An ISO 9001 Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY **NOTICE INVITING TENDER**	Phone: +91 431 257 79 38 Fax : +91 431 252 00 31 Email : tvenkat@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2851300004**	**Enquiry Date:** **06.08.2013**	**Due date for submission of quotation:** **12.09.2013**

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.
Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Quantity
10	**20T/10T-28.5M Span EOT Crane with Double Girder** as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**12.00 Nos**

Important points to be taken care during submission of offer

1. **Material shall be delivered to**
   FOR ,BHEL Stores,
   POWER EQUIPMENT FABRICATION PLANT,
   BHARAT HEAVY ELECTRICALS LIMITED
   Mundipar- 441804, Taluka: Sakoli,
   District: Bandara, Maharashtra State
2. **Delivery required 8 months from the date of purchase order.**
3. **EMD for this Tender will be (₹) : 2,00,000.00**
4. **Checklist No. BND/IND/05 and Annexure- I (Details of Company Performance) to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**
5. **All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.**

BHEL's General guidelines / instructions (refer MM / CE / GENL / 001 - EMD) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference "2851300004".

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For **BHARAT HEAVY ELECTRICALS LIMITED** Sr. Manager / Capital Equipment / MM

T. VENKATESWARAN
Senior Manager
Capital Equipment / MM
BHEL, Tiruchirappalli - 620 014.

PART A.

SECTION-I: -QUALIFING CRITERIA

The BIDDER/VENDOR (OEM) has to compulsorily meet the following requirements to get qualified for consideration of the technical offer for the SUPPLY OF EOT CRANE

S. No.	PARTICULARS	VENDOR'S RESPONSE
1.0	Only those Bidder/vendor (OEM), who have supplied and commissioned at least ONE 20 Ton capacity EOT crane Class-3 with minimum span of 28m or higher and should have supplied frequency converter drive for similar capacity crane in the past five years should quote.	
2.0	Vendor to submit Performance certificates along with their offer from minimum two of their customers for satisfactory performance of 20T EOT Cranes of Class-3 with minimum span of 28m or higher, fitted with frequency converter drive, supplied to them and are working satisfactorily for more than one year after commissioning (as on the date of opening of Tender). Suggestive format is given in the annexure.	
3.0	The bidding FIRM should have 'in-house' or 'self-owned' facility for FABRICATION and TESTING at 125 % of the rated capacity	
4.0	The vendor should have minimum 10 years experience in design, fabrication and supply of EOT cranes. Actual experience of the vendor can be specified	
5.0	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	

PART A.

SECTION – II

The vendors are requested to provide the following details

S. No.	PARTICULARS	VENDOR'S RESPONSE
6.0	Number of cranes supplied, installed and commissioned till date	
7.0	Number of cranes supplied, installed and commissioned till date in the QUOTED MODEL	
8.0	Number of cranes supplied, installed and commissioned till date for the following category of CUSTOMERS a) Power Utility Boiler Manufacturer b) Equipment Supplier for Process Industries [Heavy Engineering Companies] c) Research Establishments	
9.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centre in India and Asia	
10.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

PART A.

PERFORMANCE CERTIFICATE

(On Customer's Letter Head)

1. Supplier of the Equipment :

2. Make & Model of the Equipment :

3. Month & Year of Commissioning :

4. Application :

5.
   a) Crane Type:

   b) Crane Capacity (Metric Tonnes):

   c) Crane span :

   d) Mechanism class :

6. Performance of the Equipment : Satisfactory /
   (Strike off whichever is not applicable) Good /
   Average /
   Not Satisfactory

7. Any other remarks:

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART B.

TECHNICAL SPECIFICATIONS FOR 20T/10T 28.5M SPAN ELECTRICALLY OPERATED OVER-HEAD TRAVELLING [E O T] CRANE WITH DOUBLE GIRDER

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
1.0.0	**APPLICATION**	a. The subject crane is meant for the purpose of handling small to large (within the lifting capacity of the crane) components, in a heavy and large steel fabrication shop floor. b. The crane will be put to use for continuous duty with CT, LT and Hoist movements, which may occur simultaneously (within the operating parameters specified under Clause Nos. – 3.1.0, 3.4.0 and 3.5.0). c. The shop floor environment will be dust prone, humid, welding fume filled and ambient temperature going up to 45 °C.	
2.0.0	**SCOPE OF SUPPLY**	a. Design of crane as per BHEL Specifications b. Detailed Design & Manufacture of the crane as per BHEL Specifications. c. Complete assembling and testing of the crane before dispatch at suppliers works. d. Supply in Modules / Sub-Assemblies of the crane. e. Supply of 400Amps. Four line shrouded conductor system complete for 1650 mtrs materials as per the specification enclosed. **(See point no S1.0 to S2.9)** f. Unloading of all crane parts & shrouded conductor materials at the erection site.	

		(At BHEL Sakoli, Bhandara / Maharastra). g. Storage of all unloaded materials at site and protect from rain and theft. h. Erection / installation, wiring / cabling of the total crane at site. i. Installation and commissioning of shrouded conductor at site. j. Commissioning and Performance Prove out of the EOT crane at site. k. Performance Guarantee for 12 months, from the date of commissioning.	
3.0.0	**TECHNICAL SPECIFICATIONS**		
3.1.0	CAPACITY	Lifting Capacity	
3.1.1	Main Hoist	20 Metric Tonnes	
3.1.2	Auxiliary Hoist	10 Metric Tonnes	
3.2.0	SPAN	Wheel Centre to Wheel Centre Dimensions (Rail Centre to Rail Centre)	
3.2.1	Long Travel (LT)	28,500 mm	
3.2.2	Cross Travel (CT) Wheel gauge	3,500 mm	
3.3.0	Height of Lift	9,000 mm [Effective Height of Lift for both the HOISTS]	
3.3.1	LT wheel base	Minimum 6000 mm	
3.3.2	CT wheel base	Minimum 3500 mm	
3.4.0	DUTY CYCLE	Related to Drive Motor & Mechanisms	
3.4.1	Hoists	40 % CDF	
3.4.2	Long Travel	40 % CDF	
3.4.1	Cross Travel	40 % CDF	
3.5.0	SPEED	Operating / Working Speed [Maximum]	
3.5.1	Main Hoist	7.5 mtrs. /minute.	
3.5.2	Auxiliary Hoist	15.0 mtrs./minute.	
3.5.3	Cross Travel (CT)	30.0 mtrs./minute.	

