve a Pulse encoder (Tacho) is used at the motor to control the flux and phase shift, in order to obtain the exact position of the rotor.

All frequency converters shall be connected to application process controller (APC), where all controls on the frequency converters shall be done. The APC shall program the application to fit the required specifications. The control shall be closed loop vector control system.

Each movement of the crane motors is controlled by joystick or lever in the crane control cabin. Motors are controlled by the APC in the frequency converter cubicle. The APC gets the direction / speed signals from the joystick. The APC calculates the speed and torque, in order to secure correct speed.

When stopping the operation of hoisting or lowering, the APC performs commands to the frequency converter, for lowering the speed to zero, and keeping it at zero speed before giving order to turn on the brake. When starting the operation of lowering or hoisting, the APC controls the frequency converter with a certain torque before releasing the brake, in order to avoid any drop.

If the braking energy exceeds the energy of all the frequency converters, the braking chopper will open and use the braking resistor.

When being in "position Mode", the joystick signal is being disabled and only joystick movement signal is being used.

When the crane operator moves the joystick forward, the crane will move only over a predefined distance, and stop. To move an additional step he will have to move the joystick once more etc.

6.8.3 Control Levers and Push buttons

To control individual items (start, stop and motor speed selection) of the crane



Chanju III HEP



000290

Chapter 6 EOT Crane for Power House & ~~GIS Hall~~

joystick /control lever/push buttons shall be provided as described in these specifications.

The controls shall provide for torque and precise speed control of various motors in adequate numbers of steps (within the range of stepless speed control) in both directions of motions.

6.8.4 Safety Requirement

The complete control systems shall be designed to provide maximum safety for personnel, crane equipment, adjacent structures, plant equipment, and material being conveyed. The equipment shall comply with all laid down safety requirements applicable to this class of equipment.

6.8.5 Operation of Brakes

Whenever power supplies to the various drive motors for various motions are cut-off, the brakes shall be automatically and instantly applied. The brakes shall also be applied immediately in case of any over speed of the hoist motor in the lowering direction.

6.8.6 Electrical Interlocks

The main circuit breaker (CB) for power supply to the crane shall have interlock providing CB to be able to be closed only when all the control lever switches for the various motors are in "Off" positions. The interlock shall be so arranged that if the contactors for various motors / drives have failed to open even through the control lever switches have been brought to the "Off" positions, the CB will not close.

The master controller shall be provided with a thumb operated auxiliary switch so as to ensure the safety of personnel and equipment in case of loss of attention or sudden death of the operator during operation of crane. The control circuit of the master controller shall be so arranged that all the controls during starting and subsequent operations shall be de-energized unless the thumb operated switch is kept in pressed position. During the operation also if the operator fails to keep it pressed, the power supply to the controls shall be disconnected.

6.8.7 Miscellaneous Features

The controls shall have following provisions:

- (1) 3 poles 415 V AC, ACB with rupture current not less than 40kA.
- (2) A master push button for complete emergency stop in the cabin at a convenient location.
- (3) A key operated electrical switch for the control circuit to prevent unauthorized operation and for the safety of maintenance and operating personnel.
- (4) Indicating lamp to show that the control circuit is healthy.

Chanju III HEP

000291

Page 26

- (5) Indicating lamp for the main circuit breaker position (OFF or ON).

6.8.8 Automatic Electrical Protection

The electrical equipment and circuitry shall be provided with automatic protection, as detailed below against various faults and mal-operation of the equipment.

- (1) Protective relays for protection against instantaneous over-current, over-load, single phasing and under voltage for all motors. The over current relay shall be adjustable between two (2) to three (3) times the full load motor current.
- (2) Protective relays of motors to trip the main power supply circuit breaker in case of their operation due to fault.
- (3) MCCB's for control and protection of all motor circuits.
- (4) Air circuit breaker located in operator cabin, of 3 pole, 415 V, AC, totally enclosed type for power supply tapping from the main collectors, with interrupting capacity not less than 25kA, equipped with short circuit, overload and under-voltage trip devices and one shunt trip coil and prevention against single phasing, three (3), timer relays and other necessary devices /items.
- (5) Protection against over speed of the hoist motors which shall cut-off the power supply and apply the brakes in case any hoist motor speed increases to 105% of the rated synchronous speed.
- (6) Operation of any protective relays of motors shall trip the motor supply circuits by opening the primary contactors of the motors.

6.8.9 Circuit Breaker /Controllers.

The circuit breaker or contractor shall have an interrupting capacity of not less than 25kA* symmetrical at 415 volts. All switches, contractors, primary relays and primary circuits on the controller shall have a thermal capacity corresponding to 25kA for one second without injury and shall have a rating of at least 660 volts and capacity ratings in accordance with relevant standards. Allowable temperature rises shall be as prescribed in the standards.

All switchgear control and protective equipment viz. Breakers, contractors, controller, control switches, HRC fuses, relays, meters etc. shall be housed suitably in a cabinet place in a manner convenient for operation and maintenance in the cabins/traveling girders of the crane.

6.8.10 Alarm Gong.

An electrically operated alarm gong or buzzer which will sound while the crane is in motion shall be furnished with the crane. The alarm gong shall also be operable from a conveniently located switch when the crane is not in motion.

6.8.11 Power Supply Tapping & Other Electrical Arrangement

The power to crane shall be supplied through a fully shielded conductor and collector system installed at appropriate elevation of the machine hall /unloading



Chanju III HEP



000292

Chapter 6 EOT Crane for Power House & GIS Hall

conductor system shall be of sufficiently low impedance and suitable current carrying capacity to permit full operation of the crane at the most distant point from the power in feeds.

Metal enclosed isolating switch fuse units shall be provided by the Contractor at 1.5 m above the operating floor level for isolating the power supply leads.

Emergency Stop Push Button shall be provided in the cabin for emergency tripping. The push button shall so arranged as to immediately put off the main supply and apply all brakes simultaneously irrespective of controller position.

6.8.12 Down Shop Leads (Main Runway Conductors)

The support brackets should first be welded to the gantry. The insulators etc. should thereafter be fixed in position. The copper wire should then be lifted and tightened in position using the strain insulators at each end. The copper wire should be clear of each intermediate insulator by at least 50 mm. Before the crane is finally put into commission it should be run very slowly over each bracket to ensure that current collector does not foul.

A safe, robust and compact approved (DSL) power supply system with suitable collector using latest technology shall be provided. It shall consist of substantial rolled copper conductors or angle iron of adequate capacity with end brackets and insulators, straining bolts, intermediate brackets and insulators etc. to suit power house building. One end of the conductor shall be fitted with a terminal log to enable power and earth wires to be connected. Safety guards shall be provided to avoid the possibility of any accidental touch with these conductors.

Down shop lead conductor system shall have ratings and characteristics as follows:

- Normal operating voltage, 415 V
- Maximum design voltage, 1100V
- Number of poles 3

These conductors shall have a continuous current rating as necessary to supply the maximum demand during crane operation, as determined by the greater of the following two (2) operating conditions:

- Load current for the simultaneous operation of main hoist motors and all bridge travel motors
- Load current for the simultaneous operation of main hoist motors and all trolley travel motors.

The Down shop lead system, when assembled in place, shall permit independent longitudinal movement of the housings and conductors to allow for unequal thermal expansion and contraction. All conductors wherever required shall be housed in a common enclosure made of sheet steel not less than 16 gauge thick. Conductors shall be capable of carrying the rated current per pole continuously without overheating.



Chanju III HEP

000293



Chapter 6 EOT Crane for Power House & ~~GIS Hall~~

Pickup trolleys shall have wheels equipped with sealed ball bearings and contacts of sufficient size to maintain full current carrying capacity without overheating. Contacts shall maintain constant contact pressure and alignment with the conductors.

The supplier shall furnish all necessary supports, wall brackets, mounting bolts and accessories, anchor bolts, concrete inserts, and conduit and cable connections for the power supply to the feed box.

6.8.13 Cross Wires

Flexible copper wire PVC insulated trailing cables arranged in festoon configuration shall be provided on the bridge and cross wires. The cable shall be suspended on bearings operating on I-beam of suitable size just outside on the bridge girder.

6.8.14 Circuit Arrangement

The leads from the down shop collector shall be connected to a master manual magnetic contactor which shall be controlled by "on" and "off" pushbuttons as specified. The master contactor shall be connected to two (2) circuit breakers, each of appropriate carrying and interrupting capacity. One circuit breaker shall be connected to a 415 V/ 230 V, 3-phase, dry- type transformer of the rating required to supply power for all lights, controls, heaters, and convenience outlets on the crane. The second circuit breaker shall supply the main feed for the bridge, trolley, and hoist motors.

A 230 V, distribution panel equipped with branch circuit breakers as required, shall be provided to distribute power to the lights, heaters, and receptacles.

6.8.15 Wiring

All electrical wiring shall conform to latest version of BIS-1554 (Part-I) "PVC insulated (heavy duty) FRLS electric cables, for working voltage upto and including 1100 volts". All conductors for primary power, lighting and control circuits shall be insulated for not less than 1100 volts and shall have standard moisture resisting double braid coverings. Care should be taken to ensure that all the connections are made with proper lags, glands and ferrules to prevent loose contacts at later date due to normal crane vibration. All conductors between the secondary of the motor contactors and resistors shall have sufficient current carrying capacity in accordance with the standard specifications and shall be insulated with 1100-volt class asbestos, high temperature type tropical insulation with moisture resisting impregnation. The primary conductors to the motor shall have standard, continuous current carrying capacity of not less than 100% of the rated full load primary current of the motors. All control and lighting conductors shall be of copper of suitable sizes. All the wiring shall be subject to approval of the Purchaser. All wiring shall be laid in hot dip galvanized metal conduits. Alternately armoured cables can be used. Conductor having nominal equivalent copper area of cross section less than 2.5 mm shall not be used for wiring.

6.8.16 Illumination and Convenience Outlets

The permanent AC illumination system on the crane shall consist of four 200 watts High Bay LED Lighting units for the Power House to illuminate uniformly the area under the

Chanju III HEP

000294



Chapter 6 EOT Crane for Power House & GIS Hall

crane. Two 15-20 watts LED lighting units and two 5/15 amp convenience outlets shall be provided in operator's cabin. A convenient outlet at each end of the bridge shall also be provided.

A portable hand lamp with plug and 25 m long wiring shall also be supplied for by the supplier for use during maintenance.

6.8.17 Earthing

The crane structure, motor frames and metal cases of all electrical equipment including metal conduits or cable armouring or guards shall be efficiently bounded to facilitate earthing as per Indian Electricity Rules 1956 and latest edition of BIS-3043.

The supplier shall provide an earthing system to which all equipment under his scope of supply shall be interconnected. This system will in turn be connected to the powerhouse earth mat.

6.8.18 Runway Rails

One (1) set of runway rails suitable for crane complete with sole plates, anchor bolts; clamps etc. for the bridge travel shall be designed and supplied by the supplier for the power house length.

The runway rails shall preferably be CR-100 type, as per BIS-3443. The faces of the rail lengths shall be inclined at an angle of forty-five (45) degrees to the length to provide oblique gaps between rail lengths.

The rails for bridge travel shall be laid on and fixed to the crane beam by means of anchor bolts etc. The supplier shall supply all the materials including embedded parts for fixing the bridge rails on the crane beam. All embedded parts shall be supplied to the purchaser within two (2) months from the date of placing of work order. The supervision of erection of embedded parts for crane rails shall be responsibility of the crane supplier.

6.8.19 Lifting Beam

The lifting beam shall be supplied by the crane supplier. Lifting beam is required for handling the generator rotor, generator stator or other parts by the main hoist. The weight and dimensions of the lifting beam shall be within the transportation limitations. It shall have a full capacity to handle the highest weighted assembled part of generator rotor and generator stator. Suitable number of detachable wheel shall be provided with the lifting beam for easy movements on the assembly bay. The lifting beam shall have in-built pins for attaching to main hoists.

All connections between the lifting beam and lifting devices/ attachments for the generator rotor/stator etc. shall be so arranged that when the lifting beam is attached to the main hoists of crane, the generator rotor/stator with the shaft shall remain in a vertical position and shall be free to turn upon its vertical axis. The horizontality of the beam shall be maintained when it is lowered or raised. Suitable roller type bearings shall be provided for the load support. The final lifting arrangement for the components



Chanju III HEP

000295



Page 30

Chapter 6 EOT Crane for Power House & GIS Hall

requiring use of lifting beam etc. shall however be finalized in consultation with the generator unit manufacturer. The lifting beam shall be provided with suitable arrangements (such as mercury limits switch) to check the horizontality of the beam when it is attached to the crane. For this, balance indicator is to be provided on the lifting beam to show that beam is horizontal at all times.

Necessary drawings for lifting arrangement for stator and rotor alongwith attachments for lifting these items shall be supplied.

6.8.20 End Stops

Suitable end stops shall be provided at the end of the runway-rails for the crane.

6.8.21 Cleaning and painting

After fabrication, all structural steel and unfinished surface of casting shall be cleaned thoroughly of all mills or foundry scale, rust, dirt, oil, grease and other foreign substances. The cleaning shall be done by metal brush scrappers, chisels or hammers or by sand blasting. Oil and grease shall be removed by wiping with gasoline or benzene. After cleaning, the surface shall be given two priming coats of approved rust resistant paint. Surface which will not be accessible after the parts are assembled or erected shall be given additional shop coat. Immediately after cleaning all machined finished parts and surfaces including bolts and nuts shall be well coated with suitable rust preventive compound. In addition, one coat of finishing paint of approved colour shall be applied over two coats of primer in the shop. All paintings shall be performed in workman like manner and the resulting paint film shall be uniformly thin without runs, or partially covered areas. All joints and crevices will be coated thoroughly. No paint shall be applied on damp or framed surfaces, and material painted under cover in dump or cold weather shall remain under cover until dry. In painting machinery, special care shall be taken that no paint is applied to finished surfaces. The material shall not be loaded for shipment until the paint is thoroughly dry. In handling painted material, care shall be taken to avoid scrapping or breaking the painted surface. Sufficient quantity totally of paint for giving one coat to equipment after erection at site shall be supplied.

6.9 Inspection, Shop Assembly and Match markings

6.9.1 Material Requirements and workmanship

Materials and workmanship shall conform and comply with the latest edition of Indian Standards and in the absence of Indian Standards suitable internationally accepted standards such as ASTM, ISO, British Standards etc., subject to acceptance by the Purchaser. The supplier shall indicate and submit the list of the standards to which the materials, components, and workmanship, would conform.

Bronze and stainless steel bolts and nuts shall be used in all cases where components/part are subject to frequent adjustments or removal, such as stuffing box, adjustment bolts, adjustable bearings etc.

6.9.2 Manufacturing Procedures

Chanju III HEP

000296

Chapter 6 EOT Crane for Power House & GIS Hall

Sound quality control and inspection procedures shall be adopted during the shop manufacture and fabrication. All bought out items shall be of reputed make and conforming to National Standard/International. The supplier shall provide free access and facilities to the Purchaser and/or his authorised representatives whenever he desires so to visit the works for inspection during manufacturing of the crane and its accessories.

6.9.3 Appearance

In order to provide a neat, uncluttered appearance, all external surfaces of the crane shall be smooth and free from protrusions wherever possible. All structural gussets, electrical conduits, drive and hoist machinery and any other components shall be concealed from view

if feasible. Bolt heads for those bolts which join the major structural members may be exposed to view.

6.9.4 Fabrication in Works Only

The crane shall be completely fabricated in the supplier's workshop and no welds on main structures shall be allowed at site. If for transportation reasons the main girder has to be divided into parts, these parts shall be bolted and the bolted connections shall be designed to withstand the maximum load with the required safety factors.

6.9.5 Consumables for Site Assembly and erection

All consumables required for site assembly, erection handling and routine testing of crane at site shall be supplied by the supplier.

The quantities and technical particulars of welding electrodes required for welding of various parts of crane and other components shall be indicated during design stage.

Oil and grease required for first filling of various equipment of the crane along with ten (10%) percent excess quantities shall be supplied. Quantities, brand, grade, technical parameters, characteristics shall be informed.

6.9.6 Cleaning, Coating and Shop Painting

Before dispatch, all exposed, unfinished metal surfaces shall be thoroughly cleaned in the most appropriate manner and shop painted. After cleaning and preparation of steel surfaces, these shall be given at least one prime coat of suitable rust preventive compound the same day. Further painting shall be applied in accordance with the paint system listed below. The colours of the paint will be of a type used in similar nature of crane.

The paint system for both exterior and interior exposure shall be full gloss enamel of reputed brand & make with a total D.F.T. (dry film thickness) of 150 microns.

All interior surfaces of the crane that are accessible for maintenance inspections shall also be completely painted. All other interior surfaces shall be painted with only one (1)



Chapter II HEP

000297



coat of primer. The inside of all gear housings shall be painted with two (2) coats of an oil resisting enamel as recommended by the gear housing manufacturer.

About fifteen percent (15%) quantity and type of paint used for the second and third coats shall be provided for field touch-up work.

All materials shall be carefully boxed, crated and protected for transportation.

6.9.7 Match Marking and Despatch

The parts of crane shall be delivered in assembled condition to the maximum extent possible within the constraints of specified transport limitation of the packages, and of field handling and erection.

Field connections shall be fitted in the shop and match-marked suitably to facilitate field erection. All such match-marks shall be clearly legible after the crane is painted. On painted surfaces the match-marks shall be placed after the painting is completed. Two copies of all diagrams with such marks for field connections shall be furnished with the crane.

6.10 Inspection & Testing

6.10.1 Shop Tests

The following shop tests shall be carried out and test items marked with '**' shall be carried out in the presence of the Purchaser and Consultant's Personnel.

1. Hardness and tensile stress tests according to the applicable standards, on samples of:

- hooks*
- steel plates and steel sections of the main girders* of the bridge* and trolley* (one sample of each delivery)

2. Ropes shall be tested for yield point and ultimate breaking strength.

3. Magnetic particle inspection on:

- all major steel and cast iron castings
- all major steel forging (including hooks)

4. Ultrasonic tests on hooks.

5. Tests on electrical equipment:

Tests as detailed in the applicable standards shall be carried out on electrical apparatus and motors, control panel and cabinets.

For the hoist motors the values of the starting and rated torques shall be measured.

6. Tests on brakes*:

On the brakes, tests shall be carried out to prove that the braking capacity operation is in accordance with the required capacity.



7. Tests on welding*:

According to the adopted welded joint efficiencies. In any case 10percent of the major welds shall be radiographically examined. All major welds shall be checked with magnetic particles or dye penetrant.

The Contractor shall demonstrate the healthiness of the welded portion at the shop test attended by the Purchaser and Consultant's Personnel. The weld to be radiographed will be selected by the Purchaser and Consultant's Personnel.

8. Pre-erection and operation tests*:

Electric overhead travelling cranes shall be completely pre- assembled in the shop except that conduit and permanent wiring need not be finally installed. Where wires need to be pulled for shipment, temporary harnesses providing all power and control circuits may be substituted for the purposes of shop running tests. With Purchaser's prior approval, the operator's cabin, completely wired to controllers, and the main runway collector arm need not be assembled below the bridge in the shop, but correct fitting of structural connections shall be proved. All parts requiring lubrication shall be properly inspected and lubricated before trial operation. All motions of the hoists trolley and of the bridge travel mechanisms shall be demonstrated to the satisfaction of the Inspector. Proper meshing of all gears and the alignment of all machinery and shafting shall be checked. Correct operation of limit switches and interlocks shall be demonstrated (by manual tripping where necessary). The operational tests shall also demonstrate operability of all electrical equipment and devices, and the correct mutual functioning of interrelated components.

Dimensional checks shall be performed and noted on the crane assembly drawings to be certain that the crane has been manufactured within tolerances.

Hoisting and travelling speeds shall be checked. Join operation of the electrical equipment shall be also tested.

Load test of hook shall be carried out and test load be 150% of the rated load.

Moreover, a load test of the main and auxiliary hoists, at 125% rated capacity, shall be carried out, deflection of the bridge girders shall be measured and compared with the guaranteed value.

6.10.2 Field Tests

The contractor shall carry out the field test in the presence of the Purchaser. The tests shall include but not necessarily be limited to those described herein.

1. Field no-load tests

- Rail: The span and levels of two (2) rails shall be measured with a suitable interval.
- Bridge: The Crane after being installed and completely wired, (before installation of the trolley) shall be inspected and operated on the runway to check clearances



Chanju III HEP

000299



Chapter 6 EOT Crane for Power House & ~~GIS Hall~~

with the structure and accuracy of alignment and tracking on the runway rails.

- Trolley: After placing the trolley subassemblies on the bridge, the hoists shall be reeved, observing proper care in handling wire ropes to prevent damage. Once reeved, the hoist and travel motions shall be operated several times, through their full travel, without load on the hook blocks, to check operation on the machinery and controls and adjustment of limit switches.

2. Total Assembly: All motions of the completely assembled crane shall be thoroughly and completely observed for freedom of operation, conformance with floor coverage and reach requirements, freedom from internal mechanical interference, proper alignment of all running parts and freedom from vibration. Electrical continuity of all circuits and servicing of all points requiring lubrication shall be completely inspected.

3. Field load tests

- Running-in-Trails: Before starting the load tests, the cranes shall be operated under light loads for at least four hours actual operating time, in order to run-in the gearing and to ensure proper lubrication. After this run-in period, the cranes shall be inspected to determine that all parts have remained in correct alignment and no indications of excessive wear can be detected. Adjustments shall be made, if necessary, in accordance with the manufacturer's recommendations.

- Load Test: Loads for conducting these tests shall be provided by the Contractor and at the Purchaser's discretion may range from 25 - 125 % of rated capacities of each hoist, or in increasing increment thereof. All motions of the crane will be observed and

- Recorded during these test for conformance with the characteristics guaranteed by the Contractor.

- The following tests shall be performed on the cranes:

- Each hoist shall be operated to raise, lower and hold in any position test load of up to 125 percent of its rated capacity.

- With approximately rated load on any hoist, the hoisting and lowering speeds shall be determined and recorded. Subsequently the load shall be "inched" in the hoisting and lowering direction and the vertical movement of the load on five successive movements shall be determined and recorded and the average obtained.

- The hook speeds for each point of the controller which will move the load, both in the hoisting and lowering direction shall be determined and recorded for each hoist, for at least three loads between 20percent and 100percent rated load, to establish the overall hoist characteristics.

- With approximately rated load on the main hoists, the bridge shall be

Chanju III HEP

000300



Chapter 6 EOT Crane for Power House & ~~GIS Hall~~

each direction of travel and data recorded as in point above. The trolley shall be "inched" in both directions and similar data obtained.

- The crane shall be operated to transport test loads of up to 100 percent of the rated capacity for the full length of the runway, and the running speeds observed and recorded.

The operation of all brakes at all speeds and of all limit switches shall be checked.

The rated capacity load shall be maintained for not less than fifteen (15) minutes. After unloading, the residual (inelastic) deformations of both bridge girders shall be checked.

- Electrical Measurements: At least two observations or readings of electrical power input shall be made for each test on all crane motions unless otherwise agreed by the Purchaser. Volts amperes and watts input shall be recorded for each applicable motor during all of the tests. To avoid reconnecting electrical meters for each motion of the cranes, the meters may be connected at the incoming power supply to the crane. The amount of power used for cranes shall be measured.

6.11 List of Drawings

S No.	Drawing No.	Title
1.	DGM(ED-I)-CHANJU-III-01	Power House Cross Section

6.12 Guaranteed & Technical Particulars

The Bidder shall submit guaranteed & technical particulars of the equipment Volume-IV of Bidding Documents.

6.13 Mandatory Spares

Mandatory spares for the O&M of equipment covered under this section are given in Schedule No .II, Vol.-IV of Bidding Document. The Bidder may review the above spares and may add the spares which are essentially required for the satisfactory operation & maintenance of the equipment. The Bidder shall accordingly quote the itemized price of these spares in the price Schedule, Vol.-II of the Bidding Document.

6.14 Recommended Spares

The Bidder may recommend the spares in addition to the mandatory spares in Schedule No.III, of Vol.-IV of Bidding Document. The itemized prices of the spares shall be quoted in price Schedule Vol.-II of Bidding Document. Procurement of the recommended spares shall be at the option of the purchaser.

6.15 Tools, Tackles and Testing Devices

Chanju III HEP

000301

Chapter 6 EOT Crane for Power House & ~~GIS Hall~~

The Bidder shall supply one set of Tools, Plants Tackles & Testing Devices etc. required for proper O&M of the equipment.

The Bidder shall submit a list of above equipment in the Schedule No. IV, Item No.5 of Volume-IV and itemized price in the Schedule of prices (Vol-II) of Bidding Document.

6.16 Similar Installation

The Bidder shall submit a list of similar installation of the equipment in Schedule No. V, of Volume-IV of Bidding Document.

6.17 Delivery, erection, testing and commissioning of Equipment

The Bidder shall indicate the delivery erection, testing and commissioning of the equipment in Schedule No.VII, Item No.5 of Vol.-IV of Bidding Document.

6.18 Package / Consignment Data

The Bidder shall indicate the number of packages of consignment together with the size (LxWxH) and weight for transporting the equipment in the Schedule No. VIII, of Volume-IV of Bidding Document.

6.19 Bought out Items

The Bidder shall submit a list of the bought out items together with its make etc. in the Schedule No. IX, of Vol.-IV of Bidding Document.

6.20 Completeness of the equipment

All fittings and accessories for EOT crane and accessories that may not have been specially mentioned in these specifications but are usually necessary for completion of equipment shall be deemed to be covered by the specification and shall be indicated and furnished by the contractor without any extra charge to the HPPCL.



Chanju III HEP



000302

6.1 EOT Crane For Power House And GIS Hall

Guaranteed Technical Particulars

ITEM	DESIGNATION	UNITS	VALUE		REMARKS
			P/H	GIS Hall	
1.	General				
1.1	Manufacturer /type designation		_____	_____	_____
2.	Main data				
2.1	Number of cranes	Nos.	_____	_____	_____
2.2	Duty class of cranes		_____	_____	_____
2.3	Rated capacity of main / auxiliary hoist	Tons	_____	_____	_____
2.4	Crane span (centre to centre of rails)	m	_____	_____	_____
2.5	Normal operating speeds (at rated load)				
	bridge travel (long)	m/min.	_____	_____	_____
	trolley travel (cross)	m/min.	_____	_____	_____
	main hoist lift / lower	m/min.	_____	_____	_____
	auxiliary hoist lift / lower	m/min.	_____	_____	_____
2.6	Total lift of main / auxiliary hook	m	_____	_____	_____
2.7	Acceleration / deceleration				
	bridge travel	m/sec ²	_____	_____	_____
	trolley travel	m/sec ²	_____	_____	_____

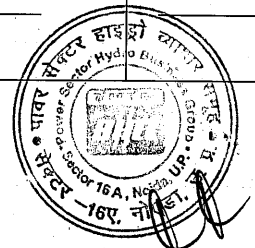
ITEM	DESIGNATION	UNITS	VALUE		REMARKS
			P/H	GIS Hall	
2.8	Lowest factor of safety (referred to yield strength)				
	- for entire crane structure		_____	_____	_____
	- for hook		_____	_____	_____
	for wire rope		_____	_____	_____
2.9	Maximum vertical deflection of bridge girder				
	at rated load plus dead load	mm	_____	_____	_____
	at test load	mm	_____	_____	_____
2.10	Test loads of main / auxiliary hoist	Kg	_____	_____	_____
2.11	Speed Regulation				
	from	%	_____	_____	_____
	To	%	_____	_____	_____
2.12	Minimum Incremental Movement of				
	main hoist	mm	_____	_____	_____
	Auxiliary hoist	mm	_____	_____	_____
	Bridge Travel	mm	_____	_____	_____
	Trolley Travel	mm	_____	_____	_____
2.13	Wheels for Bridge Travel				
	Number of wheels on each side of bridge	No.	_____	_____	_____

[Handwritten Signature]

CHANJU-III HEP

00000

000063



ITEM	DESIGNATION	UNITS	VALUE		REMARKS
			P/H	GIS Hall	
	Percentage of Drive wheels on each side of bridge	%	_____	_____	_____

6.2 Informative data

ITEM	DESIGNATION	UNITS	VALUE		REMARKS
			P/H	GIS Hall	
1.	Bridge travel mechanism				
1.1	Number of motors for normal speed	No.	_____	_____	_____
1.2	Rated power of motor for normal speed	kW	_____	_____	_____
1.3	Relative duty factor of motor for normal speed	%	_____	_____	_____
1.4	Number of wheels	No.	_____	_____	_____
2.	Trolley drive mechanism				
2.1	Number of motors for normal speed	No.	_____	_____	_____
2.2	Rated power of motor for normal speed	kW	_____	_____	_____
			P/H Runner	GIS Hall	

CHANJU-III HEP

000064



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

**SECTION IA
ANNEXURES**



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

ANNEXURE-I

MAKES OF SUB-VENDOR ITEMS

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
1.	STEEL	DILLING- GTS- VENTES		
		MOBER		
		SAIL		
		TATA STEEL		
		CORUS		
		VOEST ALPINE GROBBLECH GMBH LINZ		
		INDUSTEEL		
		THYSSEN KRUPP		
		JSPL		
		FERROMEX		
		REINERBRACH		
		AZOVSTAHL IRON & STEEL CO.		
		WUYANG IRON & STEEL CO. LTD.		
		DUFERCO CLABEQ		
		ARCELORMITTAL		
		POSCO		
		NIPPON STEEL		
		KOBE STEEL		
		JFE		
		ESSAR STEEL		
MARUBENI ITOCHU				
WELSPUN				
SWEDESH STEEL				
2.	HOOKS	STEEL FORGING & ENGG. CO.,	KOLKATA	
		SIMRITI FORGING		
		KARACHIWALA		UP TO 25T CAPACITY
		IRIZAR FORGE, SPAIN		



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
3.	GEAR COUPLINGS	ALLIANCE		
		FLEX-TRANS (formerly known as HICLIFF)		
		SAHARA		
		NUTECH		
		OEM		
4.	WIRE ROPE	USHA MARTIN		
		FORT WILLIAMS		
5.	BEARINGS	SKF		
		FAG		
		TATA		
		NBC		
6.	MOTORS	KIRLOSKAR		
		CGL		
		ABB		
		NGEF		
		SIEMENS		
		GE(ALSTOM)		
		BBL		
		KEC		
		JYOTI		
7.	BRAKES	ELECTROMAG		
		SPEED-O- CONTROL		
		BCH		FOR DCEM BRAKES ONLY
		KAKKU		
		PATHE		
8.	CONTACTOR	SIEMENS		
		ABB		
		L&T		
		C&S		
		SCHNEIDER		
		HAVELLS		



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
9.	OVER LOAD RELAYS	SIEMENS		
		L&T		
		ABB		
		SCHNEIDER (Earlier TELE MACHANIQUE)		
10.	HRC FUSES	SIEMENS		
		L&T		
		ENGLISH ELECTRIC		
		GE POWER		
		EATON (BUSSMANN)		
		ABB		
11.	ISOLATING SWITCH	SIEMENS		
		L&T		
		CONTROL & SWITCH GEAR		
		ABB		
12.	SWITCH FUSE UNITS	SIEMENS		
		L&T		
		CONTROL & SWITCH GEAR		
		ABB		
13.	TIME DELAY RELAYS	SIEMENS		
		L&T		
		ABB		
		BCH		
		SCHNEIDER (Earlier TELE MACHANIQUE)		
14.	TRANSFORMERS	PRAGATI		
		PRAYOG ELECT		
		KAPPA		
		AUTOMATIC ELECTRIC		
		SILKAANS		
15.	BULB &	PHILIPS		



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
	FLOURESCENT TUBES/FITTINGS	BAJAJ		
		CROMPTON		
16.	CABLE LUGS (HEAVY DUTY)	DOWELLS		
		UML ENGINEERS	KOLKATA	
		JAINSON		
17.	HOOTERS	BEACON		
		OSC		
		TARGET		
		KHERAJ		
18.	LIGHTING SWITCHES	ANCHOR		
		ELLORA		
		BAJAJ		
		PHILIPS		
19.	PVC POWER CABLES	CCI		
		UNIVERSAL		
		KEI		
		POLYCAB		
		INCAB		
		NICCO		
		TORRENT		
		KEC		
		HAVELLS		
20.	PVC CONTROL CABLES	HAVELLS		
		UNIVERSAL		
		POLYCAB		
		FINOLEX		
		NICCO		
		CCI		
		KEI		
		TORRENT		
		INCAB		
		DELTON		
		LAPP		



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		KEC		
21.	TRAILING CABLES	NICCO	KOLKATA	
		UNIVERSAL	SATNA	
		INCAB		
		ICL	NEW DELHI	
		APAR INDUSTRIES LTD	MUMBAI	
		CMI LTD	FARIDABAD	
		KEI INDUSTRIES LTD	NEW DELHI	
		SUYOG ELECTRICALS LTD	VADODARA	
22.	XLPE POWER CABLES	CCI		
		UNIVERSAL		
		POLYCAB		
		INCAB		
		NICCO		
		TORRENT		
		KEC		
		NEXAN		
		HAVELLS		
23.	XLPE CONTROL CABLES	APAR INDUSTRIES LTD	MUMBAI	
		CABLE CORPORATION OF INDIA LTD	MUMBAI	
		CRYSTAL CABLE INDUSTRIES LTD	KOLKATA	
		DIAMOND POWER INFRASTRUCTURE LTD	VADODARA	
		GEMSCAB INDUSTRIES LTD	NEW DELHI	
		HAVELLS INDIA LIMITED	NOIDA	
		KEI INDUSTRIES LTD	NEW DELHI	
		KRISHNA ELECTRICAL INDUSTRIES LTD	GWALIOR	
		KEC INTERNATIONAL LIMITED	MUMBAI	



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		PARAMOUNT COMMUNICATIONS LTD	NEW DELHI	
		POLYCAB WIRES PVT. LTD	MUMBAI	
		RADIANT CORPORATION PRIVATE LIMITED	HYDERABAD	
		RAVIN CABLES LIMITED	MUMBAI	
		SUYOG ELECTRICALS LTD	VADODARA	
		SRIRAM CABLES PVT. LTD	NEW DELHI	
		TORRENT CABLES LTD	AHMEDABAD	
		UNIVERSAL CABLES LTD	SATNA	
24.	CABLE GLAND	COMMET		
		SUNIL&CO		
		ARUP ENGINEERING		
		JAINSON		
		DOWELL		
		ALLIED TRADERS & EXPORTERS	NOIDA	
		BALIGA LIGHTING EQPT.PVT.LTD.	CHENNAI	
		ELECTROMAC INDUSTRIES	MUMBAI	
		INCAB	KOLKATA	
25.	PUSH BUTTONS	SIEMENS		
		L&T		
		BCH		
		SCHNEIDER		
26.	LIMIT SWITCHES	SPEED-O-CONTROL		
		ELECTROMAG		
27.	MASTER CONTROLLER	SPEED-O-CONTROL		
		ELECTROMAG		
28.	SAFETY SWITCHES	ALSTOM		
		L&T		
		SIEMENS		



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
29.	PENDENT PUSH BUTTON STATION	OEM		
30.	INDICATING LAMPS	TECKNIC		
		BCH		
		SIEMENS		
		STANDARD		
31.	MCB	SIEMENS		
		SCHNEIDER		
		CGL		
		ABB		
		L&T		
		C&S		
32.	PANELS	HAVELLS		
		SIEMENS		
		SCHNEIDER		
		CGL		
		L&T		
		ABB		
		GE		
		HAVELLS		
		RITTAL		
		PYROTECH		
33.	RESISTANCE BOXES	ENAPROS		
		OEM		
34.	FIRE EXTINGUISHERS	VIJAY		
		SAFEX		
		ZENITH		
		BHARTI FIRE ENGINEERS		
		MINIMAX		
		LIGHTEX		



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		NITIN		
35.	VVVF	L&T		
		YOKOGAWA		
		ABB		
		SIEMENS		
		SCHNEIDER		
36.	SHROUDED DSL	SUSHEEL		
		STROMAG		
37.	ANTI COLLISION DEVICE	ELECTRONIC SWITCHES INDIA		
38.	LOAD CELL	IPA		
		SARTORIUS		
39.	RRC	ACROPOLIS ENGINEERING	-	
		SNT CONTROLS	-	
40.	GEAR BOX	OEM		* = Applicable for Geared Motors only
		ELECON ENGINEERS		
		SHANTI GEARS		
		PBL*		
		NAW*		
		NORD*		
		SEW*		
BONGFILIOLI*				
41.	RAIL	JSPL		
		SAIL		

NOTE:

1. THE SUB VENDOR LIST ABOVE IS INDICATIVE ONLY AND IS SUBJECT TO BHEL AND CUSTOMER APPROVAL DURING DETAILED ENGINEERING STAGE WITHOUT ANY COMMERCIAL & DELIVERY IMPLICATION TO BHEL



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

2. BIDDER TO PROPOSE SUB VENDOR WITHIN 4 WEEKS OF PLACEMENT OF LOI. THEREAFTER NO REQUEST FOR ADDITIONAL SUB-VENDOR SHALL BE ENTERTAINED.

3. THE INSPECTION CATEGORY WILL BE FINALISED AFTER AWARD OF CONTRACT DURING DETAILED ENGINEERING. HOWEVER, THE SAME WILL BE ADHERED BY THE BIDDER WITHOUT ANY COMMERCIAL AND DELIVERY IMPLICATION TO BHEL/ CUSTOMER.



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

ANNEXURE-II MANDATORY SPARES

Mandatory spares list shall be as per **“Customer’s specification” of EOT Crane.**
Also refer **“Customer’s specification- Schedule-II- Mandatory Spares”.**

SCHEDULE-II

MANDATORY SPARES

Handwritten signature



CHANJU-III HEP

000169

5) Mandatory spares of E.O.T Crane for Power House

E.O.T CRANE FOR POWERHOUSE

(Mandatory spares)			
1.	Bearings for:		
	S.No.	Items	Quantity
	a)	Bridge travel wheels	2 nos.
	b)	Trolley wheels	2 nos.
	c)	Long Travel motor	1 no.
	d)	Cross Travel motor	1 no.
	e)	Main hoist motor	1 no.
	f)	Auxiliary hoist motor	1 no.
	g)	Rope drum of each type	1 no.
	h)	Pulleys for main hoist	2 nos.
	i)	Pulleys for auxiliary hoist	2 nos.
2.	Pair of brake shoe/disc with lining of each size of Brake used viz. DC Operated electro-mechanical or hydraulic thruster:-		
		Items	Quantity

CHANJU-III HEP

9

000180



a)	Long Travel motion	1 set (1no. of EHT+1no. DCEM)
b)	Cross Travel motion	1 set (1no. of EHT+1no. DCEM)
c)	Main Hoist	1 set (1no. of EHT+1no. DCEM)
d)	Auxiliary Hoist	1 set (1no. of EHT+1no. DCEM)
3.	Pair of brakelining with rivets for each size of brake used:-	
	Items	Quantity
a)	Long Travel motion	2 sets (2nos. of EHT+2nos. DCEM)
b)	Cross Travel motion	2 sets (2nos. of EHT+2nos. DCEM)
c)	Main Hoist	2 sets (2nos. of EHT+2nos. DCEM)
d)	Auxiliary Hoist	2 sets (2nos. of EHT+2nos. DCEM)
4.	Main spring for each size of brake used:-	
	Items	Quantity
a)	Long Travel motion	2 sets (2nos. of EHT+2nos. DCEM)
b)	Cross Travel motion	2 sets (2nos. of EHT+2nos. DCEM)



MANDATORY SPARES

c)	Main Hoist	2 sets (2 nos. of EHT+2 nos. DCEM)
d)	Auxiliary Hoist	2 sets (2 nos. of EHT+2 nos. DCEM)
5.	Brake shoe with lining for foot operated hydraulic brake for	
a)	Long Travel motion	2 sets
b)	Cross Travel motion	2 sets
c)	Main Hoist	2 sets
d)	Auxiliary Hoist	2 sets
6.	Brake coils for each size of brake used.	
	Items	Quantity
a)	Long Travel motion	2 Nos.
b)	Cross Travel motion	2 Nos.
c)	Main Hoist	2 Nos.
d)	Auxiliary Hoist	2 Nos.
7.	Brushes for	
(a)	Main hoist motor	One (1) set
(b)	Auxiliary hoist motor	One (1) set
(c)	Cross travel motor	One (1) set
(d)	Long travel motor	One (1) set
8.	Brush holder assembly complete with brushes and springs for	
(a)	Main hoist motor	One (1) set

CHANJU-III HEP

11

000182



(b)	Auxiliary hoist motor	One (1) set
(c)	Cross travel motor	One (1) set
(d)	Long travel motor	One (1) set
9.	Current collector for DSL	3 sets
10.	Insulator for conductors supports assembly of each type	2 sets each
11.	Limits switches and switches of each type	1 set each
12.	Thruster of each type	2 nos.
13.	Pair of oil seals for each gearbox used	12 Nos.
14.	Contactors of each size used	2 No. each
15.	Fixed and moving contacts of each size of contactors used	2 Nos.
16.	3 nos. coils for each size of contactors used	
(a)	Main hoist	2 Sets
(b)	Auxiliary hoist	2 Sets
(c)	Cross travel	2 Sets
(d)	Long travel	2 Sets
17.	3-phase overload relay for each motor	2 Nos.
18.	3 nos. fuse links of each size used on crane	4 sets. (12 Nos.)
19.	1 Printed circuit of each size and type	1 No.
20.	3 resistor elements of each type and size	2 Sets (6 Nos.)
21.	Complete set of lamps for lighting and signals	4 Nos.
22.	Timers of each type	2 nos. each
23.	Nylon slings 5T-10T-20T	Two of each size of reputed make



CHANJU-III HEP

12

000183





3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

ANNEXURE III - TOOLS & TACKLES

One (1) lot of following unused new set of special purpose tools, tackles and accessories along with detailed instructions and maintenance manual for the crane shall be supplied. Each tool and wrench shall be stamped so as to be identified, easy for its use. The tools shall be supplied in steel toolbox and with a copy of instruction manual. The items supplied shall be of the best quality and minimum the following shall be provided.