3.5.4	Long Travel (LT)	60.0 mtrs./minute.	
3.6.0	**MOTOR RATINGS**	Electric Motor Ratings & Frame Sizes	
3.6.1	Main Hoist	Min.35 kW ; Frame Size – VD250 M	
3.6.2	Auxiliary Hoist	Min.35 kW ; Frame Size – VD250 M	
3.6.3	Cross Travel (CT)	Min. 7.5 kW ; Frame Size – VD132 M	
3.6.4	Long Travel (LT)	Min. 2 x 18 kW ; Frame Size – VD200 L	
3.6.5	Motor type	All motors shall be of 6 pole, sq. cage induction motor with 300 starts per hour rating.	
3.7.0	**GEAR BOX**	Gear Box Size(Input and output center distance) /No of stages of gear reduction / HP rating	
3.7.1	Main Hoist	HR 650 / 2 or 3 stage gear reduction / 45HP	
3.7.2	Auxiliary Hoist	HR 650 / 2 or 3 stage gear reduction / 45HP	
3.7.3	Cross Travel (CT)	VR 400 / 2 or 3 stage gear reduction / 10HP	
3.7.4	Long Travel (LT)	HR 400 / 2 or 3 stage gear reduction / 20HP	
3.7.5	All gearbox casing	Steel fabricated type and stress relieved.	
3.8.0	ACCELERATION		
3.8.1	Cross Travel (CT)	300 mm / sec.sq.	
3.8.2	Long Travel (LT)	300 mm / sec. sq.	
3.9.0	**HOIST ROPE DETAILS**	Construction:6x37 or 6x36; Fiber core; Tensile strength 1770 kg/mm sq.	
3.9.1	Main Hoist	Dia. 18 mm ; Falls - 8	
3.9.2	Auxiliary Hoist	Dia. 18 mm ; Falls - 4	
3.10.0	**CONTROL**	Cabin Operation and Remote Control	
3.11.0	Type of Control	Master Control and Radio Remote Control	
3.12.0	Control Voltage	110 V AC	
3.13.0	Input Power Supply	415 Volts with ± 10% fluctuation , 50 Hz with ± 3% fluctuation, 3 Phase- AC	
3.14.0	Duty Class	Class – 3 [Indoor Service]	
3.15.0	Mechanism Group Classification	M 6	
3.16.0	DESIGN STANDARD	IS – 807 & 3177 / 2006	
3.17.0	**Runway Rail Size**		

3.17.1	Cross Travel (CT)	ISR 60 Lbs./Yard	
3.17.2	Long Travel (LT)	C R 80 (For reference only - not supplier scope)	
3.18.0	**Wheel Size**		
3.18.1	Cross Travel (CT)	Dia. 320 mm - 4 nos	
3.18.2	Long Travel (LT)	Dia. 630 mm – 4 nos	
3.19.0	**Brake Drum Size**		
3.19.1	Main Hoist	Dia. 300 mm – 1 no	
3.19.2	Auxiliary Hoist	Dia. 300 mm -1 no	
3.19.3	Cross Travel (CT)	Dia. 160 mm -1 No	
3.19.4	Long Travel (LT)	Dia. 200 mm – 2 Nos	
4.0.0	**MAIN FEATURES**	Crane Operational Features	
4.1.0	Control System	Frequency Converter type for all motions (with VFD / VVVF drive)	
4.2.0	Remote Control	Radio Remote Control for all motions	
4.3.0	End Clearance	End Clearances to be fixed to suit the workshop building clearances [Refer Drawing No. **M&S: PD: 13:123** – Drawing enclosed with the tender as **ANNEXURE-1.**]	
4.4.0	Crane Operation	Through Cabin Control and Radio Remote Control with option for control selection (using 3 way selector switch provided at end carriage)	
5.0.0	**STRUCTURAL FABRICATION**	Crane Structure Constructional Details	
5.1.0	Bridge / Girder & End carriages of LT and CT	Plate formed Box type Construction for Girders, End carriages of LT and CT	
5.1.1	**Bridge girder section**	**The minimum size shall be as follows**	
5.1.1.1	Cross section of bridge girder	Min. Girder Height (Flange inner- inner) – 1560mm (Minimum) Min. Girder width (Web inner- inner) – 512mm (Minimum) Top flange plate thickness – 16 mm (Minimum)	

		Bottom flange plate thickness – 12 mm (Minimum) Web plate thickness – 8 mm (Minimum) Width of top flange and bottom flange – 570 mm (Minimum) Vertical diaphragm plate thickness – 6 mm (Minimum) Distance between long diaphragms – 1200 mm (Maximum) Vertical Diaphragms shall be made of solid plates only Horizontal Stiffener to be provided- An ISA 50x50x6 shall be provided throughout the length of the web (for both webs) at about 1/3rd of the bridge height from the top.	
5.1.1.2	Camber for bridge	The Crane Bridge shall be cambered at the top as well as the bottom. The final camber shall be between +26mm and +30mm.	
5.1.2	Cross section of LT End carriage	Min. Height (Flange inner- inner) – 630 mm (Minimum) Min. width (Web inner- inner) – 292mm (Minimum) Top flange plate thickness – 12mm (Minimum) Bottom flange plate thickness – 10 mm (Minimum) Web plate thickness – 8 mm (Minimum) Width of Top flange and bottom flange – 350 mm (Minimum) Vertical diaphragm plate thickness – 6 mm (Minimum) Vertical Diaphragms shall be made of solid plates only	