S.N.	Items	Quantity
1	Complete sets of spanners (ring and ratchet type)	One set of each type
2	Complete set of screw driver	1 set
3	Insulated pliers	1 no.
4	Adjustable wrench	1 no.
5	Hand lamp	2 nos.
6	Line tester	1 no.
7	Tool box with lock and double keys	1 no.
8	Grease gun hand lever type.	2 Sets
9	Grease gun trolley mounted type	1 set
10	hydraulic jacks of 7.5T capacity	1 set
11	Any other Tool/Tackle required for maintenance	

Note:

1) One set of tool and tackles with O&M manual in the toolbox shall be supplied. Further in addition to above mentioned items, if any other items is required for maintenance of crane, the same shall also be included as a part of maintenance tools by the bidder.



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

ANNEXURE IV

PAINING SPECIFICATION

1. PAINTING shall be as per clause no. 1.2.15 of Chapter-1, General Requirement and clause no. 6.8.21 & 6.9.6 of Chapter -6, EOT crane for powerhouse, as applicable for EOT Crane & its components.

2. Color Shade:

Sl no	Components	Color	Reference color
a.	Crane structure & trolley hook and block assembly, Platforms, ladders and handrails	Yellow	RAL 1004
b.	Panels	Pearl White	RAL 1013
c.	Motor	As per manufacturer's standard	---



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

ANNEXURE-V

DRAWINGS/ DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT

The successful bidder shall submit the following drawings / documents during detail engineering for Customer's/Consultant's approval /information:

DRAWINGS / DOCUMENTS OF POWER HOUSE AREA EOT CRANE

S.N.	HPPCL DRAWING / DOCUMENT NO.	BHEL DRAWING / DOCUMENT NO.	DRAWING TITLE	APPROVAL CATEGORY	Submission schedule (Weeks from LOA/LOI)
A. BASIC ENGINEERING DRAWING / DOCUMENTS					
1.	CH-III-6-EOT-PH-PE-V0-541-501-A101	PE-V0-541-501-A101	Manufacturing Quality Plan including sub vendor list for 63/8T Power House Crane	APPROVAL	3
2.	CH-III-6-EOT-PH-PE-V0-541-501-A102	PE-V0-541-501-A102	Mechanism Sizing Calculation for 63/8T Power House Crane	APPROVAL	3
3.	CH-III-6-EOT-PH-PE-V0-541-501-A103	PE-V0-541-501-A103	General arrangement and assembly drawing including wheel load details, for 63/8T Power House Crane with CT DSL details	APPROVAL	3
4.	CH-III-6-EOT-PH-PE-V0-541-501-A107	PE-V0-541-501-A107	Schematic circuit diagram of all panels & BOM Including earthing diagram for 63/8T Power House Crane"	APPROVAL	5
B. BALANCE ENGINEERING DRAWING / DOCUMENTS					
1	CH-III-6-EOT-PH-PE-V0-541-501-A104	PE-V0-541-501-A104	Crab sub assembly for 63/8T Power House crane with CT wheel assembly	APPROVAL	3
2	CH-III-6-EOT-PH-PE-V0-541-501-A105	PE-V0-541-501-A105	Main and Auxiliary hook block assembly with details of hook, nut and check plate for 63/8T Power House Crane	APPROVAL	4
3	CH-III-6-EOT-PH-PE-V0-541-501-A106	PE-V0-541-501-A106	GA of Lifting beam assembly for 63/8T Power House Crane	APPROVAL	4
4	CH-III-6-EOT-PH-PE-V0-541-501-A108	PE-V0-541-501-A108	"General Arrangement of a) Protective panel b) Main hoist panel c) Aux. hoist panel d) Cross Travel panel e) Long Travel panel. f) Pendent g) Remote Radio Control For 63/8T Power House Crane"	APPROVAL	5
5	CH-III-6-EOT-PH-PE-V0-541-501-A109	PE-V0-541-501-A109	Mandatory spare parts list for 63/8T Power House Crane	APPROVAL	8
6	CH-III-6-EOT-PH-PE-V0-541-501-A110	PE-V0-541-501-A110	Gantry Rail installation and Sole plate, Anchor bolt drawing, rail clamp details/ rail fixing details and Grouting Detail / procedure for 63/8T Power House crane	APPROVAL	4
7	CH-III-6-EOT-PH-PE-V0-541-501-A111	PE-V0-541-501-A111	General arrangement for PVC shrouded DSL for 63/8T Power House Crane	APPROVAL	6
8	CH-III-6-EOT-PH-PE-V0-541-501-A112	PE-V0-541-501-A112	O & M Manual, Component wise weight schedule, lifting arrangement & safety arrangement for 63/8T Power House Crane	APPROVAL	12



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

9	-	PE-V0-541-501-A113	Power house EOT crane- Structural calculations (including structural calculation for crab structure).	APPROVAL	4
10	-	PE-V0-541-501-A114	Power house EOT crane-manufacturing quality plan of lifting beam	APPROVAL	4
11	-	PE-V0-541-501-A115	Power house EOT Crane-manufacturing quality plan of motor	APPROVAL	4
12	-	PE-V0-541-501-A116	Power house EOT crane-lifting beam, General Arrangement drawing and sizing calculation	APPROVAL	5
13.	-	PE-V0-541-501-A117	Power house EOT crane-LT wheel machinery & assembly drawings	APPROVAL	4
14.	-	PE-V0-541-501-A118	Power house EOT crane-DSL sizing & cable sizing and cable schedule	APPROVAL	6
15.	-	PE-V0-541-501-A119	Power house EOT crane-Data sheet of crane	APPROVAL	8
16.	-	PE-V0-541-501-A120	Power house EOT crane-Motor data sheet	APPROVAL	6
17.	-	PE-V0-541-501-A121	Power house EOT crane-Cabin layout drawing	APPROVAL	6
18.	-	PE-V0-541-501-A122	Power house EOT Crane-Crane lubrication drawing	APPROVAL	6
C. BIDDER TO SUBMIT FOLLOWING ADDITIONAL DOCUMENT ALSO					
1.	-	PE-V0-541-501-A123	Power house EOT crane -crane operational write up	APPROVAL	5
2.	-	PE-V0-541-501-A124	Consignment details (including details of dimensions (LxBxM), weight, type i.e. loose/box/crate)	INFORMATION	10
3.	-	PE-V0-541-501-A125	Field Quality Plan	INFORMATION	20
4.	-		Other drawings / documents as required by employer, time to time during detailed engineering.	APPROVAL	

Notes:

1. The above drawing list is tentative and shall be finalized with the successful bidder after placement of order. While some of the drawings indicated above may not be applicable, some additional drawings may also be required based on scope of work.
2. Drawings shall be prepared in Auto-Cad latest edition. Required no. of hard and soft copies (editable) of the drawings shall be furnished as per requirement specified elsewhere in the specification.
3. Only manual calculation with authentic supporting literature (e.g. extracts of hand Book/ standard/codes) shall be acceptable. All design calculations and drawings shall be in SI system only.
4. Bidder to note that all values/dimensions/elevations etc. without supporting back up data adopted/assumed by the successful bidder (during contract stage) in the design calculation/drawings shall be taken by the customer/owner to be correct unless they are stipulated in the specification. Any problem arising later in this regard shall be made good by the successful bidder at his cost and no extension of time shall be granted for the same.
5. All the drawings and documents including general arrangement drawing, data sheet, calculation etc. to be furnished to the customer during detailed engineering stage shall include / indicate the following details for clarity w.r.t. Inspection, construction, erection and maintenance etc.: -



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

- a) All drawings and documents shall indicate the list of all reference drawings including general arrangement.
- b) All drawings shall include / show plan, elevation, side view, cross - section, skin section, blow - up view; all major self-manufactured and bought out items shall be labeled and included in BOQ / BOM in tabular form.
- c) Painting schedule shall also be made as a part of general arrangement drawing of each equipment / items indicating at least 3 trade names.
- d) All the drawings required to be furnished to customer during detailed engineering stage shall include technical parameters, details of paints and lubrication, hardness and BOQ / BOM in tabular form indicating all major components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc.
- e) Drawings/ documents to be submitted for purchasers review/ approval shall be under Revision A, B, C... etc. while drawings /documents to be submitted thereafter for customer's approval after purchaser's approval shall be under R-0, 1, 2, 3 etc.
- f) Drawings and documents not covered above but required to check safety of machines/ system, shall be submitted during detailed engineering stage without any commercial implication.
- g) All drawings shall include "B.O.M" and indicate quantity, material of construction, make along with IS/BS No., Technical parameters, dimensions, hardness, machining symbol and tolerance, requirement of radiography and hydraulic tests, painting details, elevation, side view, plan, skin section and blow-up view for clarity.
- h) All drawings shall be prepared as per BHEL's title block and shall bear BHEL's drawing No.
- i) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's/ Customer's/ Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.
- j) Bidder to follow the following the drawing submission schedule:
 - i. 1st submission of drawings as per the submission schedule.
 - ii. Every revised submission incorporating comments – within 10 days.
- k) Bidder to submit revised drawings complete in all respects incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

ANNEXURE VI – PACKING PROCEDURE

COMMON GUIDELINES FOR PACKING

1. GENERAL:

The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit & storage. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage of materials.

All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Contractor shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.

The identification marking indicating the name and address of the consignee shall be clearly marked in indelible ink on two opposite sides and top of each of the packages. In addition, the Contractor shall include in the marking gross and net weight, outer dimension and cubic measurement.

Each package shall be accompanied by a packing note (in weather proof paper) quoting specifically the name of the Contractor, the number and date of contract and names of the office placing the contract, nomenclature of contents and Bill of Material.

2. TYPES OF PACKING:

The following 5 types of packing have been standardized for packing of General Components/ Assemblies.

- 1) 'OP' - Open Type.
- 2) 'PP' - Partially Packed.
- 3) 'CP' – Crate/Box Packing - Components/Equipment requiring physical protection.
- 4) 'CQ' - Case Packing – Machined Components-Small & Medium Components/ Assemblies/ Equipment which require corrosion & physical protection.
- 5) 'CR' - Case Packing – Electrical/Electronic Components/ Assemblies, which require special packing viz. Water Proof, Shock Proof etc...

3. DESCRIPTION OF TYPES OF PACKING:

The various types of packing, as standardized above, are described below.

3.1 'OP' - Open Type

In case, of components which are not affected by water & dust and do not require special protection, are generally not machined, shall be sent as open packages. However, these components may be sent in crates, wherever necessary.

3.2 'PP' - Partially Packed

Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film.

3.3 'CP' - Crate Packing

Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.

3.4 'CQ' - Case Packing - Machined Components/Assemblies/Equipment

Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

pilferage problems shall be packed in Containers. Wherever required adequate quantity of silica gel or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with 100GSM (Colourless) Multi Layered Cross Laminated Polyethylene Film, wherever required. This may be prescribed for electronic parts/critical machined components/surfaces. For mechanical product like valves where motors are separately securely wrapped in polyethylene, the requirement of individual component wrapping shall be exempted.

3.5 'CR' - Case Packing - Electrical & Electronic Components/Assemblies

Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. Adequate quantity of Silica gel packed in cotton bags of 100grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with 100GSM (Colourless) Multi Layered Cross Laminated Polyethylene Film before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel.

Empty space in the cartons shall be filled with rubberized coir to get proper cushioning effect. The cartons shall be manufactured from corrugated Fiber Board.

4 PREPARATION OF PACKING CASES

4.1 DIMENSIONS:

- a) Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm as per applicable drawings of the respective units.
- b) Width of all planks including the tongue shall be more than 125mm and after planing it shall be minimum 100mm.
- c) Minimum number of planks shall be used for a shook.
- d) Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel).
- e) Width of binding planks shall be minimum 100mm.
- f) Distance between any 2 binding planks shall be less than 750mm.
- g) diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm
- h) Distance of the outer edges of these planks from the edge of case shall be less than 250mm.
- i) Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

4.2 JOINTING OF PLANKS

Single length planks shall be used for cubicles whose overall length is less than 2400mm. For cubicles of length more than 2400mm, jointing is permitted. The jointing shall be done with one single or maximum of 2 planks of wood same as other planks of width 250 mm (minimum) with two rows of nails on either side of the joint in zigzag manner. From the joint along height side, it shall be of lap joint with overlap of at least the width of plank.

4.3 TONGUE AND GROOVE JOINTS

Two consecutive planks shall be joined by tongue and groove joint. Depth of tongue shall be 12+1 mm, thickness of tongue shall be 8 +1 mm. The groove dimensions shall be such that the tongue fits tightly into the groove to make a good joint. This type of joint can be done based on the product requirement wherever required.

4.4 PERMISSIBLE DEFECTS

Wood shall be free from knots, bows, visible sign of infection and any kind of decay caused by insects, fungus, etc.

End splits: Longest end splits at each end shall be measured and lengths added together. The added length shall not exceed 60mm per meter run of shook's. Wood pins shall be used to prevent further development of split.

Surface cracks: Surface cracks with a maximum depth of 3mm are permissible. A continuous crack of any



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

depth all along the length is not allowed.

4.5 OTHER MATERIALS

4.5.1 NAILS

The dia. of the nails shall be 3.15mm. The length of the nails shall be 65mm wherever two planks of 25mm thickness are joined and 75mm wherever a 25mm planks is joined to a 50mm plank.

4.5.2 BLUE NAILS

These are used for nailing bituminized Kraft paper/hessian cloth to the planks. The length of the nails shall be 16mm.

4.5.3 HOOP IRON STRIPS

These are used for strapping the boxes. The width of the strips shall be 19+1mm and thickness 0.6+0.01mm. The material shall be free from rust.If sufficient nailing is done for bigger boxes, strapping need not be done.

4.5.4 CLIPS

These shall be used for strapping the hoop iron strips on the boxes.

4.5.5 BRACKETS

These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of thickness min 2mm and width 25+1mm. The brackets shall be of "L" shape, the length of each side being 100+2mm. Two holes shall be provided towards the end of each side for screwing /nailing.

4.5.6 FASTENERS

Bolts, double nuts, spring washers will have to be used for packing of some special items like transformers, reactors, breakers, etc., to hold the job to the bottom plank of the box. The bolts, nuts, washers will be provided by the vendor. Drilling of holes will have to be done using contractor's tools.

4.5.7 MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM

100GSM (Colourless) Multi Layered Cross Laminated Polythelene Film are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

4.5.8 RUBBERISED COIR:

The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

4.5.9 FOAM RUBBER / 'U' FOAM:

This is used for covering the delicate items. This material is provided by the vendor.

4.5.10 MARKING PLATE:

This shall be of anodized aluminium sheet. Size of the marking plate shall be maintained minimum of size as per the details specified in the Figure 4.

4.5.11 PACKING SLIP HOLDER:

This shall be of galvanized iron tinned sheet /Aluminium sheet

4.5.12 SILICA GEL:

Silical gel shall be used for such products only where moisture needs to be avoided.

4.5.13 COTTON BAGS:

These are used for holding silica gel. The bags shall have the following matter indicated on them:

BHEL-UNIT NAME PLACE -PINCODE
SILICA GEL -INDICATING TYPE
BLUE : -ACTIVE
ROSE : -REDUCED ACTIVITY



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

WHITE : -NO ACTIVITY. TO BE REPLACED WITH FRESH SILICA GEL

4.5.14 COTTON/ PLASTIC TAPE:

This is used for tying small items. And also to prevent vibrations of moving parts within the cubicles.

4.5.15 MARKING INK:

The ink used normally is black in color. In some special cases other color also will have to be used. The ink shall be non-fading/indelible and non-washable by water.

4.5.16 POLYETHYLENE BAGS:

These are to be used for keeping the Packing slips. The bag shall be of size 70mm X 100mm (minimum).

4.5.17 Hessian cloth, twine thread, paint will have to be used in packing certain items.

4.5.18 Mechanical Latching clamps:

For CLW Railway panels and similar Panels self-locking clamps can also be used on need basis in conjunction with or apart from regular bolt and nut fixing arrangement. For reusable boxes, these clamps provide easy locking and unlocking arrangement. These clamps will be made available from BHEL in some cases.

4.5.19 STICKERS

The following stickers to be put by the vendor on cubicles/Boxes after packing.

- 1) Case No sticker: 2 nos. Size 25.Cm x 0.45Cm
- 2) BHEL Monogram sticker: 1 no. Size 1.75Cm x 2.3Cm
- 3) Address sticker: 2 nos. Size 3.8Cm x 3.0Cm
- 4) Direction sticker "Front" & "Back" - 4 nos. Size 2.0Cm x 0.75Cm
- 5) Chain Mark Sticker: 4 Nos. Size – 3.0Cm x 0.75Cm
- 6) "Fragile" sticker: 2 Nos. Size. 2.1Cm x 1.5Cm
- 7) "DO NOT STACK" sticker - 2 Nos. Size 3.0Cm x 2.2Cm

In place of stickers, writing all the details legibly with paint shall be allowed & respective units may take decision accordingly.

5. PACKING OF CUBICLES:

5.1 The packing is to be done as per clause 4 in all respects.

5.2 The cubicles are already fixed on wooden pallets. Hence the contractor need not arrange the bottom pallets normally.

5.3 The cubicles will be of different sizes both width wise and lengthwise. The cubicles may be made up of single suite, 2 Suite, 3 Suite, 4 Suite, etc., The width of the cubicles generally varies from 400 mm to 1650mm. The length of the cubicle, generally varies from 1500 mm to 4800 mm. The height is normally 2430 mm. In some cases, the height may be less/more.

5.4 MULTI LAYER CROSS LAMINATED POLY FILM

The inner surface of 4 sides of shook's shall be nailed with Multi-layer cross laminated poly film (as per 4.5.7) using blue nails (as per 4.5.2) wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.

The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film (as per 4.5.7). This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.

The cubicles shall be covered with Multi-layer cross laminated poly film (as per 4.5.7).

5.5 SILICA GEL:

Silica gel (as per 4.5.12) packed in cotton bags shall be kept at different places inside the cubicle as per BHEL-



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

Unit directions. Each suit of cubicle shall be provided with 1 kg of Silica gel (for a 4 suit cubicle 4 kgs of Silica Gel to be used. The bag containing silica gel to be as per 4.5.13).

5.6 LOOSE PARTS:

Any loose parts in the cubicles shall be tied using cotton/ plastic tape. Wooden battens shall be provided wherever necessary.

5.7 WOODEN BATTENS:

In case of cubicle which are not rectangular in shape like control desks, sufficient number of wooden rafters/battens of proper size shall be provided to give strength to the package.

5.8 RUBBERISED COIR:

Gap between the cubicle and the case shall be filled with rubberized coir (as per 5.5.8) with distance between consecutive layers less than 500mm.

5.9 CLAMPING:

Packing shall be bound at edges by nailing M.S. Clamps / Brackets (as per 5.5.5). Each vertical edge shall have minimum 3 clamps. Top horizontal edges will have one clamp for every meter length of package. However, minimum 4 clamps shall be nailed at the top for any cubicle.

5.10 PACKING SLIP:

Packing slip kept in the polyethylene bag (As per 5.5.16) shall be placed in the box at appropriate place. In addition, one more packing slip covered in polyethylene cover and packing slip holder (as per 5.5.11) shall be nailed to front / rear of case.

5.11 MARKING PLATE:

One no. (As per 5.5.10) shall be nailed to the front side of the case.

5.12 CASE MOUNTING:

After complete packing, stencil marking of various details and marking of symbols shall be done as per BHEL instructions using indelible / non-washable marking ink.

5.13 Different types (Typical) of Cubicles with sizes for Packing

1. Single suite cubicle - 900 x 950 x 2500
2. Two suite cubicle - 1650 x 950 x 2500
3. Three suite cubicle - 2400 x 950 x 2500
4. Four suite cubicle - 3150 x 950 x 2500
5. Regulation cub - 1300 x 1350 x 2500
6. Thy cub - 2870 x 1350 x 2500
7. VFD Cub - 3800 x 1550 x 2500

6 PACKING OF LOOSE ITEMS/SPARES

- 1) Shape of cases shall be square, rectangular with single gabled roof or with double gabled roof depending on the nature of the job to be packed. Construction shall be as per drawings enclosed. Only gable will be additional as required.
- 2) Wood with Tongue and Groove joint as per clause 4.3.
- 3) Width of planks shall be at least 100 mm. Width of binding planks (battens) shall be at least 75mm.
- 4) External surface of planks on front and rear shall be plane 100% (except bottom plank).
- 5) Inner surfaces of all 6 sides shall be lined with Multi Layered Cross Laminated Polythelene Film (as per clause 4.5.7) using blue nails.
- 6) Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

- 7) Internal packing: Items that go into the box shall be packed using 100GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film. Any space left between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect.
 - 8) Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.
 - 9) Silica gel as per clause 4.5.12 held in cotton bags as per clause 4.5.13 shall be kept at proper places in the box.
 - 10) Packing slip kept in polyethylene bag (clause 4.5.16) shall be placed in the box.
 - 11) Marking plate as per clause 4.5.10 shall be nailed to side of the box.
 - 12) Two numbers of hoop iron strips as per clause 4.5.3 shall be strapped tightly on the case using clips.
 - 13) Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.
 - 14) Loose items to be kept inside the cubicle
- The components which are removed from cubicle for shipping purpose only, such as meters shall be kept inside the cubicle individually, kept in wooden box and tied firmly in bottom of Cubicle.
 - Other items which are given loose in addition to cubicle shall be packed in separate boxes.

7 BOX SIZES

7.1 BOX SIZES

Table 1 – SPARES WOODEN BOX DETAILS

SNO	BOX	BOX SIZE	BOX Wt	Carrying Capacity
	TYPE	(in mm)	(in KG)	
1	A	800 X 200 X 200	15	
2	B	1500 X 200 X 200	22	
3	C	2000 X 200 X 200	27	
4	D	1100 X 200 X 200	15	
5	E	200 X 200 X 200	5	
6	F	320 X 250 X 260	13	
7	G	320 X 250 X 430	16	
8	H	430 X 370 X 430	23	
9	I	1100 X 400 X 400	45	
10	J	1500 X 500 X 400	65	
11	K	2000 X 500 X 400	93	
12	L	2500 X 500 X 400	88	
13	M	900 X 600 X 600	100	
14	N	3000 X 400 X 400	60	
15	P	600 X 500 X 400	35	
16	Q	710 X 630 X 600	90	
17	R	850 X 630 X 670	102	
18	S	1000 X 770 X 670	140	
19	T	2500 X 850 X 800	180	
20	U	1500 X 700 X 700	120	



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

21	W	1200X900X600	120
22	Y	450 X 200 X 200	10

Table 2 – WOODEN BOX DETAILS

BOX TYPE	BOX SIZE (in MM)	BOX Wt (in KG)	Carrying Capacity
1	320X250X260	10	
2	320X250X430	15	
3	430X370X430	25	
4	670X670X470	65	
5	720X630X600	75	
6	1000X770X660	100	
7	1100X430X670	80	
8	1200X1200X900	80	
9	1300X770X1050	155	
10	2500X850X800	225	
11	2000X1500X1200	305	
12	1850X1050X1250	260	
13	2000X800X800	180	
14	2600X1500X1600	470	
15	250X250X600	20	
16	250X250X880	30	
17	300X300X700	25	
18	380X380X880	45	
19	510X510X1400	60	
20	570X570X1400	80	
21	575X575X1875	105	
22	3600X1100X1100	390	
23	900X500X800	110	
24	2000X950X740	225	
25	1600X1120X700	220	
26	2500X2000X1200	490	
27	2900X1900X1400	525	
28	3000X1000X900	370	
29	3200X2200X950	450	
30	2150X1100X750	325	
31	2000X2000X700	130	
32	700X1200X1325	130	

TABLE 3 STEEL BOXES

TYPE	DIMENSION IN MM	WEIGHT



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

S.NO.		LENGTH	BREADTH	HEIGHT		CARRYING CAPACITY (KGS)
1	I	2480	1680	1500	339	4500
2	II	1200	900	600	61	2000
3	IIB	1800	850	950	115	2500
4	III	900	600	600	29	1000
5	IV	600	450	500	19	750
6	V	400	350	300	11	500

TYPICAL PATTERN OF WOODEN BOX

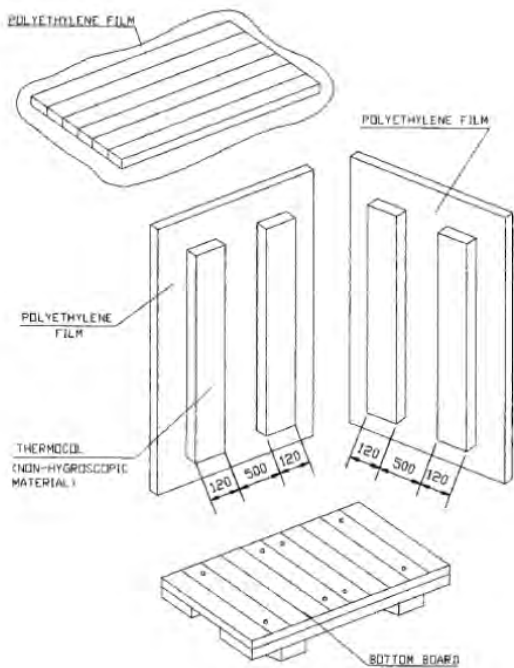
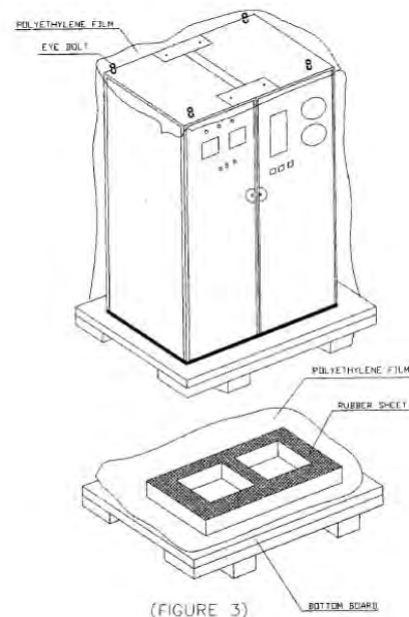


Figure 1



(FIGURE 3)

Figure 2

7.3 SEALED PACKING:

Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture. The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and edges are to be protected by rubber mats to prevent the polyethylene sheet from damage. Top surface of the case shall be free from dents to prevent rain water pockets.

8 MARKINGS/STENCILINGS



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

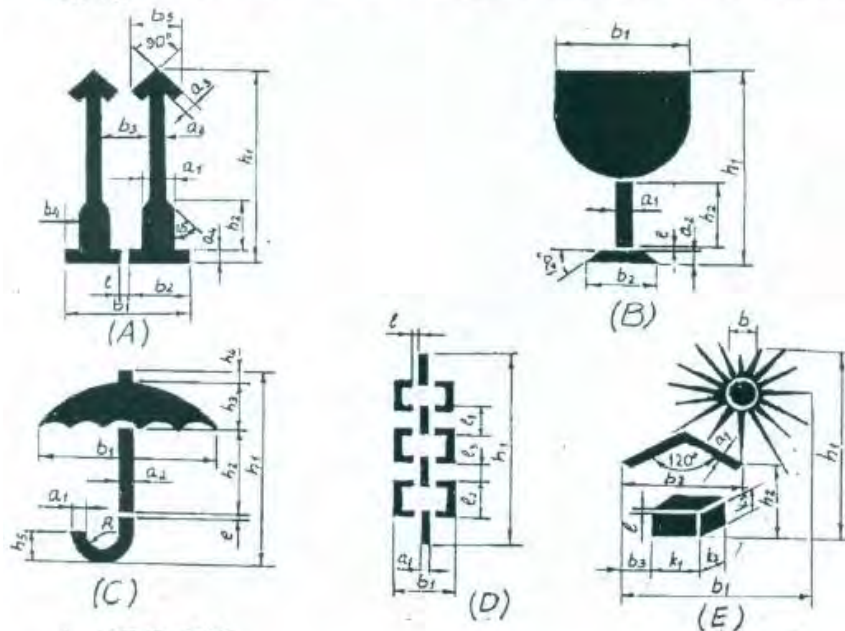
SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

MARKINGS ON PACKING CASE S

1. THIS PLANT STANDARD PRESCRIBES THE VARIOUS CAUTION SIGNS AND OTHER MARKINGS ON PACKING CASES.
2. DIMENSIONS IN THE TABLE 1 SHALL BE USED FOR MAKING STENCILS ONLY.



- A. UPRIGHT
- B. FRAGILE
- C. PROTECTION FROM FALLING OR CONDENSING MOISTURE
- D. SLINGING POSITION
- E. PROTECTION FROM DIRECT RADIATIONS.



Figure 3



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

DESIGN- ATION	DIMENSION IN MM																							
	a1	a2	a3	a4	b1	b2	b3	b4	b5	b	l	h1	h2	h3	h4	h5	k1	k2	k3	l1	l2	l3	R	
A	1	12	5	5	4	52	25	19	8	21		2	84	23										
	2	17	7	7	6	75	36	29	11	30		3	119	33										
	3	24	10	10	8	104	50	38	16	42		4	168	46										
	4	34	14	14	11	147	71	59	23	60		5	239	65										
B	1	5	5		50	33					2	84	25											
	2	7	7		71	47					3	119	36											
	3	10	10		100	66					4	168	50											
	4	14	14		142	94					5	239	71											
C	1	4	3		66						2	80	39	19	5	11							6	
	2	6	4		85						3	114	55	27	7	16							9	
	3	8	6		120						4	160	78	38	10	22							12	
	4	11	9		170						5	227	110	54	14	31							17	
D	1	6			30						4	148									30	30	10	
	2	9			42						5	209									42	42	14	
E	1	3			69	47	10			16	2	91	26				17	8	11					
	2	4			98	67	15			23	3	128	33				24	11	16					
	3	6			138	94	20			32	4	182	62				34	16	22					

Table 4

Black and Red Marking Ink to IS:1234 "Ink, Stencil, Oil Base, For Marking Porous Surfaces" or duplicating ink stencilling, oil base for marking porous surfaces.

All cases containing fragile items are to be stencilled with red marking and stencilling paint/ink **"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER"**.

Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height. In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel.

Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.

Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.

Note: In case the size of package is small for using the stencils, then hand written letters/figures shall be allowed.



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00


 BHEL – <unit> - <location> - <pin>	
CONSIGNEE	
MATERIAL	
CUSTOMER REF.	MO. NO.
DESPATCH ADVICE NOTE NO	CASE NO
DIMENSIONS(MM) L x B x H	NET WT -KGS
	GROSS WT -KGS
SPECIAL INSTRUCTIONS	HANDLE WITH CARE - KEEP DRY DO NOT DROP - DO NOT TILT

Figure 4 – TYPICAL MARKING PLATE (225 X 170)



Figure 5

Easy spares [Initial and O&M] Traceability and Identification at units and as well as at sites:

9 STANDARD METHOD OF PACKING

Table 5 - Standard Method of Packing

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
PRESSURE VESSELS								
TOWERS					○			
TANKS					○			
VESSLS					○			



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

GASKETS	O							
FASTENERS	O							
COVERS		O						
EXCHANGERS								
HEAT EXCHANGERS					O			
TUBE BUNDLE	O							
SHELL					O			
AIR FIN COOLERS					O			
COLOUMNS, MOTOR SUSPENSIONS, PLENUM CHAMBERS, SCREEN GUARDS, ETC					O			
BEARING BLOCKS	O							
FANS	O	O						
MOTORS	O							
GASKETS	O							
FASTENERS	O							
TEST FLANGES			O					
TEST RINGS			O					
COVERS			O					
CRYOGENIC VESSELS								
COLD CONVERTERS					O			
HORIZONTAL STORAGE TANKS					O			
TRANSPORTATION TANK					O			
COLD BOX					O			
DRYING UNIT					O			
DRYING BOTTLES					O			
MOISTURE SEPARATORS					O			
SILENCERS					O			
ONGC SKIDS					O			
VAPORISER		O						
SPECIAL PRODUCTS								
SI/VI PIPING		O						
CRO BIO CONTAINERS	O							
DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
AIR BOTTLES	O							
TITANIUM BOTTLE	O							
WAR HEAD CONTAINER	O							
MISSILE CONTAINER	O							
FUEL CONTAINER	O							
AIR LOCK ASSEMBLY	O							
BOILER DRUMS					O			
BOILER ITEMS								
COILS			O					



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

PANELS					0			
HEADERS			0		0			
FEEDERS								
MACHINED ITEMS								
SHELL SEGMENTS					0			
SHELL SEGMENTS IN STACKS					0			
SPHERE PETALS								
COLOUMNS, BASE PLATES, TIERCOS, PIPES, NOZZLE E1, F1, INTERNAL PIPES, PADS ETC.					0			
ROLLERS	0							
VALVE TRAYS								
VALVE TRAY COMPONENTS	0							
LATTICE GIRDERS		0						
FASTENERS	0							
GASKETS	0							
SUB CONTRACTS								
FAB STRUCTURALS					0			
SUPPORTING STRUCTURALS					0			
STRUCTURE SUB ASSEMBLY					0			
FAB PIPES					0			
GRATINGS					0			
STAIR CASES					0			
HANDRAILS/ PLATFORMS					0			
BOUGHT OUT COMPONENTS								
IRON & STEEL (LIKE PLATES, BEAMS, ANGLES, CHANNELS ETC.)					0			
PIPE FITTINGS								
CS PIPES, TUBES					0			
SS PIPES, TUBES					0			
FIN TUBES	0							
ELBOWS		0			0			
DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
FLANGES	0	0						
VALVES	0							
GAUGES	0							
DEMISTERS		0						
ABSCRBANTS (LIKE MOLECULAR SIEVES, ACTIVATED ALUMINA, MOBILE SORBID)						0		
PAINT TINS		0						
PAINT DRUMS						0		
IGNITORS	0							
SPRAY NOZZLES	0							



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

ELECTRICAL INSTRUMENTATION								
MOTORS, PUMPS, COMPRESSORS, TURBINES	O							
SWITCH BOARDS, DISTRIBUTION BOARDS, STARTERS, JUNCTION BOXES		O						
INDICATORS, VIBRATOR SWITCHES	O							
CABLE BUNDLES, CABLE DRUMS					O			
CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL		O						
OPERATIONAL SPARES	O							

10 PROCEDURE FOR HANDLING OF COMPONENTS

The purpose of this procedure is to protect the quality of the components/equipment while handling in various stages of manufacturing packing & despatching.

- 10.1 Adequate care shall be taken in handling the material, and components to avoid damage during receipts, storage issue manufacture & despatch operations.
- 10.2 Appropriate material handling equipment like fork lifters, cranes etc. shall be used where needed.
- 10.3 Lifting by crane and transportation by trolley of critical items and large components like rotors castings etc. shall be done carefully.
- 10.4 For critical items, where specified, special handling fixtures shall be used for lifting.
- 10.5 Slings and shackles used for lifting the components/equipment shall be checked for fitness and suitability before use.
- 10.6 Slings used on machined surfaces shall be suitably padded. No slings shall be used on journal surfaces.
- 10.7 Precision machined components like blades, catches, rollers etc. shall be lifted using suitable wooden pallets.

10.8 HANDLING OF COMPONENTS ON RECEIPT/DESPATCH

Before loading/unloading a packing case from the carrier look for the following shipping instructions painted on the packing case.

- a) The markings showing the upright position.
- b) The markings showing the sling position
- c) Markings showing the fragile contents.
- d) Other required markings as per clause no.10

10.8.1 Appropriate cranes and slings should be used for different components/ cases. Slings should normally make an angle as minimum as possible (width wise) but in no case more than 15°.

10.8.2 Handling and lifting should be done without jerks or impacts.

10.8.3 Immediately after receipt of the goods, the packing should be examined all-round for any sign of damage. If necessary, lift the cover or a number of boards of the case so as to make the contents visible. In the event of sealed packing being used the plastic sheeting should not be damaged. It is imperative that the packing material is restored in original condition after the inspection.

10.8.4 On receipt of the equipment it should be checked with the shipping list and missing or damage if any should be reported immediately. It is important to arrange for immediate examination to determine the extent of the damage, the cause of the damage and where applicable the person or persons responsible for the damage. According to general practice when transporting by railway or by road vehicle the carrier concerned should be immediately called upon (within specified periods) for jointly establishing a



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

statement of the damage. This is essential as a basis for a subsequent claim and possible damage report to the insurance company.

10.8.5 Protective coating applied on machined surfaces should not be disturbed. The plastic covering should be put back carefully so that it prevents ingress of dust and moisture. Some packing may have vapour phase inhibitor (VPI) paper enclosed inside the packing cases. This should be restored to its original place as far as possible.

10.8.6 Silica gel and such other chemicals kept in the box as desiccants and indicators should also be left in the box itself.

11 GENERAL GUIDELINES FOR ODC TRANSPORTATION/DESPATCH

Based on the Dimensions/Weight indicated in the Transportation Sketch, the type of Trailer is decided and indicated in the Tender Enquiry.

11.1 TRANSPORTATION:

1. LOW BED TRAILERS (LB 8):

Well Bed Length: 10000mm
Over Gooseneck: 13000mm
Width: 3000mm
Carrying Capacity: 40MT

2. LOW BED TRAILERS (LB 16):

Well Bed Length: 12000mm
Over Gooseneck: 16000mm
Width: 3000mm
Carrying Capacity: 75MT

**3. TOW TYPE TRAILERS (WITH FRONT DOLLEY 16 TYRES): 12000MM length
(for Exceptional equipment length: 30000mm and above)**

Bigger Dia equipment are loaded in the Well with overhanging.

Smaller Dia equipment with excess length are loaded over Gooseneck with rear hanging.
The Vehicle Dimensions are defined above are only guidelines for selection based on actual Dimensions/Weight of the Consignment

11.2 PACKING:

For all ODCs, Wooden Saddles are cut to the diameter of equipment as per the Transportation Sketch.