5.1.2.1	Jacking pads	Jacking pad shall be provided between web plates of end carriage ends for removal of LT wheel.	
5.1.2.2	Wheel Clearance	Minimum clearance to be maintained between rail top and bottom flange of end carriage shall be as follows 1.For Long travel – 100 MM 2.For Cross travel – 50 MM	
5.2.0	Raw Material	Only steel plates tested and certified for quality by reputed inspection authorities, shall be used. Test Certificates to be produced for BHEL verification and form part of the documentation.	
5.2.1	Welding of web plate	Top flange shall be welded inside also with web plate and it shall be equal length stitch weld minimum.	
5.2.2	Welding of stiffener plate.	All stiffener plates shall be inside welded both sides with top flange and web plates and it shall be equal length stitch weld minimum.	
5.3.0	Welded Joints	To be followed for Girder Fabrication	
5.3.1	Number of butt welded joints allowed in web and flange plates of bridge girder.	Max Three joints only. (Joint at the center of the span shall be avoided.)	
5.3.2	Welding Electrodes	a. For all Horizontal Welding E 7018 /ER70S-6 (MIG) Electrode only should be used. b. For all Vertical Welding E 7048 /ER70S-6 (MIG) Electrode only should be used.	
5.3.3	Welded Joint Testing	All Butt Welded Joints (compression / tension and flanges / web joints) shall be subjected to 100% X-Ray Testing and X-Ray Films and its reports are to be produced for BHEL verification and form part of the documentation.	

5.4.0	Splice Joints	NO bolted SPLICE JOINT IS ALLOWED IN GIRDER FABRICATION [Girder has to be of SINGLE PIECE only to the total length of the span 28500 mm].	
5.5.0	Platform on Girders	The Platforms provided on both the Girders shall be for full length and fixed through BOLTED JOINTS only. Minimum foot walk clearance of 500 mm shall be provided at all points.	
5.6.0	Wheel Assembly	The Wheel Assembly coming for Cross Travel (CT) & Long Travel (LT) shall be of LIVE AXLE SYSTEM with L-Type Bearings and shall be as per the BHEL Drawing No. **3-M-02R-0011993**. [Drawing is enclosed and given as **ANNEXURE -2**].	
5.7.0	Heat Treatment & NDT Examination	The Trolleys shall be Stress Relieved after welding and NDT examinations if required. All weldings shall be tested by NDT means [MPI, LPI & RT] after Stress Relieving operation.	
5.8.0	Machining Operation	All mechanical mating surfaces and wheel seating areas are to be machined to the required finish and protected	
5.9.0	Surface Cleaning	Both the Girders and the Trolleys are to be thoroughly cleaned after completion of all operations but prior to painting.	
5.10.0	**Painting**	**The crane parts are to be painted as follows**	
5.10.1	At supplier works	During Stage-I inspection the inside of the girder/end carriage shall be painted with one coat of red oxide before closing. This shall be verified during inspection.	
5.10.2	At supplier works	During Stage-II inspection, the crane shall be painted with One coat of Primer with 25 microns of DFT (Dry Film Thickness) and 48 hours of compulsory curing after painting.	

		The crane shall be dispatched with one coat of Primer only.	
5.10.3	At Erection Site	After the crane erection is complete, the crane has to be painted as follows a. Touch-up painting of Primer wherever necessary b. Two coats of Enamel Paint (Color – Tractor Orange) each with a DFT of 25 microns and intermittent curing of minimum 16 hours.	
5.10.4	Paint & labor	All paints and labor etc. for painting at site also shall be the scope of the crane supplier.	
6.0.0	**MECHANICAL ELEMENTS**		
6.1.0	Gears	Gears in all the Stages shall be helical in design and to be of machined, lapped and hardened if necessary. Required test certificates shall be produced for BHEL verification and shall part of documentation.	
6.2.0	Gear Box Casing	Shall be of fabricated type and stress relieved by thermal heat-treatment process, prior to machining.	
6.3.0	Rope Drum	Shall be of fabricated type and stress relieved. The circumferential weld joints shall be tested by 100 % X-Ray for quality assurance.	
6.3.1	MH rope drum size	400 mm diameter (at the bottom of the grove)	
6.3.2	AH rope drum size	400 mm diameter (at the bottom of the grove)	
6.3.3	MH & AH rope drums shall be	Shall be at the at middle of the CT gauge 3500mm	
6.3.4	Flange in rope drum	MH & AH rope drums shall be provided with minimum 100mm height flange at both ends to prevent rope slip.	
6.4.0	Type of Coupling	a. Between Motor and Gear Box- Full gear coupling	

		b. Between Gear Box and Rope Drum- Geared rope drum coupling/ spline shaft c. Between Gear Box and Wheels(For LT and CT)- Half gear coupling with floating shaft (Minimum floating shaft length for Long Travel shall be 1500 mm)	
6.4.1	Placing of CT gear box	The cross travel gearbox shall be located at the center of the CT span 3500 mm	
6.5.0	Wheels	The Wheels shall be of Forged and Wheel Tread hardened to 300/350 BHN. Wheels shall be fitted with L-Type Bearings. Test certificates for wheel tread hardness shall be produced for BHEL verification and shall part of documentation.	
6.6.0	Mechanical Joints	Fit Bolts shall be as per IS 3640-1982 for all joints coming in main members & platform supports.	
6.7.0	**Pulley size**	**Pulley sizes shall be as follows**	
6.7.1	MH & AH Pulley	Bottom block and top return pulleys - 400 mm. (at the bottom of the grove)	
6.7.2	MH & AH eq. pulley	250 mm with antifriction bearing. (at the bottom of the grove)	
6.8.0	Hook latch	Hook latch shall be provided for MH & AH hooks	
6.9.0	Gear & thruster oil	Appropriate grade oil should be supplied for all gearboxes and thruster brakes to the required quantity.	
6.10.0	Buffer	Spring loaded buffer shall be provided for LT and CT end carriages as per standard.	
6.10.1	LT buffer height	The height of LT buffer canter from LT rail top shall be 700 mm	
7.0.0	**ELECTRICAL ELEMENTS**		
7.1.0	Operational Controls	The Crane shall be provided with the following controls : a. Cabin Control [Master Control]	