Wooden Saddles	For Diameter up to 4000mm	For Diameter above 4000mm
Length:	1836/2743mm (6'0"/9'0")	3353mm (11'0")
Width:	300mm (1'0")	300mm (1'0")
Height:	Saddle + one/two wedges a top	Saddle + three/four wedges a top

Number of Saddles:	
Minimum	3 in case of Loading inside Well +1 when loaded on Gooseneck
Maximum:	4 in case of Loading inside Well +2 when loaded on Gooseneck



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

For Securing the equipment firmly on the Trailer, 19mm (3/4”), wire rope with 25mm (1”) Heavy Duty Turn Buckles / BD Clamps are used as Lashing for the equipment.

12 GUIDELINES FOR HANDLING/LOADING/LASHING

- Jobs to be checked for complete painting before loading.
- Components to be lifted with Nylon belts. This protects painting, edges and attachments.
- All the components to be transported by putting inside the properly fabricated Crating
- Small components may fall down while transporting without closed crating and there are chances of missing of small parts. Hence, it is always better to transport small components in closed containers/crating. Loose to be being shipped in a closed crating.
- No component loaded over the crating.
- **LASHING:** Use Nylon belts only for lashing of all components. It prevents removal off painting and cut in the materials.



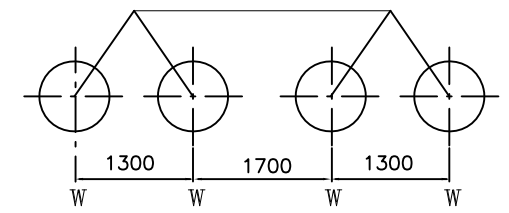
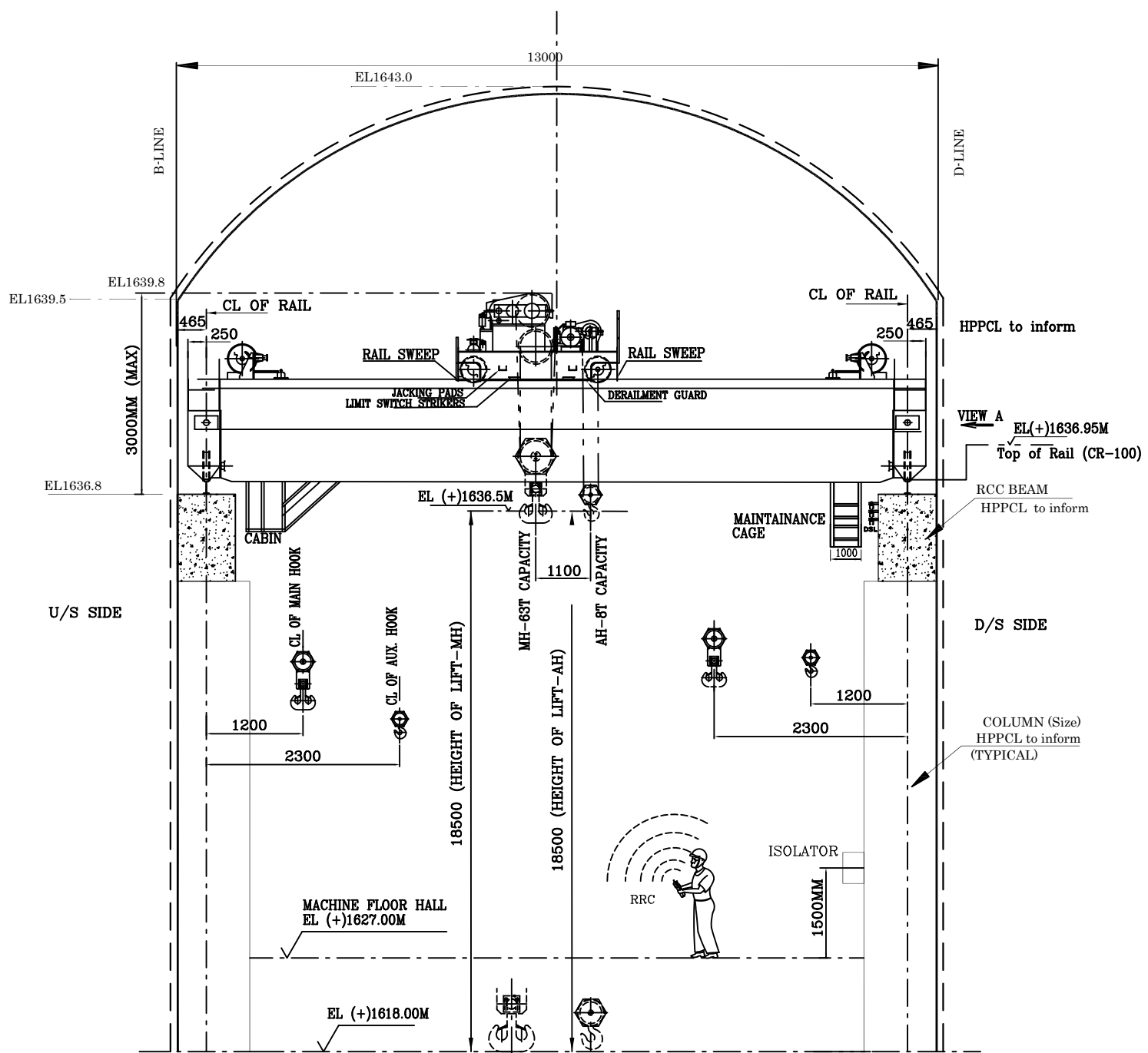
3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IA

REV. 00

CRANE CLEARANCE DIAGRAM

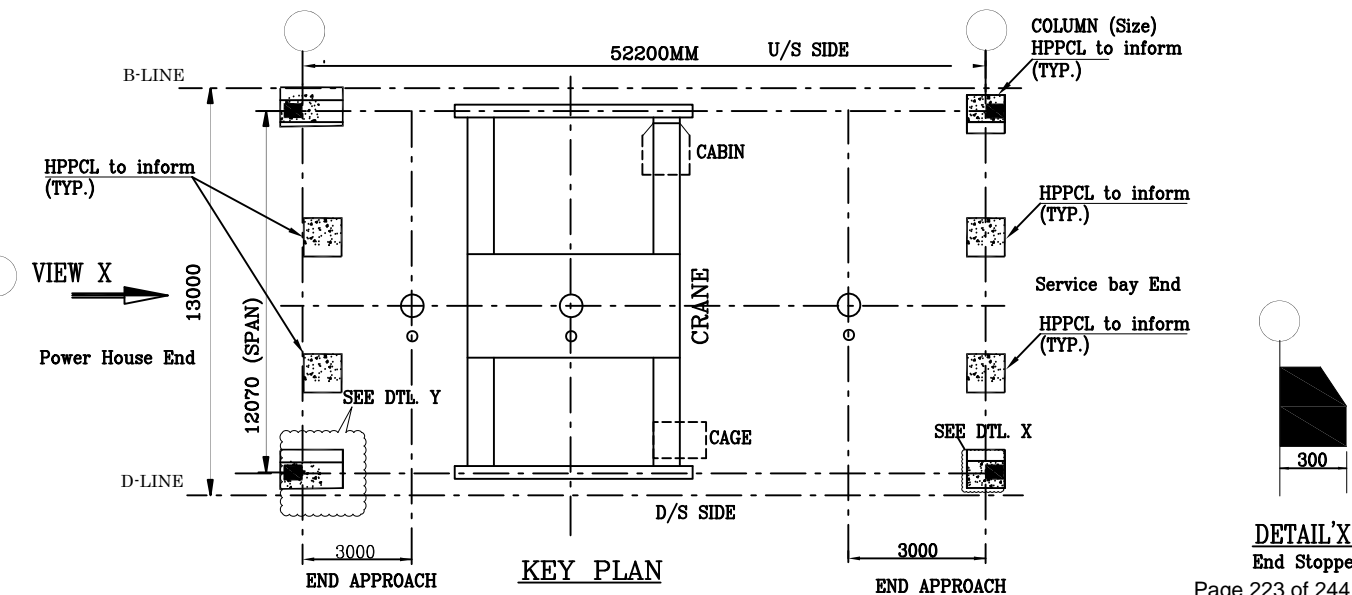


VIEW-A
W = 20 TONS
MAXIMUM WHEEL LOAD DIAGRAM WITHOUT IMPACT

NOTES

- 1) DRAWING IS NOT TO THE SCALE.
- 2) ALL DIMENSIONS ARE IN MM & ELEVATIONS IN METRES.
- 3) THE LOAD AND DIMENSIONS ARE INDICATIVE AND SUBJECT TO CHANGE DURING DETAIL ENGINEERING AFTER AWARD OF CONTRACT TO BHEL'S SUB CONTRACTOR.
- 4) REFERENCE DRGS:
 - a) Power House Cross section through unit centreline
Drg no CH-III-01-GR-12000022851
 - b) Power House Pan at EL.1627.0 Machine hal & serve bay
Drg no CH-III-01-GR-12000022855.
 - b) Power House & Transformer Hall (Excavation Sequence Detail)
Drg no 41-CH-III-53 & 54.

VIEW-X



Transmission Status:		Space for Approval Stamp by Owner	
For Approval			
01	YK/GP	VH	LJ
00	YK/GP	VH	LJ
REV.	PREPARED	CHECKED	APPROVED
			DATE
			MODIFICATIONS
			STAT.

OWNER HIMACHAL PRADESH POWER CORPORATION LTD.		
PROJECT CHHANJU-III HEP (3X16 MW)		
DOC. TITLE CRANE CLEARANCE DIAGRAM OF P/H 63/8T DOUBLE GIRDER EOT CRANE.		
	BHARAT HEAVY ELECTRICALS LTD (A Govt. of India Enterprise) PROJECT ENGINEERING MANAGEMENT NOIDA	
CUST. DOC. NO.	CH-III-6-EOT-PH-PE-DG-541-501-A001	SH. / NO. OF SH. 01 OF 01
BHEL DOC. NO.	PE-DG-541-501-A001	REVISION 01

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company.

COMPUTER FILE NAME : --



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

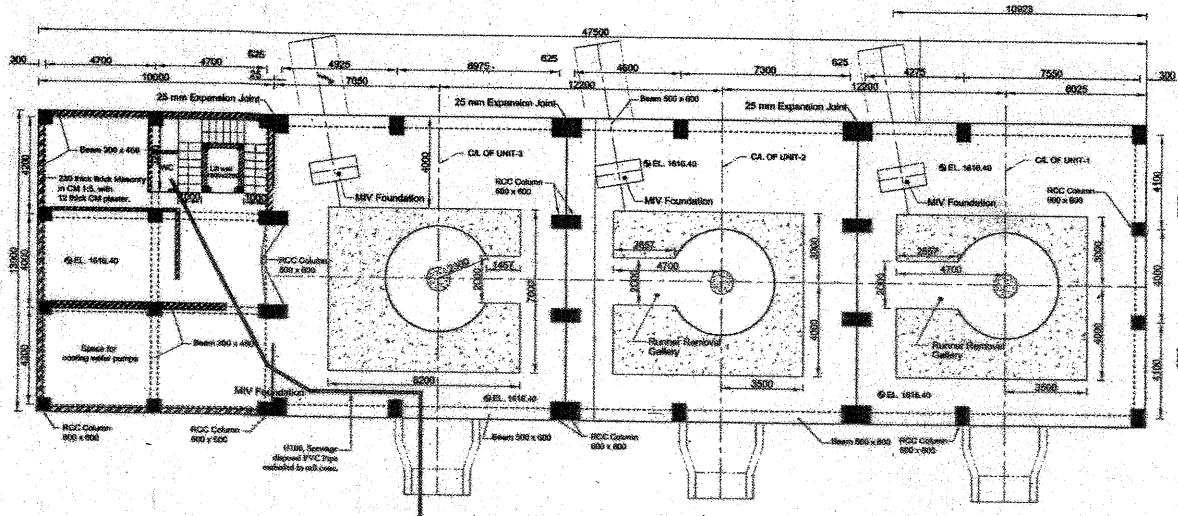
SECTION IA

REV. 00

ANNEXUE IX REFERENCE DRAWINGS

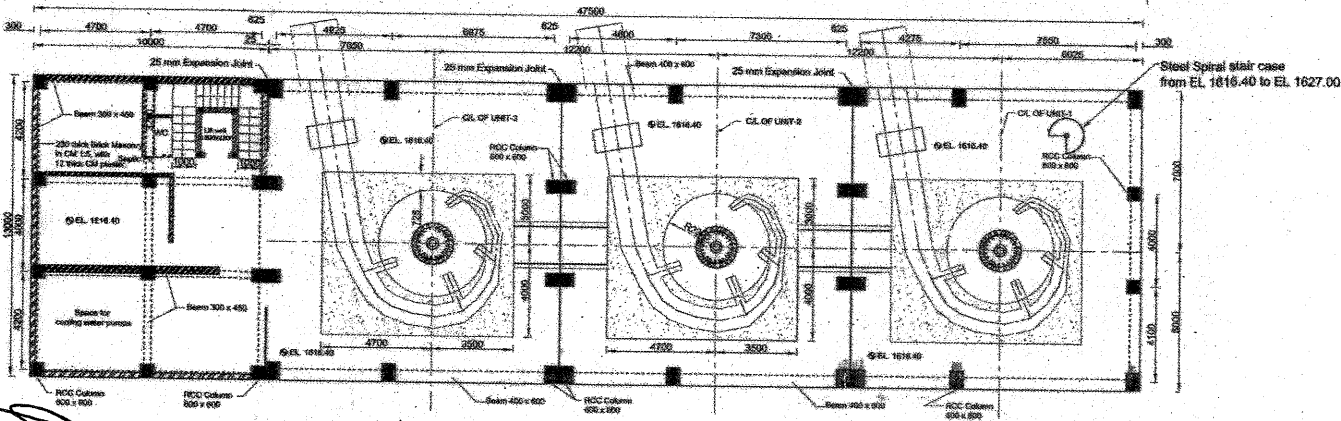
- **CUSTOMER DRAWING**
- **POWER HOUSE CROSS SECTION THROUGH UNIT CENTRE LINE**
- **MIV FLOOR PLAN AT EL.1616.40**
- **TURBINE FLOOR PLAN AT EL.1619.80**
- **GENERATOR FLOOR PLAN AT EL.1622.70**
- **PLAN AT EL.1627.0 MACHINE HALL & SERVICE BAY**

NOTE :
For notes refer sheet 1 of 6

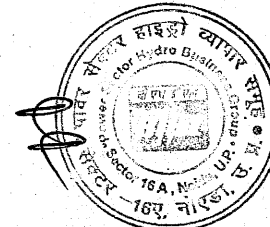
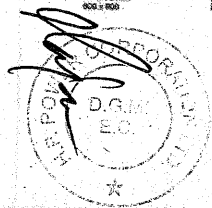


**MIV FLOOR
(PLAN AT EL 1616.40)**

000024



**DISTRIBUTOR CENTER LINE
(PLAN AT EL 1618.00)**



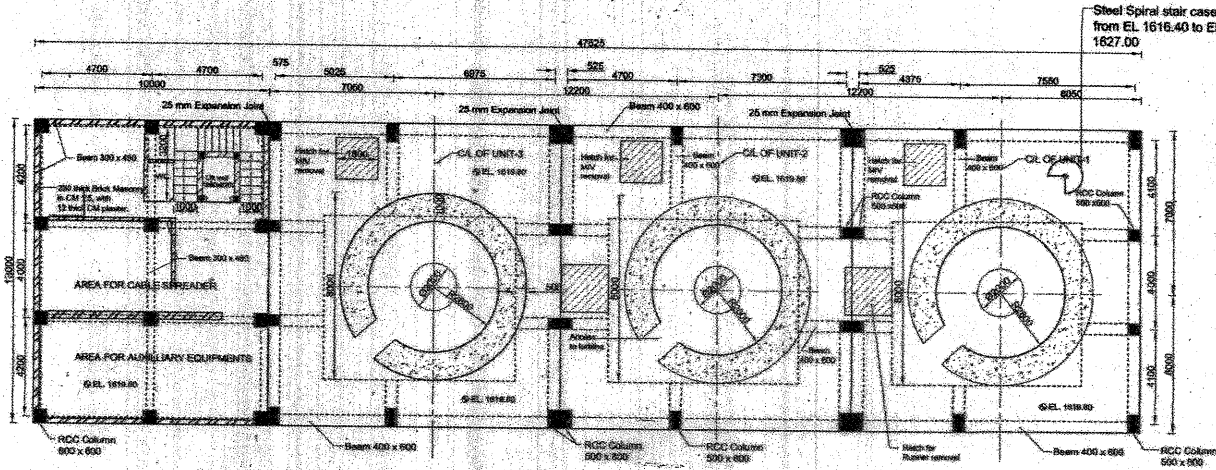
This drawing supercedes the specification drawings earlier issued vide this office letter no. HPPCL/POC-II/DC-CH-III HEP/PH/2015-16/Vol-I/614-619 Dated 01-02-16

This is a Specification Drawing for Tender Purpose Only

SHEET 2 OF 6		
HIMACHAL PRADESH POWER CORPORATION LIMITED PLANNING AND DESIGN (CIVIL) - II		
CHANJU-III HYDROELECTRIC PROJECT - 48MW UNDERGROUND POWER HOUSE COMPLEX PLAN AT EL 1615.40 & AT EL 1618.00 CONCRETE OUTLINE		
DSGN <i>(Signature)</i>	CHKD. <i>(Signature)</i>	RECD. <i>(Signature)</i>
DRWN <i>(Signature)</i>	SUPV. <i>(Signature)</i>	APPD. <i>(Signature)</i>
CH-III-PH-SPN-35	SUNDERNAGAR, NOV 2017	POC-II-2143

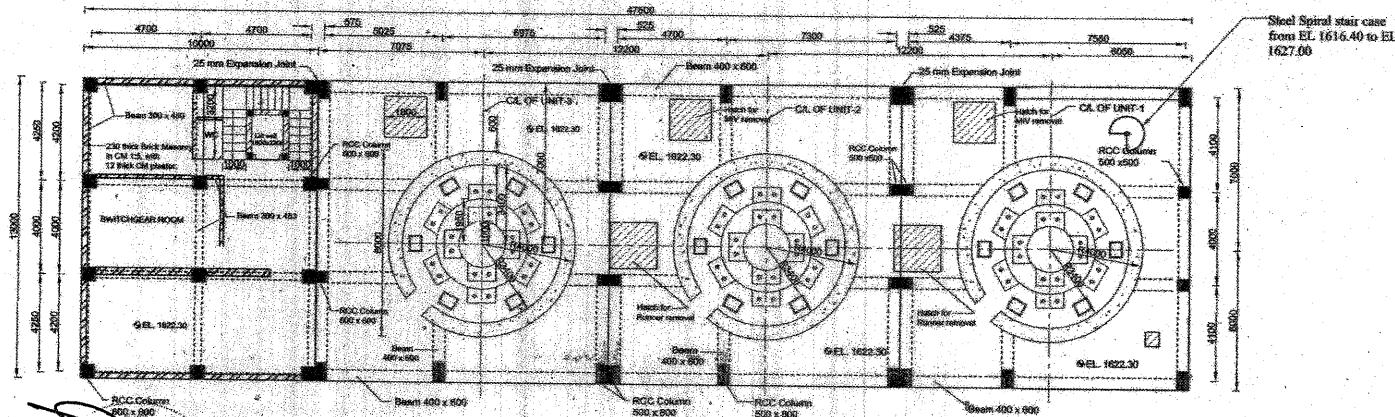
NOTE :

1. For notes refer dng-CH-III-SPN-34.



PLAN AT EL.1619.80 TURBINE FLOOR

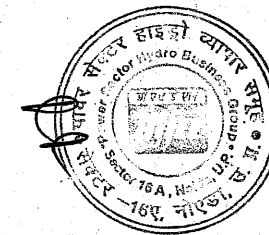
000025



PLAN AT EL.1622.30 GENERATOR FLOOR

This drawing supercedes the specification drawings earlier issued vide this office letter no- HPPCL/PDC-II/DC-CH-III HEP/PH/ 2015-16/Vol-1/ 614-619 Dated 01.02.2016.

This is a Specification Drawing for Tender Purpose Only

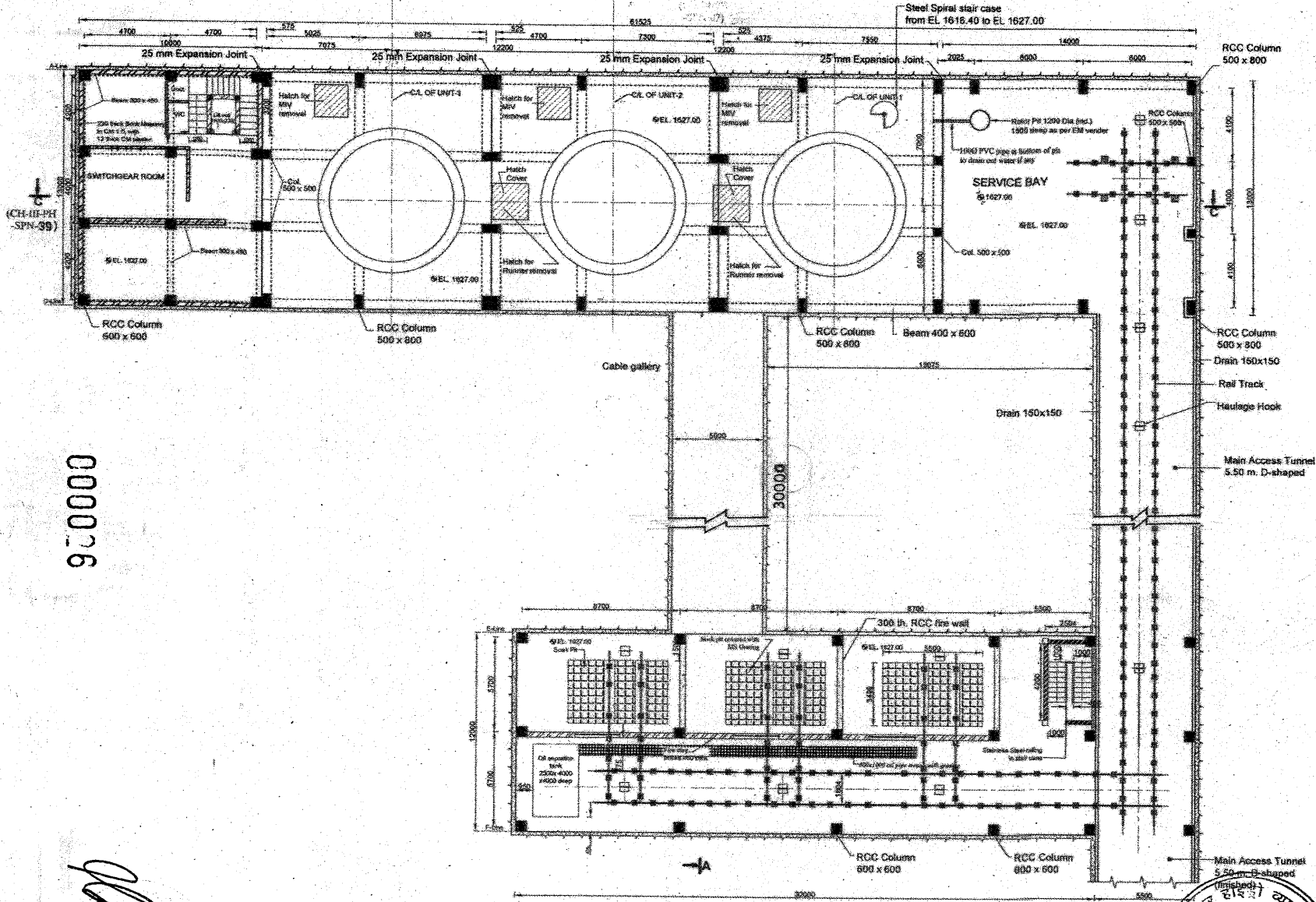


HPP CORPORATION LIMITED PLANNING AND DESIGN (CHIL)-I		
CHANDUR HYDROELECTRIC PROJECT-48MW UNDERGROUND POWER HOUSE COMPLEX PLAN AT EL. 1619.80 & AT EL. 1622.30 CONCRETE OUTLINE		
DESGN: <i>[Signature]</i> DRWN: <i>[Signature]</i>	CHD: <i>[Signature]</i> SURV: <i>[Signature]</i>	RECM: <i>[Signature]</i> APPD: <i>[Signature]</i>
CH-III-PH-SPN-36	SUNDERNAGAR, NOV. 2017	PDC-2 21 4 4

NOTE :

1. For notes refer drg-CH-III-SPN-34

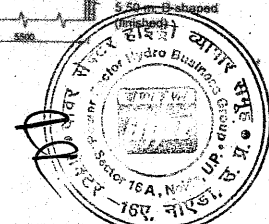
→A(CH-III-PH-SPN-38)



PLAN AT EL.1627.00 MACHINE HALL FLOOR

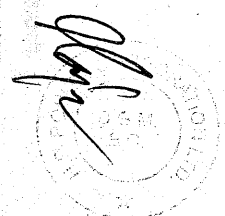
This drawing supersedes the specification drawings earlier issued vide this office letter no-HPP-CL/PDC- II/DC-CH-III-REP/PH/2015-16/Vol-1/614-619 Dated 01.02.16

This is a Specification Drawing for Tender Purpose Only



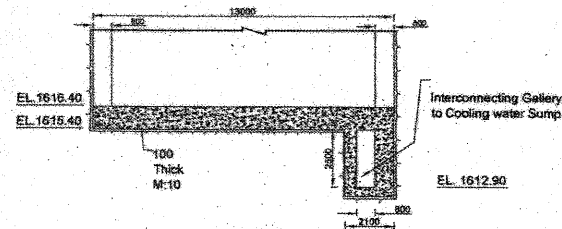
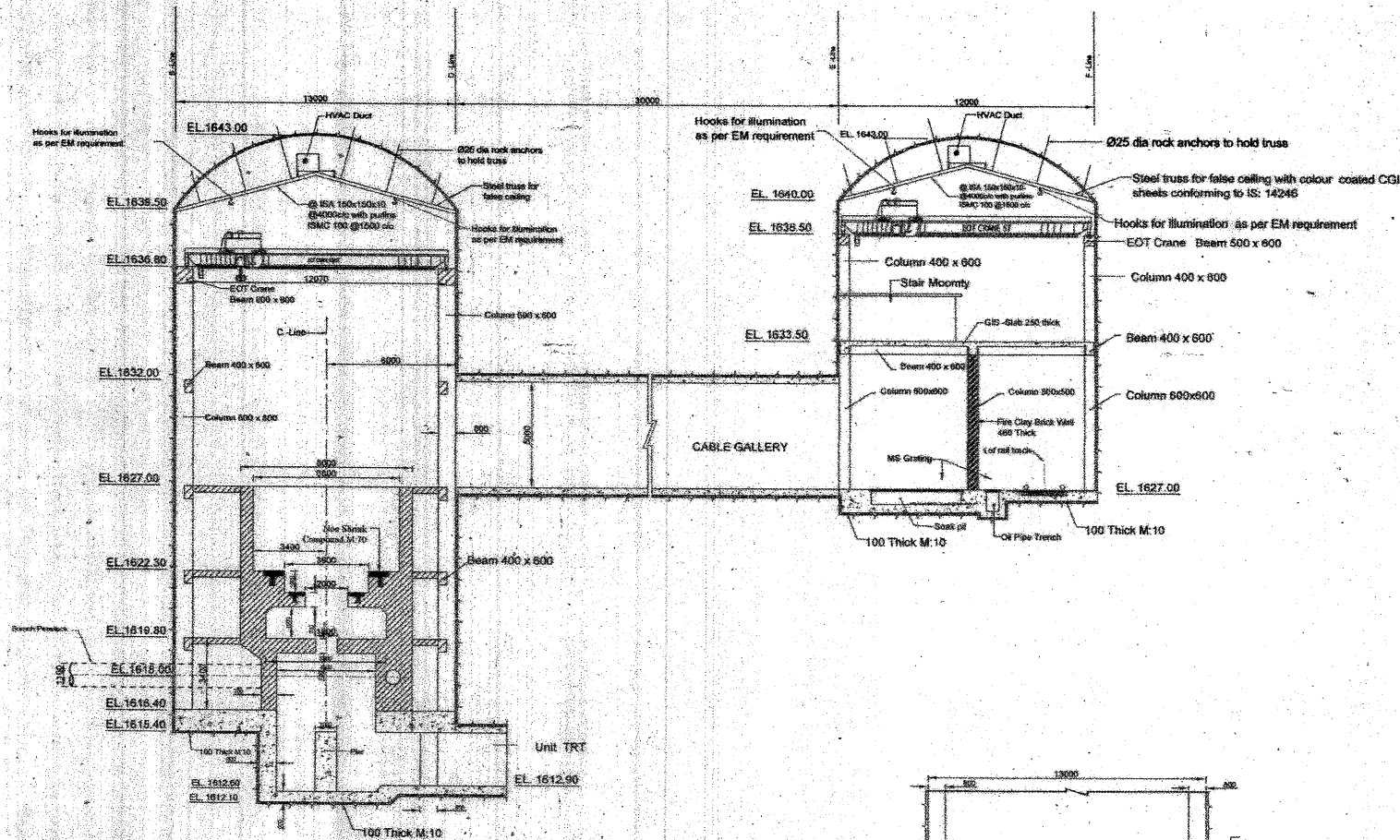
SHEET 4 OF 6			
HIMACHAL PRADESH POWER CORPORATION LIMITED PLANNING AND DESIGN (PWL)-II			
CHANDU-III HYDROELECTRIC PROJECT - 48MW UNDERGROUND POWER HOUSE COMPLEX			
PLAN AT EL.1627.00 M. CONCRETE OUTLINE			
DESIGNED <i>[Signature]</i> (S. Prakash Sharma)	CHECKED <i>[Signature]</i> (S. P. Gupta)	REVISION <i>[Signature]</i> (S. V. Choudhary)	
DRAWN <i>[Signature]</i> (Prakash Sharma)	SUBMITTED <i>[Signature]</i> (S. P. Gupta)	APPROVED <i>[Signature]</i> (S. V. Choudhary)	
CH-III-PH-SPN-37		SUNDERNAGAR, NOV. 2017	
		PDC-II-2145	

000026



NOTES :

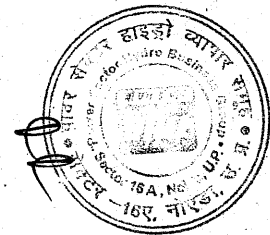
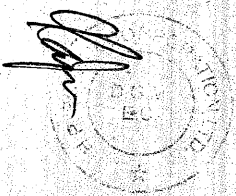
1. All dimensions are in millimetres and elevations & RDs in meters unless specified otherwise.
2. No dimension is to be scaled out from the drawing.
3. For other relevant notes refer drawing CH-III-SPN-34



000027

This is a Specification Drawing for Tender Purpose Only

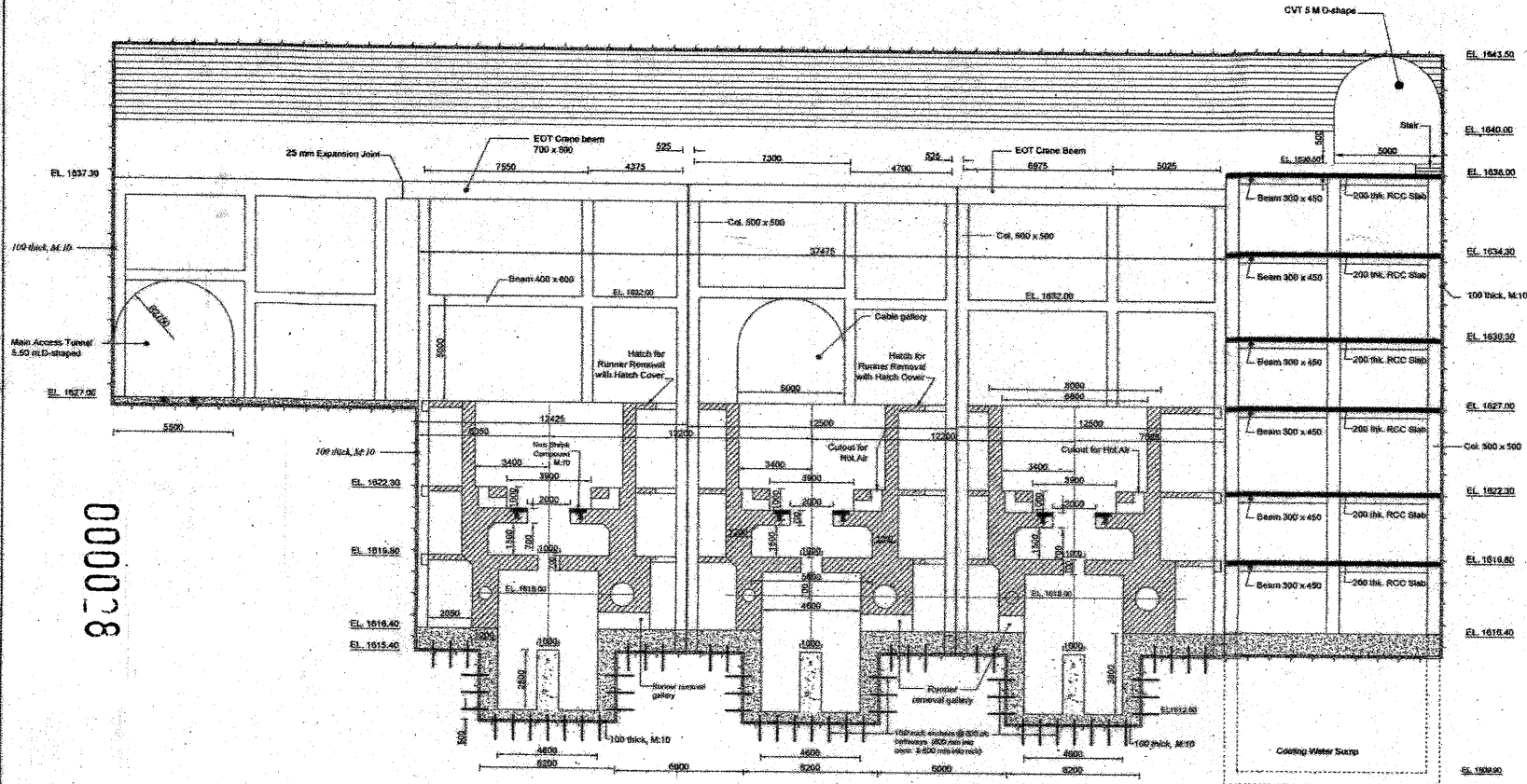
These drawings supercedes the specification drawings issued earlier Vide this office letter no. HPPCL/UDC-II /DC-CH-III HEP/PH/2015-16/Vol. I/514-619 dated 01-02-2016



SHEET 5 OF 6		
HMACHAL PRADESH POWER CORPORATION LIMITED PLANNING AND DESIGN (CIVIL) - B		
CHANJU-III HYDROELECTRIC PROJECT - 48MW UNDERGROUND POWER HOUSE COMPLEX		
CROSS SECTION CONCRETE OUTLINE		
DSGN: <i>[Signature]</i>	CHKD: <i>[Signature]</i>	RECM: <i>[Signature]</i>
DRWN: <i>[Signature]</i>	SUBM: <i>[Signature]</i>	APPD: <i>[Signature]</i>
CH-III-PH-SPN-34	SUNDERNAGAR, NOV. 2017	FDG-N-2146

NOTE:

1. For notes refer drg-CH-III-SPN-34

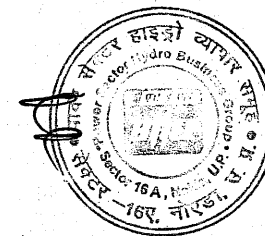
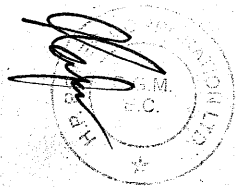


000028

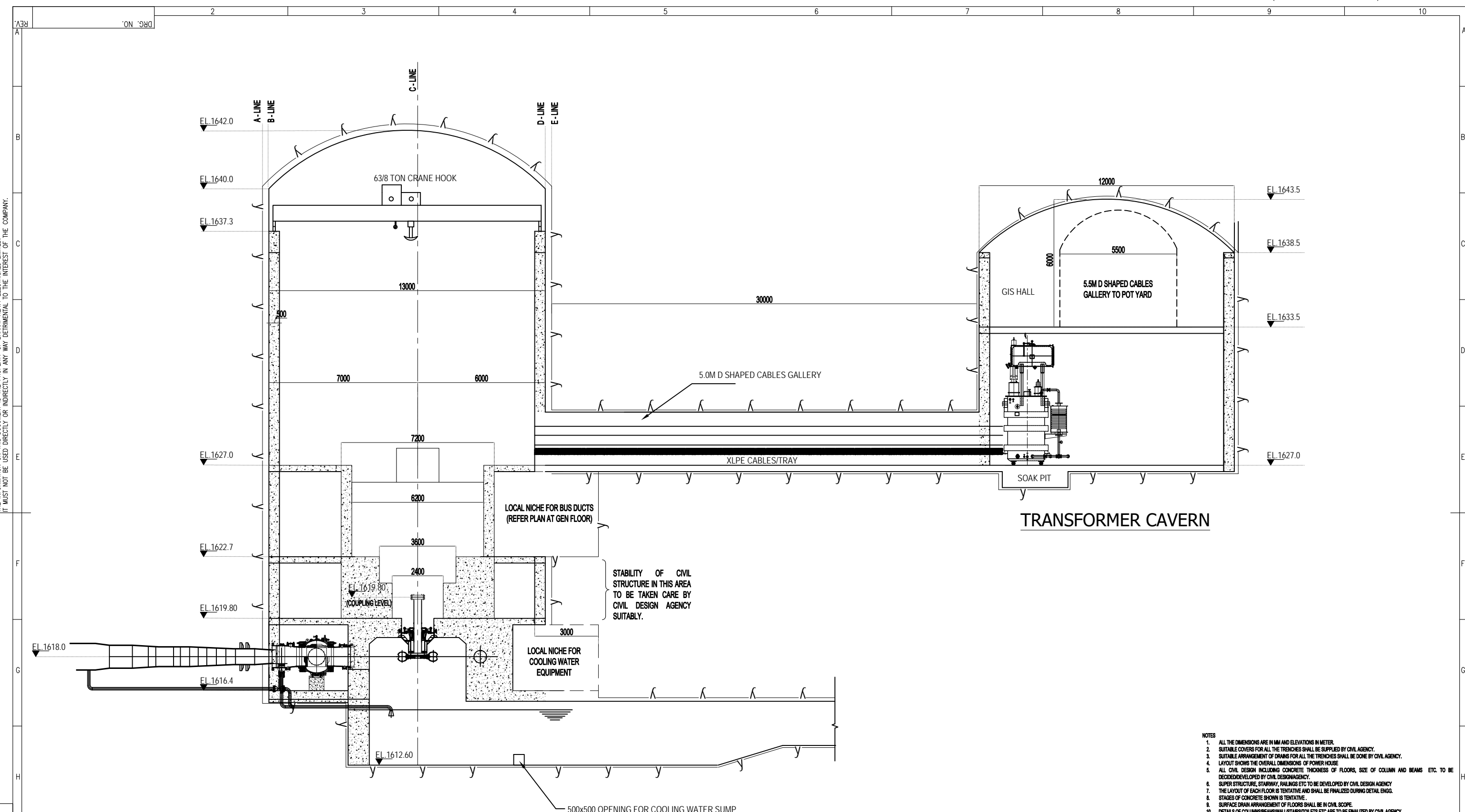
This drawing supercedes the specification drawing earlier issued vide this office letter no. HPPCL/PDC-16/BC-CH-III-HEP/PH/2015-16/Vol-I/614-619 Dated 01.02.2016

This is a Specification Drawing for Tender Purpose Only

SECTION C-C
(CH-III-PH-SPN-37)