		b. Radio Remote Control [Micro processor based Two Step Push Button Type]	
7.2.0	Control Voltage	110 V AC	
7.3.0	Type of Brakes	a. Main Hoist - DC Brake b. Auxiliary Hoist - DC Brake c. Cross Travel - Thruster brake d. Long Travel - Thruster brake	
7.4.0	Protection	All Panels, Limit-Switches and Motors shall have IP 54 protection.	
7.5.0	Electric Motors	All Electric Motors shall be as per IS-325 and IS-1231 and also suitable for 300 starts per hour. Test certificates shall be produced for BHEL verification and form part of documentation.	
7.6.0	Electric Contactors	All Panels shall have only SIEMENS / L&T Contactors and shall be suitable for AC3 Duty Class.	
7.7.0	Contactors Rating	The rating of all Contactors shall be atleast 50% higher than the respective electric motor full load current at the specified duty cycle.	
7.7.1	VFD / VVVF drive	Rating of VFD / VVVF drive shall be at least 25% higher than the respective electric motor rating at the specified duty cycle.	
7.8.0	Long Travel Motion	Dual Drive Mechanism shall be provided for LT (Long Travel) Motion.	
7.9.0	Illumination	a. Four numbers of 500 Watts Halogen Lamps shall be provided in end carriage between bridges. (Each side 2 nos) b. All Electric Panels shall be provided with suitable illumination for visibility and trouble shooting.	
7.10.0	Controller Steps	A 4-Step Controller has to be provided for a. Main Hoist b. Auxiliary Hoist	

		c. Long Travel d. Cross Travel Note: Cam discs should be made of metal / Bakelite only.	
7.11.0	Frequency Converter	The VVVF Drive shall be supplied with suitable DBR for all motions. The duty cycle of all the DBRs shall be 40%.	
7.12.0	Portable programmable device	A portable programmable device 1 No for uploading/downloading or modifying the parameters in the VVVF Drives shall be supplied. (only 1 no for all 12 cranes)	
7.12.1	Anti-Collision Device	An Anti-Collision Device of infra-red type shall be provided on both sides of the crane. The operating range shall be 3.0 meters to 10.0 meters.	
7.12.2	Load Cell	a. For main hoist, load Weighing System (with tolerance +/- 50 kg) with LOAD CELL (shear pin type) to be fixed / provided at the equalizer pulley. b. The remote display shall be of 100 mm size (JUMBO)	
7.12.3	Crab wiring	Crab shall be fully wired.	
7.13.0	Hoist limit	Each hoist shall be provided with both rotary and counter weight limits	
7.14.0	Cabin	The following items shall be provided in the cabin. 1. Operator chair, 2. Light, 3. Fan, 4. Warning bell, 5. Fire extinguisher, 6. Remote Indication lamp and 7. Push button station – with the following	

		buttons a. OFF Push Button - Mushroom Head [Plastic] Stay put- colour in RED. b. ON Push Button - Illuminated [GREEN colour 110Vac BA9 Filament Lamp] Flush type Push button[Plastic] c. BELL pushbutton – Projecting Head[Plastic] Push Button actuator [BLACK Colour] BRIDGE LIGHT ON/OFF switch - 2-Position 8. A rubber mat shall be provided at the floor of the cabin.	
7.15.0	CT Cabling	Drag chain with cable system shall be used for CT motion.	
7.16.0	Electric Cables and recommended current rating	All the cables used in the crane shall be insulated flexible copper cables as per IS:1554 (Part-I)-1964 and the current rating shall be as per IS: 3961 (Part-II)- 1967	
7.16.1	**Spares Set -1**	The following spares one set also shall be supplied (one set for 12 cranes) The recommended spares list shall at least contain the following spares 1. LT wheel bearing – 2 No 2. CT wheel Bearing – 2 No 3. Thrusters for brakes – 2 Nos 4. Warning bell – 2 No 5. 500 W Halogen lamp – 2 Nos 6. Limit switches – 1 No of each variety used in the crane 7. Master controller – 1 No 8. Main Hoist Brake drum – 1 No	

		9. Oil Seals- 1 No of each variety used in the crane 10. 3 Ton chain pulley block with 9 Mtr height of lift.- 2 Nos 11. 50 Ton hydraulic jack remote pump type	
16.6.2	**Spares Set -2**	For 12 EOT Cranes, the following spare shall be included in the offer (one set for 12 cranes) 1. <u>Gearbox-</u> a. Main Hoist Gearbox- 1 No b. Aux. Hoist Gearbox- 1 No c. Cross Travel Gearbox – 1 No d. Long Travel Gearbox – 1 No 2. <u>Motors-</u> a. Main Hoist Motor- 1 No b. Aux Hoist Motor- 1 No c. Cross Travel Motor – 1 No d. Long Travel Motor – 1 No 3. <u>Wheels</u> (wheel & axle only not wheel assembly) a. Long Travel wheel with axle – 2 Nos b. Cross Travel wheel with axle – 2 Nos 4. <u>Brake drums</u> a. Main Hoist Brake drum – 1 No b. Aux Hoist Brake drum – 1 No 5. <u>Brake Shoes</u> a. Main Hoist Brake shoe with lining-----4 nos b. Aux Hoist brake shoe with lining ------4 nos c. Cross Travel brake shoe with lining--- 4 nos d. Long Travel brake shoe with lining-----4 nos e. DSL shrouded conductor spare – 2% of the total length of DSL ie 2% of 1650 = 33m (approx.)	

8.0.0	**SELECTION of BOI and COMPONENTS**	The makes of Components or Bought-Out-Items shall be strictly as per the list given below.	
8.1.0	Hoist Hooks	HERMAN MOHTTA / HERCULES / SILPA UDYOG / SMRITI FORGINGS / KARACHIWALA	
8.2.0	Wire Rope	USHA MARTIN / FORT WILLIAM / RA WIRE ROPE	
8.3.0	Electric Motors	GEC / BHARAT BIJLEE / SIEMENS / KEC/ ALSTHOM	
8.4.0	DC Brake Unit	Only BCH make	
8.5.0	Radio Remote Control	Tele crane make(F24-10D) / Ittowa make (winner)	
8.6.0	Thruster Brake Unit	ELECTROMAG / SPEED-O-CONTROL / OMEGA	
8.7.0	Limit Switch (Gravity Type)	SIEMENS / INDUSTRIAL SYNDICATE / BCH / SKC / SOC	
8.8.0	Contactors	SIEMENS / L&T	
8.9.0	Over-Load-Relay	SIEMENS /L&T (THERMAL TYPE)	
8.10.0	HRC Fuses	GE / L&T /SIEMENS	
8.11.0	Rotary limit switch	SIEMENS / OMEGA / SOC / INDUSTRIAL SYNDICATE	
8.12.0	Switch fuse unit	L&T / SIEMENS / GEC	
8.13.0	Moulded case C.B	SIEMENS / L&T	
8.14.0	Cable drag chain	IGUS / CABLE SCHLEPP	
8.15.0	Push - Buttons	SIEMENS / L&T /AIRON	
8.16.0	Connectors	ELMAX make or reputed make with IS approved and acceptable BHEL.	
8.17.0	Couplings	WMI / FENNER / ALFEX	
8.18.0	Bearings	SKF / NBC / ZKL	
8.19.0	Cables	Reputed Makes & IS Approved acceptable by BHEL.	
8.20.0	Bridge Light Fittings	PHILIPS / GE / CROMPTON	
8.21.0	Load Cell	IPA make or reputed make with IS approved and acceptable to BHEL	

8.22.0	VVVF Drives	ABB / MITSUBISHI / YASKAWA	
8.23.0	Shrouded conductor	NBM / Silver line / SAFE LINE (STROMAG)/SAFE TRACK(SUSHEEL)	
8.24.0	Gear boxes	ELECON / SHANTHI GEARS / RADICON / CROMTON GRREAVES	
8.25.0	Catalogues of brought out items	The vendor shall provide the Technical catalogues of the following bought-out items along with the offer. 1. Steel Wire rope 2. Crane duty electric motors 3. Gearbox 4. DC Brake 5. Thruster Brake 6. Radio Remote 7. Limit Switches 8. Load cell 9. VVVF Drive along with DBR selection chart. 10. Cable drag chain 11. DSL Shrouded conductor system	
9.0.0	**DOCUMENTS/ DETAILS for APPROVAL**	The following documents and details are to be submitted for BHEL Approval, prior to taking up the manufacture of the crane.	
9.1.0	Drawings and Documents	Set I: a. Calculations for Selection of Electric Motors, Gear Reducers, Brakes, Couplings, etc. b. Calculations for Bridge Girder, Crab, End - Carriage and their connections. c. GA Drawing of the Crane. d. GA Drawing of Trolley. e. GA Drawing of Individual Mechanisms. Set II: a. Drawings of Bridge, End-Carriage and their	

		connection. b. Sub-Assembly Drawing for Wheels, Hook Blocks, Gear Boxes, Hoist rope drums and all brake Drums. c. Wiring Diagram with Logic Circuits with bill of materials. d. Cable Selection based on Current Rating and cable schedule. Initially Set I drawings to be submitted in one lot and approval to be obtained from BHEL. Based on this, set II drawings to be submitted for approval.	
9.2.0	Technical Details	a. Total Weight of the Crane including all Electrical Equipment. b. Total Weight of Trolley including all Electrical Equipment c. Weight of each Bridge assembled and ready for erection with and without Mechanical and Electrical Equipment. d. Weight of End-carriage assembled and ready for erection. e. Total Weight of Structural, Mechanical and electrical Equipment and indicated separately also. f. Weight of Operator's Cabin together with all Equipment mounted in it.	
10.0.0	INSPECTION	The following schedule of stage inspections is to be strictly adhered to, prior to dispatch from the suppliers works.	
10.1.0	STAGE – I	a. Verification of Test Certificate for Raw Materials used for Girders, End-Carriages, Trolley, Gear Box Casings, etc. b. Verification of X-Ray Report of Butt-Joints	

		coming in the Girders and Random Testing on the Welds, by physical examination. c. Box Girder setting before closing of the Bottom Flanges – for inspecting the quality of welding and presence of waviness d. Trolley Frame Fabrication before setting the Mechanisms e. End–Carriage Fabrication before closing of the Bottom Flanges. The following Test certificates to be produced during Stage-I Inspection a. TC for plates used for bridge fabrication b. TC for plates used for End carriage fabrication c. TC for the steel rounds used for Gear fabrication. d. TC for plates used for Gearbox casing fabrication. e. X-Ray film and report for all the Butt-Joints in the girders.	
10.2.0	STAGE – II / Final	a. Inspection of Bridges, End–Carriages and platform fabrication. b. Verification of Span & Diagonal Dimensions, Checking of Wheel Alignment, Mechanical Assemblies and Total Alignment. c. Free running of all the all Mechanisms. d. Measurement of CAMBER in the Bridges. e. Full / Rated Load Test and trolley and Deflection Test f. Deflection and Permanent Set Measurement. g. 25% OVER-LOAD Lifting Ability Check.	