SHEET 6 OF 6		
HIMACHAL PRADESH POWER CORPORATION LIMITED PLANNING AND DESIGN (CIVIL) - II		
CHANDIGARH HYDROELECTRIC PROJECT - 48MW UNDERGROUND POWER HOUSE COMPLEX		
LONGITUDINAL SECTION CONCRETE OUTLINE		
DSGN <i>[Signature]</i> (Senior Engineer)	CHKD <i>[Signature]</i> (S.D.O. Grade)	RECM <i>[Signature]</i> (El. Asst. Commr.)
DRWN <i>[Signature]</i> (Junior Engineer)	SLBM <i>[Signature]</i> (S.D.O. Grade)	APPD <i>[Signature]</i> (S.D.O. Grade)
CH-III-PH-SPN-37		PDC-II-2147

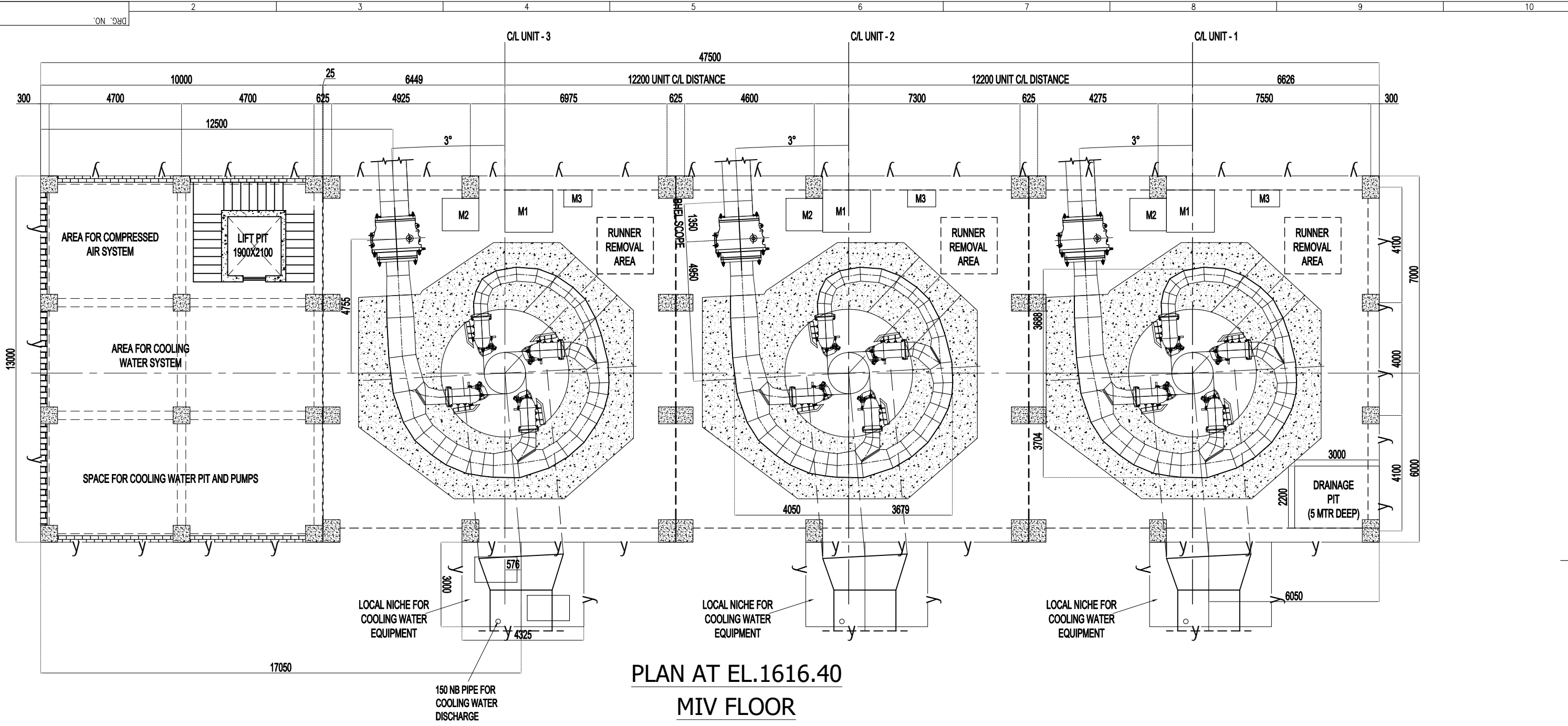


POWER HOUSE CROSS SECTION THROUGH UNIT CENTERLINE

- NOTES
1. ALL THE DIMENSIONS ARE IN MM AND ELEVATIONS IN METER.
 2. SUITABLE COVERS FOR ALL THE TRENCHES SHALL BE SUPPLIED BY CIVIL AGENCY.
 3. SUITABLE ARRANGEMENT OF DRAINS FOR ALL THE TRENCHES SHALL BE DONE BY CIVIL AGENCY.
 4. LAYOUT SHOWS THE OVERALL DIMENSIONS OF POWER HOUSE.
 5. ALL CIVIL DESIGN INCLUDING CONCRETE THICKNESS OF FLOORS, SIZE OF COLUMN AND BEAMS ETC. TO BE DECIDED/DEVELOPED BY CIVIL DESIGN AGENCY.
 6. SUPER STRUCTURE, STAIRWAY, RAILINGS ETC TO BE DEVELOPED BY CIVIL DESIGN AGENCY.
 7. THE LAYOUT OF EACH FLOOR IS TENTATIVE AND SHALL BE FINALIZED DURING DETAIL ENGG.
 8. STAGES OF CONCRETE SHOWN IS TENTATIVE.
 9. SURFACE DRAIN ARRANGEMENT OF FLOORS SHALL BE IN CIVIL SCOPE.
 10. DETAILS OF COLUMN/BEAM/WALL/STAIR/TOILETS ETC ARE TO BE FINALIZED BY CIVIL AGENCY.
 11. STATION LAYOUT DRAWINGS ARE FOR REFERENCE ONLY, ALL OTHER RESPECTIVE EQUIPMENT/SYSTEM DRAWINGS MUST BE REFERRED FOR CONSTRUCTION.
 12. LOCATION OF THE EQUIPMENT SHOWN ARE TENTATIVE ANY ADJUSTMENT AT SITE MAY BE DONE AS PER SITE CONDITION.

ADDITIONAL INFORMATION		PROJECT	CHHANJU-III HEP (3X16 MW)	
STATUS OF DRAWING		CUSTOMER	HIMACHAL PRADESH POWER CORPORATION LTD.	
DISTRIBUTION OF PRINTS		CUSTOMER'S DWG NO.	CH-III-01-GR-12000022851	
		CUSTOMER'S CONSULTANT	-	
		CONTRACTORS	BHARAT HEAVY ELECTRICALS LTD.	
		SUB-SUPPLIER / VENDOR		
DRWN	BSINGH	SIGN	DATE	NO. OF VAR.
CHKD	RSINGH		07.03.26	
APPD	RSINGH		07.03.26	
DEPT CODE		UNTO. DIMS. GR.	ANGLE	SCALE
				1:200
TITLE		WEIGHT(KG)	REF. TO ASSY DRG.	ITEM NO.
POWER HOUSE CROSS SECTION THROUGH UNIT CENTERLINE				
DRAWING NO.		REV.		
12000022851		00		
SHEET NO.		NO. OF SHEETS.		
		10		

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED
		APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED
INVENTORY NO.		SIGN. & DATE		REF. DRG. NO.		ZONE		ZONE		ZONE		ZONE		ZONE		ZONE		ZONE		ZONE		ZONE	



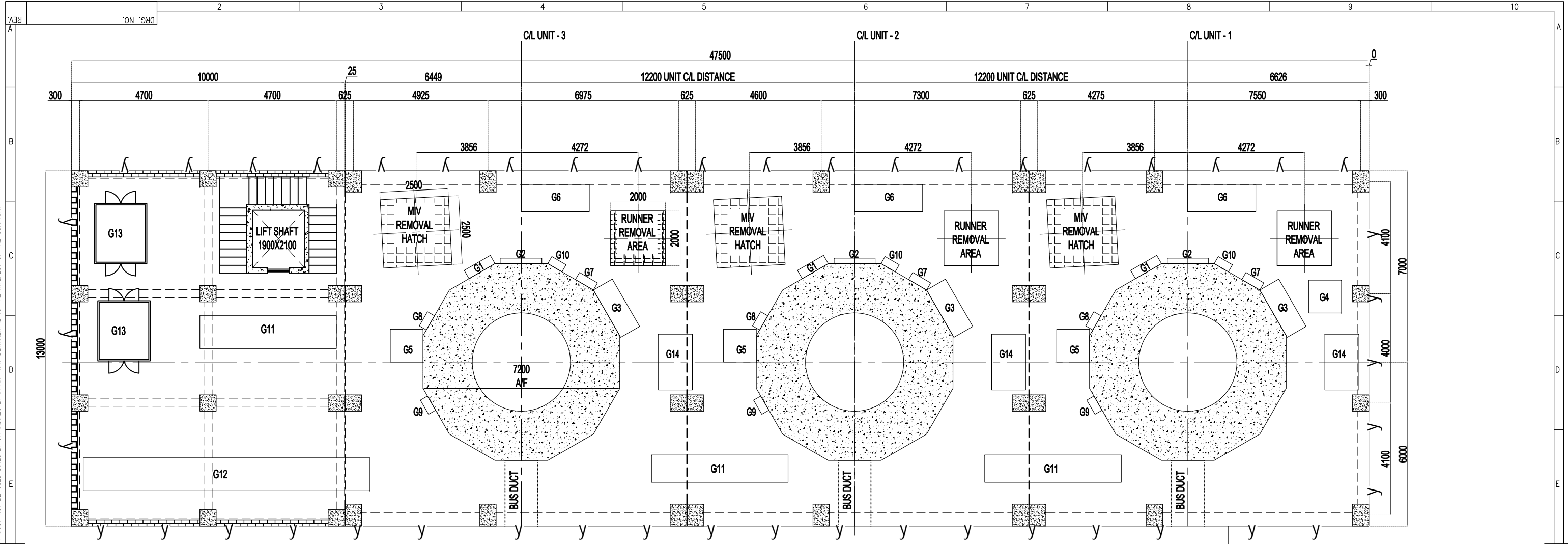
**PLAN AT EL.1616.40
MIV FLOOR**

TENTATIVE LIST OF EQUIPMENT (MIV FLOOR)

SL.							
M1	PP, PA AND N2 SKID FOR MIV	2000	1500	2800	3	2150	HPE GOV
M2	MIV HCP	1300	1150	1800	3		HPE GOV
M3	MIC ECP	1000	600	1900	3	1000	HPE GOV

- NOTES**
- ALL THE DIMENSIONS ARE IN MM AND ELEVATIONS IN METER.
 - SUITABLE COVERS FOR ALL THE TRENCHES SHALL BE SUPPLIED BY CIVIL AGENCY.
 - SUITABLE ARRANGEMENT OF DRAINS FOR ALL THE TRENCHES SHALL BE DONE BY CIVIL AGENCY.
 - LAYOUT SHOWS THE OVERALL DIMENSIONS OF POWER HOUSE
 - ALL CIVIL DESIGN INCLUDING CONCRETE THICKNESS OF FLOORS, SIZE OF COLUMN AND BEAMS ETC. TO BE DECIDED/DEVELOPED BY CIVIL DESIGN AGENCY.
 - SUPER STRUCTURE, STAIRWAY, RAILINGS ETC TO BE DEVELOPED BY CIVIL DESIGN AGENCY
 - THE LAYOUT OF EACH FLOOR IS TENTATIVE AND SHALL BE FINALIZED DURING DETAIL ENGG.
 - STAGES OF CONCRETE SHOWN IS TENTATIVE.
 - SURFACE DRAIN ARRANGEMENT OF FLOORS SHALL BE IN CIVIL SCOPE.
 - DETAILS OF COLUMNS/BEAMS/WALLS/STAIRS/TOILETS ETC ARE TO BE FINALIZED BY CIVIL AGENCY.
 - STATION LAYOUT DRAWINGS ARE FOR REFERENCE ONLY, ALL OTHER RESPECTIVE EQUIPMENT/SYSTEM DRAWINGS MUST BE REFERRED FOR CONSTRUCTION.
 - LOCATION OF THE EQUIPMENT SHOWN ARE TENTATIVE ANY ADJUSTMENT AT SITE MAY BE DONE AS PER SITE CONDITION.

ADDITIONAL INFORMATION	PROJECT	CHHANJU-III HEP (3X16 MW)
STATUS OF DRAWING	CUSTOMER	HIMACHAL PRADESH POWER CORPORATION LTD.
DISTRIBUTION OF PRINTS	CUSTOMER'S DWG NO.	CH-III-01-GR-12000022852
	CUSTOMER'S CONSULTANT	-
	CONTRACTORS	BHARAT HEAVY ELECTRICALS LTD.
	DEPT	UNTL. DIMS. GR.
	ANGLE	SCALE
	WEIGHT(kg)	REF.TO ASSY.DRG.
	ITEM NO.	NO.OF ITEMS
	TITLE	DRAWING NO.
		12000022852
		REV.
		00
		SHEET NO.
		NO. OF SHEETS.
		10



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

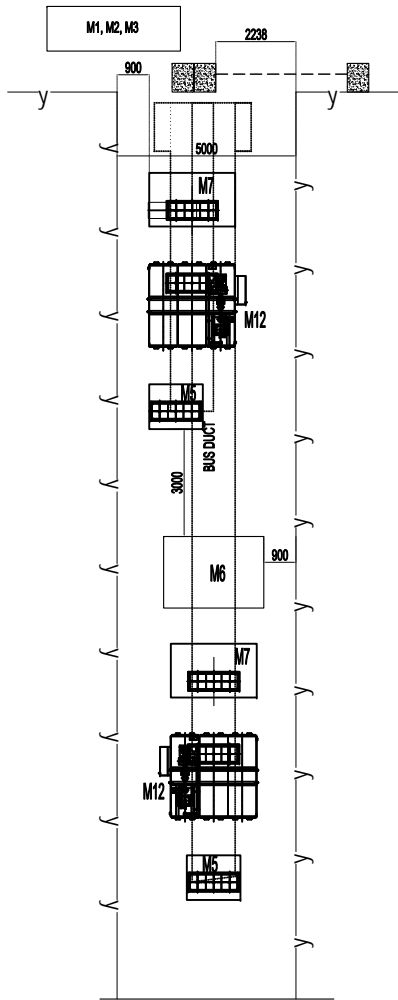
TENTATIVE LIST OF EQUIPMENT (GENERATOR FLOOR)							
SL.	ITEM DESCRIPTION	WIDTH	DEPTH	HEIGHT	QTY	Wt. (kg)	SUPPLY
G1	BRAKE JACK CONTROL PANEL	1100	350	1200	3	350	H.G.E
G2	MARSHALLING BOX	1500	200	1200	3	100	H.G.E
G3	HS LUBRICATION UNIT	2000	800	800	3	400	H.G.E
G4	PORTABLE MOTORIZED POWER PACK	1200	1200	1800	1	300	H.G.E
G5	BRAKE DUST COLLECTOR	1200	1200	2500	3	500	H.G.E
G6	WATER MIST TYPE FF SYTEM FOR GEN.	2500	1000	2300	3	1000	H.G.E
G7	CONTROL PANEL FOR HS LUBE UNIT	760	300	760	3	-	HPE ELECT
G8	CONTROL PANEL FOR BRAKE DUST COLLECTOR	600	300	760	3	-	HPE ELECT
G9	CONTROL PANEL FOR CARBON DUST COLLECTOR	600	300	760	3	-	HPE ELECT
G10	CONTROL PANEL FOR SPACE HEATER	600	300	600	-	-	HPE ELECT
G11	UNIT AUX BOARD (UAB)	5000	1200	2300	3	-	HPE ELECT
G12	SSB 1 AND 2	10500	1200	2300	1	-	HPE ELECT
G13	SST	2200	1915	2300	2	-	JHS
G14	NG CUBICLE	2000	1250	1800	3	-	JHS

PLAN AT EL.1622.70 GENERATOR FLOOR

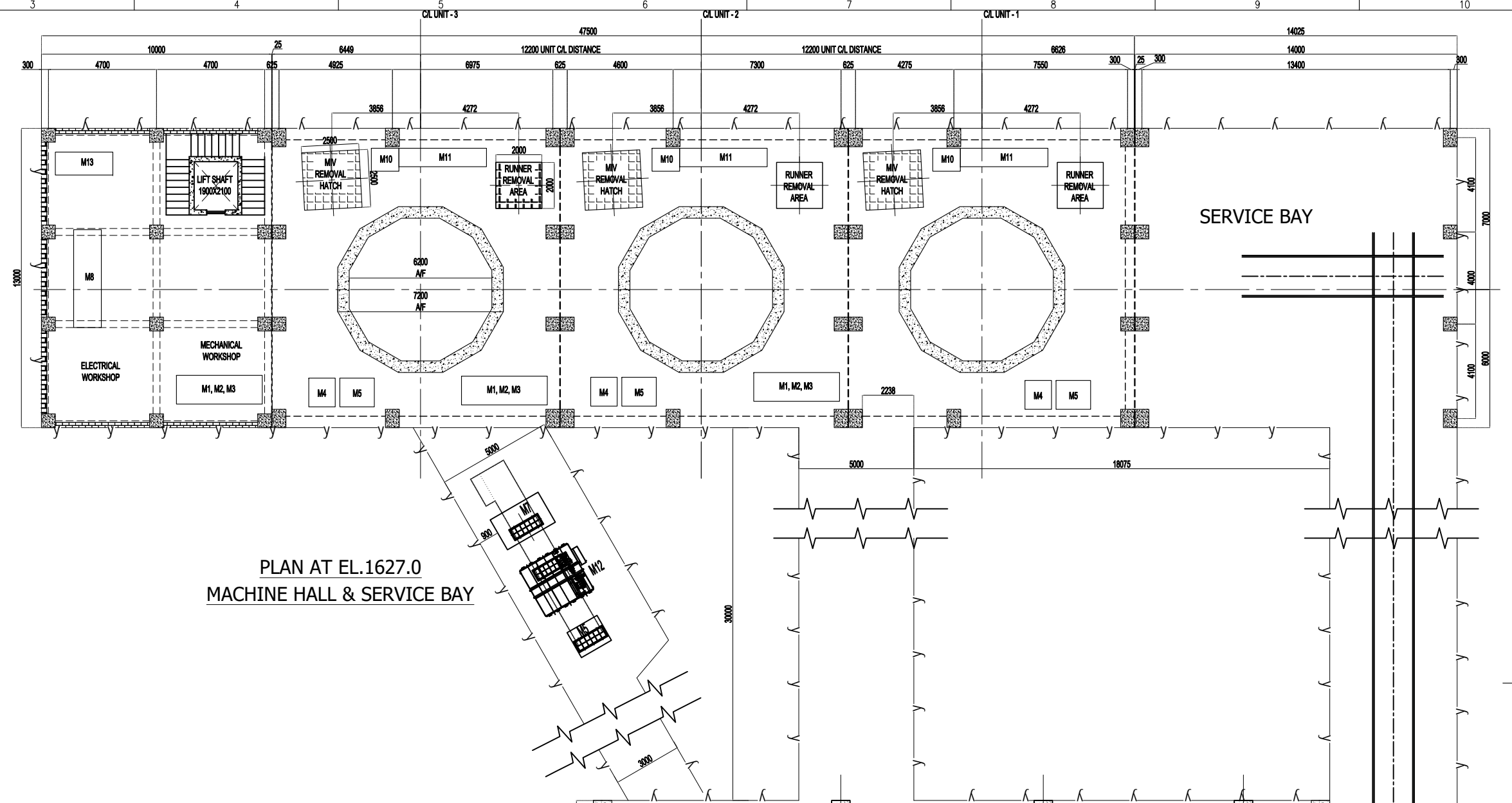
- NOTES**
- ALL THE DIMENSIONS ARE IN MM AND ELEVATIONS IN METER.
 - SUITABLE COVERS FOR ALL THE TRENCHES SHALL BE SUPPLIED BY CIVIL AGENCY.
 - SUITABLE ARRANGEMENT OF DRAINS FOR ALL THE TRENCHES SHALL BE DONE BY CIVIL AGENCY.
 - LAYOUT SHOWS THE OVERALL DIMENSIONS OF POWER HOUSE.
 - ALL CIVIL DESIGN INCLUDING CONCRETE THICKNESS OF FLOORS, SIZE OF COLUMN AND BEAMS ETC. TO BE DECIDED/DEVELOPED BY CIVIL DESIGN AGENCY.
 - SUPER STRUCTURE, STAIRWAY, RAILINGS ETC TO BE DEVELOPED BY CIVIL DESIGN AGENCY
 - THE LAYOUT OF EACH FLOOR IS TENTATIVE AND SHALL BE FINALIZED DURING DETAIL ENGG.
 - STAGES OF CONCRETE SHOWN IS TENTATIVE.
 - SURFACE DRAIN ARRANGEMENT OF FLOORS SHALL BE IN CIVIL SCOPE.
 - DETAILS OF COLUMNS/BEAMS/WALLS/STAIRS/TOILETS ETC ARE TO BE FINALIZED BY CIVIL AGENCY.
 - STATION LAYOUT DRAWINGS ARE FOR REFERENCE ONLY, ALL OTHER RESPECTIVE EQUIPMENTS/SYSTEM DRAWINGS MUST BE REFERRED FOR CONSTRUCTION.
 - LOCATION OF THE EQUIPMENT SHOWN ARE TENTATIVE ANY ADJUSTMENT AT SITE MAY BE DONE AS PER SITE CONDITION.