		<u>The following Test Certificates to be produced during Stage-II / Final Inspection.</u> 1. TC for all Hoist Hooks 2. TC for Steel Wire ropes 3. TC for Heat treatment and final hardness for all gears. 4. TC for Wheel Hardness for LT and CT 5. TC for all thruster brakes 6. TC for all DCEM Brakes 7. TC for all motors 8. TC for all limit switches 9. TC for all VVVF Drives.	
10.3.0	Inspection of shrouded conductor	Pre dispatch inspection shall be offered to BHEL for full quantity in one lot at manufacture's works.	
11.0.0	**CRANE ERECTION & COMMISSIONING (including shrouded conductor)**		
11.1.0	Unloading of all crane parts (like Girders, end carriage, CT assembly, LT Mechanism etc & shrouded conductors)	Unloading of all crane components at BHEL site, Bhandara- Maharashtra shall be the scope of the supplier. Required mobile crane, manpower, lifting tackles etc. shall be the scope of supplier.	
11.2.0	Crane Erection & Cabling (including shrouded conductor)	Complete crane erection/installation, wiring/cabling of the various components at BHEL shall be the scope of the supplier	
11.3.0	Crane Commissioning	Commissioning of the Crane and Performance Prove –Out for 125% of Crane's Capacity and Smooth Functioning of the Crane (at BHEL site) shall also be the RESPONSIBILITY of the supplier.	

12.0.0	**O & M MANUALS**	Each Crane shall be provided with THREE Copies of Erection, Operation & Maintenance Manual hard copy and soft copy in CD, containing the following technical details	
12.1.0	Drawings & Details	a. Crane GA Drawing. b. Crab Assembly Drawing. c. Total Crane Wiring Schematics. d. Detailed Wiring Diagrams for Sub-Systems /Panels e. VVVF Drive's Logic Circuits f. Wheel Assembly Drawings g. Bottom Block Assembly Drawing h. Gear Box Assembly Drawings i. Coupling Drawing and Details j. Specifications/Ratings of All Bought-Out Items k. Warranty/Guarantee Card for all Bought Out-items l. Trouble Shooting Chart for all Systems	
13.0.0	**PERFORMANCE GUARANTEE**	The Performance of the Total Crane and/or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a minimum period of 12 months from the date of performance acceptance at BHEL Works or 18 months from the date of supply whichever is earlier.	
14.0.0	**TRAINING**	The Supplier shall arrange training for four BHEL persons at VVVF Drive OEM's works free of cost on programming, operation, maintenance and trouble shooting of the offered drive. The training period shall not be less than three days. All the costs incurred for the training shall be the scope of the supplier. The travelling, boarding and lodging expenses of BHEL persons will be borne by BHEL.	

Specification for 4-Line DSL shrouded conductor system required for EOT cranes for BHEL Bhandara site.			
S1.0	**CONDUCTOR**		
S1.1	Total length of shrouded conductor required	For all the 12 EOT cranes:1650 Mtrs 240 Mtr Bay X 2 Nos = 480 MTR 234 Mtr Bay X 5 Nos = 1170 Mtr 1170 + 480 = 1650 Mtr For 5+2 =7 bays	
S1.2	Quantity in each	Red color insulated conductor =1650 Mtr Yellow color insulated conductor =1650 Mtr Blue color insulated conductor =1650 Mtr Green color insulated conductor =1650 Mtr	
S1.3	Current rating of conductor / Material	400 Amps / Copper	
S1.4	Standard length of each conductor	4.5Mtr (Appx.)	
S1.5	Cross sectional area of conductor	Shall be adequate for the current rating.	
S1.6	Insulation cover	Red, Yellow, Blue & Green.	
S1.7	Support pitch	Minimum distance between support brackets - 1000 MM	
S1.8	Hanger clamp	4 pole with double bolted arrangement.	
S1.9	Location of power feeding	Center feeding	
S1.10	Minimum Pitch between conductors	40 mm	
S1.11	Conductor Joint type	4 bolted (2+2 each side) joint	
S1.12	System voltage	500V AC	
S1.13	Insulation	PVC	
S1.14	Protection	IP21	
S1.15	Ambient tem.	Suitable for 50°C Ambient Temperature rise.	
S1.16	Installation	Indoor.	

S2.0	**CURRENT COLLECTOR**		
S2.1	Rating of current collector	125 A	
	Material	sintered copper	
S2.2	Type	Sliding contact with sufficient contact pressure while on movement	
S2.3	Tolerance in collector movement	Horizontal +/- 200 mm Vertical +/- 60 mm	
S2.4	Current collector assembly	Shall be suitable to take vertical and horizontal misalignment during long travel motion of the EOT cranes.	
S2.5	Anchoring	Anchoring clamps shall be provided to avoid conductor longitudinal movement for all the 7 bays	
S2.6	Insulated covers shall be supplied for	At all conductor joints, at all center power feed, anchoring point and at all ends.	
S2.7	Number of current collector assembly required	**192 nos** 8 nos for each crane (Number of cranes 24 20/10T EOT crane-12 nos 10T EOT cranes-10 nos 30/10T EOT crane-2 nos)	
S2.8	Indicator lamps Red, Yellow, Blue & Green	Shall be provided at all ends and at center feed location of all 7 bays.	
S2.9	Current collector holding brackets required.	For 24 cranes (To hold 8 current collectors in each crane)	

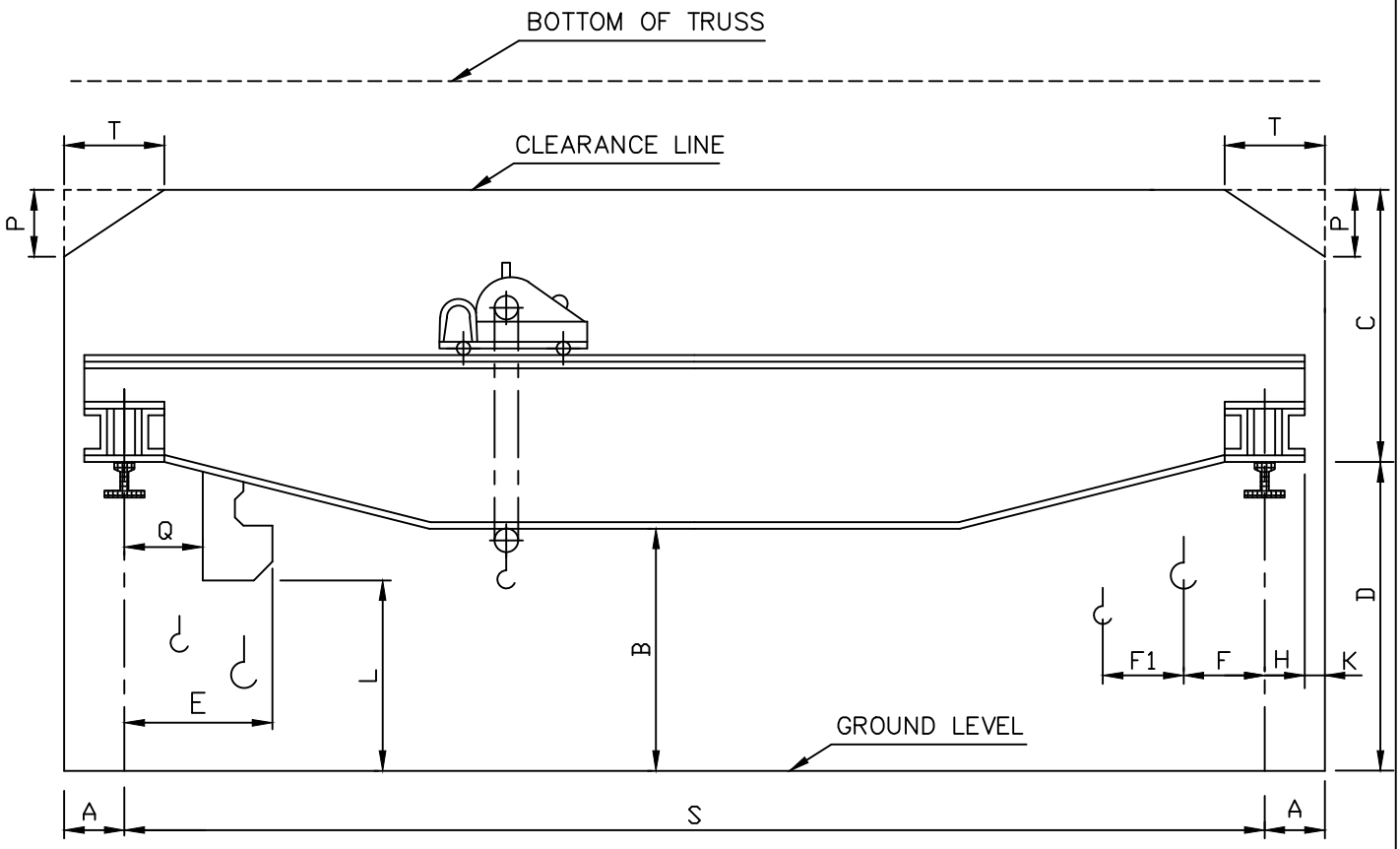
SCOPE

A. Supply
1. EOT crane 20/10Ton 28.5 M span 9Mtr height of lift -------12 Nos
2. Shrouded conductor 4 line ----------1650 Mtrs
3. Current collector----------192 Nos

B. Service
1. Erection / installation, cabling / wiring and commissioning of 20/10T EOT crane ---12 Nos
2. Installation and commissioning of shrouded conductor ----1650 Mtrs
3. Installation and commissioning of current collector----------192 Nos

Note: Order to be placed for above Supply & Service (3+3=6 items) both are to be made to a single vendor only.

CLEARANCE DIAGRAM FOR E.O.T. CRANE

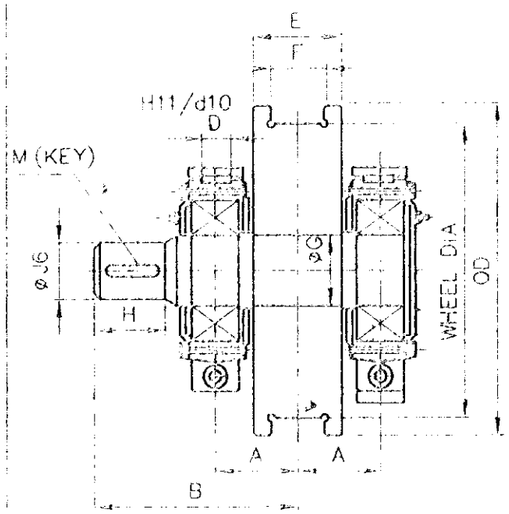


	30Tx28500 SPAN 9 M. LIFT	20Tx28500 SPAN 9 M. LIFT	10Tx28500 SPAN 9 M. LIFT
S	28500	28500	28500
D	9000	9000	9000
C	3000 MAX.	3000 MAX.	3000 MAX.
A	300	300	300
K	100 MIN.	100 MIN.	100 MIN.
T	1500	1500	1500
P	1000	1000	1000
B	–	–	–
L	–	–	–
Q	1050 Min	1050 Min	1050 Min
F			
F1			
H			
E			