ADDITIONAL INFORMATION		PROJECT	CHHANJU-III HEP (3X16 MW)		
STATUS OF DRAWING		CUSTOMER	HIMACHAL PRADESH POWER CORPORATION LTD.		
DISTRIBUTION OF PRINTS		CUSTOMER'S DWG NO.	CH-III-01-GR-12000022854		
		CUSTOMER'S CONSULTANT	-		
		CONTRACTORS	BHARAT HEAVY ELECTRICALS LTD.		
		SUB-SUPPLIER / VENDOR	-		
DRWN	NAME	SIGN	DATE	NO. OF	
	BSINGH		07.03.20	VAR.	
CHKD	RSINGH		07.03.20		
APPD	RSINGH		07.03.20		
REV.	DATE	ALTERED	DATE	ALTERED	DATE
		CHECKED		CHECKED	
		APPROVED		APPROVED	
DEPT		UNTL. DIMS. GR.	ANGLE	SCALE	WEIGHT(kg)
				1:200	
TITLE		REF. TO ASSY.DRG.	ITEM NO.	NO. OF	
GENERATOR FLOOR PLAN AT EL.1622.70					
DRAWING NO.		REV.			
12000022854		00			
SHEET NO.		NO. OF SHEETS.			

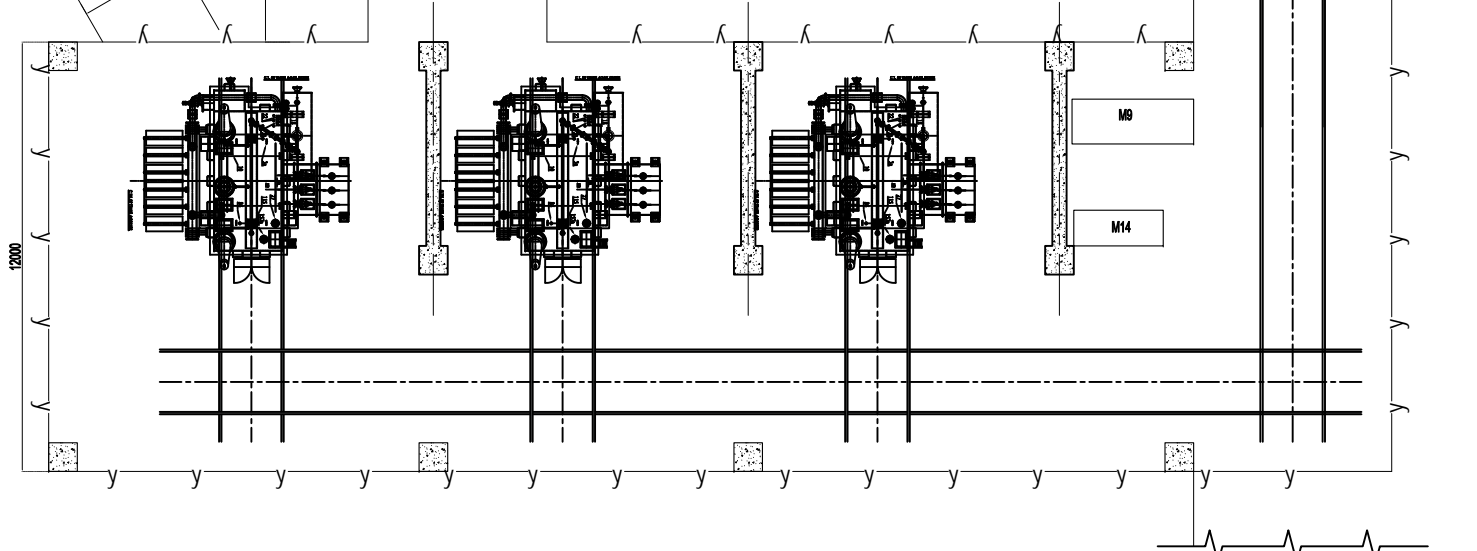
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.



**PLAN AT EL.1622.30
(VIEW OF BUS DUCT GALLERY)**



**PLAN AT EL.1627.0
MACHINE HALL & SERVICE BAY**



TENTATIVE LIST OF EQUIPMENT (MACHINE HALL FLOOR)							
SL.	ITEM DESCRIPTION	WIDTH	DEPTH	HEIGHT	QTY	Wt. (kg)	SUPPLY
M1	REGULATION PANEL WITH AVR	1900	1250	2320	3	1000	EDN
M2	THYRISTOR CONVERTOR PANEL	680	1250	2320	3	700	EDN
M3	FIELD SUPPRESSION PANEL	1150	1250	2320	3	800	EDN
M4	AC BREAKER PANEL	1150	1250	1400	3	1400	EDN
M5	AUX. TRANSFORMER PANEL	1500	1250	2320	3	1500	EDN
M6	DB ISOLATOR PANEL	2800	2000	2320	3	2000	EDN
M7	EXCITATION TRANSFORMER CUBICLE	2400	1500	2500	3	1000	EDN
M8	SSB 3 (MACHINE HALL FLOOR)	4250	1200	2300	1	4000	EDN
M9	SSB 4 (TRANSFORMER HALL)	3400	1200	2300	1	3200	EDN
M10	EHGC	1200	1000	2520	3	900	EDN
M11	UNIT CONTROL BOARD (UCB)	3804	800	2100	3	3000	EDN
M12	LAVT	2400	2250	2210	3	-	RDPR
M13	DCDB (MACHINE HALL)	2500	1000	2500	1	5000	HPE-ELECT
M14	DCDB (TRANSFORMER HALL)	2500	1000	2500	1	5000	HPE-ELECT

- NOTES**
- ALL THE DIMENSIONS ARE IN MM AND ELEVATIONS IN METER.
 - SUITABLE COVERS FOR ALL THE TRENCHES SHALL BE SUPPLIED BY CIVIL AGENCY.
 - SUITABLE ARRANGEMENT OF DRAINS FOR ALL THE TRENCHES SHALL BE DONE BY CIVIL AGENCY.
 - LAYOUT SHOWS THE OVERALL DIMENSIONS OF POWER HOUSE.
 - ALL CIVIL DESIGN INCLUDING CONCRETE THICKNESS OF FLOORS, SIZE OF COLUMN AND BEAMS ETC. TO BE DECIDED/DEVELOPED BY CIVIL DESIGN AGENCY.
 - SUPER STRUCTURE, STAIRWAY, RAILINGS ETC TO BE DEVELOPED BY CIVIL DESIGN AGENCY.
 - THE LAYOUT OF EACH FLOOR IS TENTATIVE AND SHALL BE FINALIZED DURING DETAIL ENGS.
 - STAGES OF CONCRETE SHOWN IS TENTATIVE.
 - SURFACE DRAIN ARRANGEMENT OF FLOORS SHALL BE IN CIVIL SCOPE.
 - DETAILS OF COLUMN/BEAM/WALL/STAIR/TOILETS ETC ARE TO BE FINALIZED BY CIVIL AGENCY.
 - STATION LAYOUT DRAWINGS ARE FOR REFERENCE ONLY, ALL OTHER RESPECTIVE EQUIPMENT/SYSTEM DRAWINGS MUST BE REFERRED FOR CONSTRUCTION.
 - LOCATION OF THE EQUIPMENT SHOWN ARE TENTATIVE ANY ADJUSTMENT AT SITE MAY BE DONE AS PER SITE CONDITION.

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	
		CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED	
		APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED	

ADDITIONAL INFORMATION		PROJECT		CHHANJU-III HEP (3X16 MW)																	
STATUS OF DRAWING		CUSTOMER		HIMACHAL PRADESH POWER CORPORATION LTD.																	
DISTRIBUTION OF PRINTS		CUSTOMER'S DWG NO.		CH-III-01-GR-12000022855																	
		CUSTOMER'S CONSULTANT		-																	
		CONTRACTORS		BHARAT HEAVY ELECTRICALS LTD.																	
<table border="1"> <tr> <th>NAME</th> <th>SIGN</th> <th>DATE</th> <th>NO. OF VAR.</th> </tr> <tr> <td>DRWN BSINGH</td> <td></td> <td>07.03.26</td> <td></td> </tr> <tr> <td>CHKD RSINGH</td> <td></td> <td>07.03.26</td> <td></td> </tr> <tr> <td>APPD RSINGH</td> <td></td> <td>07.03.26</td> <td></td> </tr> </table>		NAME	SIGN	DATE	NO. OF VAR.	DRWN BSINGH		07.03.26		CHKD RSINGH		07.03.26		APPD RSINGH		07.03.26		SUB-SUPPLIER / VENDOR		DURGESH RSINGH	
NAME	SIGN	DATE	NO. OF VAR.																		
DRWN BSINGH		07.03.26																			
CHKD RSINGH		07.03.26																			
APPD RSINGH		07.03.26																			
DEPT		UNTO. DIMS. GR.		ANGLE																	
CODE		SCALE		WEIGHT(kg)																	
TITLE		REF. TO ASSY.DRG.		ITEM NO.																	
PLAN AT EL.1627.0 MACHINE HALL & SERVICE BAY		DRAWING NO.		REV.																	
		12000022855		00																	
		SHEET NO.		NO. OF SHEETS.																	



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IC

REV. 00

**SUB-SECTION IC
DATASHEET - A**



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IC

REV. 00

DATA SHEET FOR DOUBLE GIRDER EOT CRANE WITH VVVF DRIVES

Details are to be furnished by bidder during detail engineering stage only

S.N.	DESCRIPTION	TECHNICAL PARTICULARS FOR POWER HOUSE CRANE
1.0	Design, fabrication and testing of the crane confirm to standard / code number	IS: 3177 & IS 807 (latest edition)
2.0	Number of crane/s	One No. (1)
3.0	Crane classification	M3 duty for Mechanical and Electrical as per IS: 3177– (latest
4.0	Suitable for outdoor or indoor duty	Indoor duty
5.0	Capacity (T)	
5.1	Main hoist	
	Rated SWL – tonnes	63 Tonnes
5.2	Aux. Hoists	
	Rated SWL – tonnes	8 Tonnes
6.0	Span	As per attached crane clearance diagram
7.0	Operation from	Operator’s Cabin + Radio Remote Control (RRC)
8.0	CRANE PERFORMANCE	
8.1	Crane speed with full load	
a	Main Hoist (M/Min.)	1 m/min.
b	Aux. Hoist (M/Min.)	5 m/min.
c	Crab travelling speed (CT motion) (M/Min.)	5 m/min.
d	Crane travelling speed (LT motion) (M/Min.)	10 m/min.
8.2	Micro Speed (inching) with full loads	
a	Main Hoist lift	0.1 mm
b	Auxiliary Hoist lift	0.5 mm
c	Long (Bridge) Travel	2.0 mm
d	Cross (Trolley)Travel	1.0 mm
8.3	Acceleration/deceleration for	
a	Bridge Travel	0.10 m/sec ²
b	Trolley Travel	0.10 m/sec ²
8.4	Lift in Meters	
a	Main Hook	As per attached crane clearance diagram
b	Aux Hook	As per attached crane clearance diagram



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IC

REV. 00

8.5	Clearances / hook approaches		
a	Minimum working clearance required for crane movement/ maintenance from the centreline of rail and nearest side obstruction	465 mm (Refer crane clearance diagram)	
b	Maximum distance between bottom of gantry rail and the highest point of Crane	3000 mm (Refer crane clearance diagram)	
8.6	Terminal Position of Crane		
a	Main/auxiliary from the centre of the gantry rail on Upstream side	1200 mm/ 2300 mm (Refer crane clearance diagram)	
b	Main/auxiliary/ monorail from the centre of the gantry rail on Downstream side	2300 mm/ 1200 mm (Refer crane clearance diagram)	
c	The distance of main and auxiliary hooks from inner edge of wall/nearest obstruction in their terminal positions at both the ends	3000 mm (Refer crane clearance diagram)	
9.0	Runway Length	52.2 m (Refer crane clearance diagram)	
10.0	Hand rail pipes	32 mm NB heavy duty GI pipes as per IS 1239 having top and bottom rail at height of 1000 mm and 600 mm and vertical post spacing not Exceeding 1500 mm with provision of kick plate (minimum 100 mm high and 6mm thick)	
11.0	COMPONENT DETAILS		
11.1	Trolley/ Bridge girder		
a	Type	Fabricated	
b	Method of fabrication	Welded	
c	Material conforming	IS: 2062 Gr. B	
11.2	Rope details		
a	Standard	IS:2266	
b	Construction	Extra flexible plough steel / 6 x 36 or 6x37 construction	
c	Factor of safety	6	
d	Type of core	Fibre/Steel	
11.3	Gear box details		
a	Material (gear/pinions)	Cast steel/forged steel	
b	Gear box housing material	Gearbox casing shall be fabricated from tested quality cast steel or welded steel plates and duly stress relieved	
11.4	Lifting hooks	Main Hoist	Aux Hoist
	Type	Rams horn type with Safety Latch swivelling type as per BIS:5749 with anti-swivel arrangement	Point hook with shank with safety latch Swivelling type as per IS: 15560. With anti-swivel arrangement
	Material	Refer "CUSTOMER SPECIFICATION"	
11.5	Brakes		
A.0	Hoist Motions	Main Hoist	Aux Hoist



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION IC

REV. 00

a	Type of Brake	Electro-mechanical DC brake and electro hydraulic thruster brakes.	Electro-mechanical DC brake and electro hydraulic thruster brakes.
b	Number Provided	Two (2) nos. for each motor	Two (2) nos. for each motor
c	Braking capacity of each brake	150% of full load torque	
B.0	Travel Motion	CT	LT
a	Type of Brake	Electro-mechanical DC brake and electro hydraulic thruster brakes.	Electro-mechanical DC brake and electro hydraulic thruster brakes.
b	Number Provided	Two (2) nos. for each motor	Two (2) nos. for each motor
c	Braking capacity of each brake	150% of full load torque	
12.0	Motors		
a	Type	Squirrel cage	
b	Enclosure and Degree of protection	TEFC & IP55	
c	Voltage, Phase and Frequency	3 Ph, 4 wire, 415V ±10%, 50 Hz ±3% Combined voltage & frequency variation within the above limits.	
d	Rated capacity (KW)	Refer "CUSTOMER SPECIFICATION – GENERAL TECHNICAL SPECIFICATION"	
e	Service class	S4	
f	Number of starts/ hour	As per IS 3177	
g	Pull out torque	2.5 times the rated load torque	
h	Space heater requirement	Refer "CUSTOMER SPECIFICATION – GENERAL TECHNICAL SPECIFICATION"	
13.0	Power conductors (DSL)		
	Type	LT: PVC shrouded Cu conductor bus bar. DSL phase indicating lamps to be provided at both end of bay. CT: Trolley power conductors shall be of the festooned wire Type.	
14.0	Control panel		
a	Material	Refer "CUSTOMER SPECIFICATION – GENERAL TECHNICAL SPECIFICATION"	
b	Numbers and location	One each for Protective, MH, AH, CT and LT located on bridge platform.	
c	Degree of Protection	Refer "CUSTOMER SPECIFICATION – GENERAL TECHNICAL SPECIFICATION"	
d	Features		
15.0	Cable (Fixed)	Power	Control
a	Material	Armored Copper, FRLS	
b	Size	Minimum 2.5 mm ²	
c	Voltage Grade	Refer "CUSTOMER SPECIFICATION – GENERAL TECHNICAL REQUIREMENT"	
16.0	Fire Extinguisher		



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION IC

REV. 00

a	Type and Size	4.5 kg, CO2 type
b	Numbers and Location	Three on bridge and one no. in Cabin
17.0	Power Supply	A two-way supply control switch shall be installed which shall be fed A.C supply from two boards. A.C supply to runway conductors shall be fed from this switch.
18.0	Transformer	Qty. / Rating
a	Control	2 X 100 % - 415/110V/24V
b	Lighting	2 X 100 % - 415/230V
19.0	Illumination	
a	In Cabin	Refer "CUSTOMER SPECIFICATION
b	Over Bridge	
c	Under bridge	
d	For inspection of crane components	
20.0	Type of platform required on the full length of bridge.	Chequered plate platform minimum 6 mm thick as per IS :3502.
a	Type of access from gantry girder level to crane bridge	Rung ladder at ends of crane bridge from gantry girder level walkway to crane bridges walkway.
b	Type of access to maintenance cage from crane bridges walkway	Rung ladder.
c	Type of access to Cabin from crane bridges walkway	Refer "CUSTOMER SPECIFICATION.
21.0	Type of control for Various motions	Through VVVF drive.



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION III

REV. 00

SECTION III

- 1. DOCUMENTS TO BE SUBMITTED ALONG WITH BID**
- 2. PRE-BID CLARIFICATION SCHEDULE**
- 3. COMPLIANCE CUM CONFIRMATION CERTIFICATE**



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION III

REV. 00

DRAWINGS / DOCUMENTS TO BE SUBMITTED WITH THE BID

Bidder shall submit the following drawings / documents along with their bid:

- a) Deviation schedule with reference to specific clauses of the specification along with reason for such deviation in the 'Deviation Schedule' (Cost of withdrawal) format as attached in GCC.
- b) Un-priced copy of price format indicating quoted/ not quoted against each row/column
- c) Copy of pre-bid clarifications/ amendment/ corrigendum issued by BHEL, if any, duly signed & stamped
- d) Signed/ Stamped copy of Compliance cum Confirmation Certificate

OFFER WILL BE CONSIDERED AS INCOMPLETE IN ABSENCE OF ANY OF ABOVE DOCUMENTS. DOCUMENT OTHER THAN ABOVE, IF ANY, SUBMITTED WITH THE OFFER WILL NOT FORM PART OF CONTRACT AND WILL NOT BE CONSIDERED FOR BID EVALUATION.



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION III

REV. 00

PRE-BID CLARIFICATION SCHEDULE

S. NO.	SECTION/CLAUSE/PAGE NO.	STATEMENT OF THE REFERRED CLAUSE	CLARIFICATION REQUIRED

The bidder hereby clarifies that above mentioned are the only clarifications required on the technical specification for the subject package.

Signature: _____

Name: _____

Designation: _____

Company: _____

Date: _____

Company Seal



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE

SPECIFICATION No: PE-TS-541-501-A001

SECTION III

REV. 00

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under "exclusion and those resolved as per 'Schedule of Deviations', with regard to same.
- b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'
- c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.

- d) All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
- e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

- f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
- g) All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
- h) Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions
- i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account
- j) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.
- k) As built drawings shall be submitted as and when required during the project execution.
- l) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.



3X16 MW HPPCL CHANJU HEP
ELECTROMECHANICAL WORKS PACKAGE
**TECHNICAL SPECIFICATION 63/8T
DOUBLE GIRDER EOT CRANE FOR
POWER HOUSE**

SPECIFICATION No: PE-TS-541-501-A001

SECTION III

REV. 00

- m) Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.
- n) Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
- o) In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.