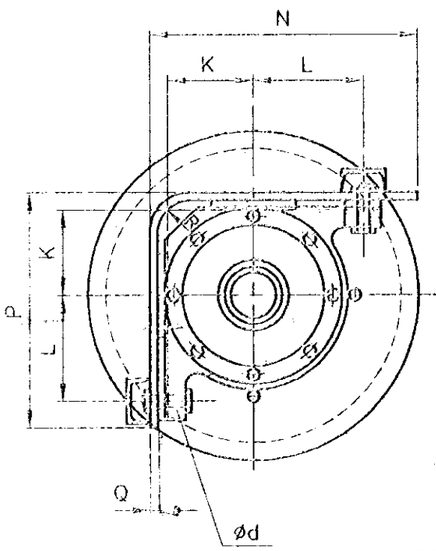
	DRAWN: S.Selvamanickam DATE: 18.03.13'	
	TITLE: CLEARANCE DIAGRAM FOR E.O.T. CRANE (FOR BHANDARA PROJECT)	M&S: PD: 13: 123

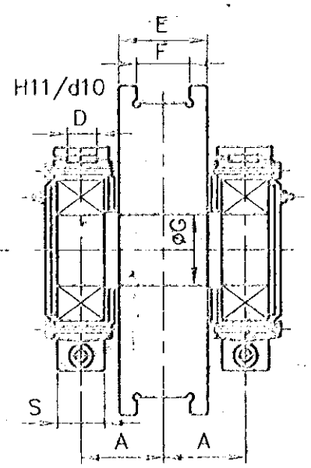
ALL DIMENSIONS ARE IN MM

SL. No.	T.O.D. (WHEEL DIA) IN MM	RAIL SIZE	A	B	D	E	F	øG	H	øJ	K	L	ød	M (KEY)	N	P	Q	S	R	COUPLING No.	SKF BRG No. & BRG. SIZE	TOTAL WEIGHT IN Kg. FOR DRIVE & IDLE
			DIMENSIONS																			
16	800/850	CR-100 CR-120	190	450	80	210	150	152	140	130	212	255	32	32x18x130	687	588	20	150	80	107	22330 150x320x108	870.00 845.00
15		CR-80	168	420	80	180	110	152	125	110	212	255	32	28x16x115	687	588	20	150	80	106	22330 150x320x108	796.00 775.00
14	710/750	CR-100 CR-120	190	450	80	210	150	152	140	130	212	255	32	32x18x130	642	588	20	150	80	107	22330 150x320x108	808.00 784.00
13		CR-100 CR-120	180	420	71	210	150	132	125	110	180	224	32	28x16x115	607	517	20	130	80	106	22326 130x280x93	728.50 711.50
12		CR-80	180	400	71	180	110	132	125	110	180	224	32	28x16x115	607	517	20	130	80	106	22326 130x280x93	653.00 636.00
11	630/680	CR-80/CR-100 & CR-120	180	420	71	210	150	132	125	110	180	224	32	28x16x115	567	517	20	130	80	106	22326 130x280x93	629.00 611.50
10		90-105 Lbs/Yd CR-80	150	365	60	180	105	111	110	90	160	190	26	25x14x100	547	462	20	120	60	105	22322 110x240x80	448.00 434.50
9	500/550	CR-80 CR-100	160	375	60	180	125	111	110	90	160	190	26	22x14x100	482	462	20	120	60	105	22322 110x240x80	253.00 245.50
8		CR-80	150	360	50	180	125	91	105	80	125	160	26	22x14x90	445	395	20	100	50	104	22318 90x190x64	389.00 378.00
7		60/75/90 & 105 Lbs/Yd	150	360	50	180	105	91	105	80	125	160	26	22x14x90	445	395	20	100	50	104	22318 90x190x64	301.00 294.00
6	400/450	CR-80 CR-100	150	360	50	180	125	91	105	80	125	160	26	22x14x90	395	395	20	100	50	104	22318 90x190x64	253.00 245.50
5		90 Lbs/Yd 105 Lbs/Yd	145	315	40	180	105	76	85	70	112	140	22	20x12x75	375	345	16	90	50	103	22315 75x160x55	197.00 192.00
4	320/370	75 / 90 & 105 Lbs/Yd CR-80	145	315	40	180	105	76	85	70	112	140	22	20x12x75	345	345	16	90	50	103	22315 75x160x55	162.00 157.00
3		50 SQ.BAR 60 Lbs/Yd 75 Lbs/Yd	112.5	260	40	125	85	61	65	55	85	112	17	16x10x55	312	287	16	80	50	102	22312 60x130x46	118.50 118.00
2	250/280	50 SQ.BAR 60 / 90 & 105 Lbs/Yd	105	250	32	125	85	61	65	55	76	100	17	16x10x55	254	249	12	60	40	102	22212 60x110x28	66.00 63.00
1	200/230	90 Lbs/Yd 50 SQ.BAR 60 Lbs/Yd	95	220	32	100	67	46	55	40	71	95	17	12x8x45	239	232	12	65	40	101	22309 45x100x36	51.00 50.00



DRIVING WHEEL ASSY





IDLE WHEEL ASSY

MATERIAL :- SHAFT - 45C8/IS:1570.
WHEEL - 55C8/IS:5517.
FORGED.
TREAD PORTION WHEEL HARDNESS 300 TO 350 (BHN)

No.of Pieces	DESCRIPTION	MATERIAL	STANDARD	NET.WT.IN KGS.	DRAWING No.	ITEM No.
REFERENCE			COMPONENT CODE: 29		EQUIPMENT CODE: 00	
			ALTERATIONS	DCN. REF	DATE	SIGN.	INDEX
SCALE \	DRAWN	RKM					
	CHECKED	R.Ramamoorthy					
	APPROVED						
	DATE	20-10-2000					

MACHINE: CRANE WHEEL ASSY
TYPE: GENERAL
TITLE: STANDARD CRANE WHEEL ASSY
DRAWING No: 3-M-02R-11993 00
REV.
No.of Sheets: Sheet No: