



## Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

An ISO 9001  
Company

|                |   |
|----------------|---|
| <b>ENQUIRY</b> | Phone: +91 431 257 70 49<br>Fax : +91 431 252 07 19<br>Email : <a href="mailto:csguna@bheltry.co.in">csguna@bheltry.co.in</a><br>Web : <a href="http://www.bhel.com">www.bhel.com</a> |
|----------------|---|

|  |                        |                      |  |
|--|------------------------|----------------------|--|
|  | <b>Enquiry Number:</b> | <b>Enquiry Date:</b> | <b>Due date for submission of quotation:</b> |
|  | <b>2620700096</b>      | <b>06.12.2007</b>    | <b>07.01.2008</b>                            |
| You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order |                        |                      |  |

| Item  | Description  | Quantity   | Delivery<br>(Item required at BHEL on) |
|---|--|--|--|
| 10  | 30 Ton EOT Crane as per the technical specification & commercial conditions applicable (to be downloaded from web site <a href="http://www.bhel.com">www.bhel.com</a> or <a href="http://tenders.gov.in">http://tenders.gov.in</a> ) | 1 No.  | 30.06.2008                             |
| <b>BHEL commercial terms &amp; conditions with Price Bid and Bank Guarantee formats along with technical specifications can be downloaded from BHEL web site <a href="http://www.bhel.com">http://www.bhel.com</a> or from the Government tender website <a href="http://tenders.gov.in">http://tenders.gov.in</a> (public sector units &gt; Bharat Heavy Electricals Limited page) under Enquiry reference “2620700096”.</b> |  |  |  |
| Tenders should reach us before 14:00 hours on the due date<br>Tenders will be opened at 14:30 hours on the due date<br>Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present  |  | Yours faithfully,<br>For BHARAT HEAVY ELECTRICALS LIMITED<br><br>Manager / Capital Purchase / MM / Manufacturing |  |

**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**

| <b>S. No.</b> | <b>PARTICULARS</b>  | <b>VENDOR'S RESPONSE</b> |
|---------------|---|--------------------------|
| <b>1.0</b>    | <p>Only those Bidder/vendor (OEM), who have supplied and commissioned at least ONE 30Ton capacity EOT crane class-3 with minimum span of 28 Mtr or higher in the past five years and such crane is presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender), should quote.</p> <p>However, if such crane has been supplied to BHEL, then it should be presently working satisfactorily for more than six months after its commissioning and acceptance (on the date of opening of Tender) in BHEL. The vendor should have also supplied frequency converter drive for similar capacity crane</p> <p>Performance certificate from the customers (minimum 2) regarding satisfactory performance of machine supplied to them in attached format should be enclosed along with technical offer.</p> |                          |
| <b>2.0</b>    | 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.  |                          |
| <b>3.0</b>    | The bidding FIRM should have 'in-house' or 'self-owned' facility for FABRICATION and TESTING at 125 % of the rated capacity   |                          |
| <b>4.0</b>    | The vendor should have minimum 10 years experience in design, fabrication and supply of EOT cranes.   |                          |

**SECTION – II**

The vendors are requested to provide the following details

| <b>S. No.</b> | <b>PARTICULARS</b>  | <b>VENDOR'S RESPONSE</b> |
|---------------|---|--------------------------|
| <b>3.0</b>    | Number of Years of Experience of the BIDDER/VENDOR (OEM) in the field of design, manufacture, |                          |

|            |   |  |
|------------|---|--|
|            | supply, erection & commissioning of cranes  |  |
| <b>4.0</b> | Number of cranes supplied, installed and commissioned till date   |  |
| <b>5.0</b> | Number of cranes supplied, installed and commissioned till date in the QUOTED MODEL   |  |
| <b>6.0</b> | Number of cranes supplied, installed and commissioned till date for the following category of CUSTOMERS<br>a) Power Utility Boiler Manufacturer<br>b) Equipment Supplier for Process Industries [Heavy Engineering Companies]<br>c) Research Establishments |  |
| <b>7.0</b> | Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centre in India and Asia   |  |
| <b>8.0</b> | Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.   |  |

### **SECTION – III**

Bidder / Vendor (OEM) to note the following

| <b>S.No.</b> | <b>REQUIREMENTS</b>  | <b>VENDOR'S RESPONSE</b> |
|--------------|--|--------------------------|
| <b>9.0</b>   | The BIDDER / VENDOR shall submit the offer in TWO PARTS - Technical [ <b>with PART A &amp; PART B</b> ] & Commercial and Price Bid.  |                          |
| <b>10.0</b>  | The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause. Where details are required, a mere 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer. |                          |
| <b>11.0</b>  | The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria   |                          |
| <b>12.0</b>  | The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation  |                          |
| <b>13.0</b>  | BIDDER has to indicate the Country of Origin for the supply of equipment.  |                          |

**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 : Best in the market /  
(Strike off whichever is not applicable) Satisfactory /  
Good /  
Average /  
Not Satisfactory
7. Any other remarks:

Date:

Signature & Seal of the Authority  
Issuing the Performance Certificate

**PART B.****TECHNICAL SPECIFICATIONS FOR ELECTRICALLY OPERATED  
OVER-HEAD TRAVELLING [E O T] CRANE WITH DOUBLE GIRDERS**

| <b>S.No.</b> | <b>PARTICULARS</b>     | <b>BHEL SPECIFICATIONS</b>  | <b>VENDOR's TECHNICAL OFFER<br/>(With Complete Details)</b> |
|--------------|------------------------|---|---|
| <b>1.0.0</b> | <b>APPLICATION</b>     | <p>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 shopfloor.</p> <p>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).</p> <p>c. The shopfloor environment will be dust prone, humid, welding fume filled and ambient temperature going upto 50 ° C. , due to pre-heating of jobs.</p> |   |
| <b>2.0.0</b> | <b>SCOPE OF SUPPLY</b> | <p>a. Design as per Tender Specifications</p> <p>b. Detailed Design and Manufacture as per BHEL GENERAL SPECIFICATIONS, given as <b>ANNEXURE-3</b>.</p> <p>c. Assembly and Testing before Despatch</p> <p>d. Supply in Modules / Sub-Assemblies</p> <p>e. Commissioning and Performance Prove-Out at BHEL Works</p> <p>f. Performance Guarantee for 24 months, from the date of commissioning.</p>  |   |

| S.No.        | PARTICULARS                     | BHEL SPECIFICATIONS  | VENDOR's TECHNICAL OFFER<br>(With Complete Details) |
|--------------|---------------------------------|--|---|
| <b>3.0.0</b> | <b>TECHNICAL SPECIFICATIONS</b> |  |   |
| <b>3.1.0</b> | CAPACITY                        | Lifting Capacity   |   |
| <b>3.1.1</b> | Main Hoist                      | 30 Metric Tonnes   |   |
| <b>3.1.2</b> | Auxiliary Hoist                 | 10 Metric Tonnes   |   |
| <b>3.2.0</b> | SPAN                            | Wheel Centre to Wheel Centre Dimensions                    |   |
| <b>3.2.1</b> | Long Travel (LT)                | 28,500 mm  |   |
| <b>3.2.2</b> | Cross Travel (CT)               | 3,500 mm   |   |
| <b>3.3.0</b> | Height of Lift                  | 9,000 mm<br>[Effective Height of Lift for both the HOISTS] |   |
| <b>3.4.0</b> | DUTY CYCLE                      | Related to Drive Motor & Mechanisms                        |   |
| <b>3.4.1</b> | Hoists                          | 40 % E D   |   |
| <b>3.4.2</b> | Long Travel                     | 40 % E D   |   |
| <b>3.4.1</b> | Cross Travel                    | 40 % E D   |   |
| <b>3.5.0</b> | SPEED                           | Operating / Working Speed [Maximum]                        |   |
| <b>3.5.1</b> | Main Hoist                      | 7.5 mtrs./minute.  |   |
| <b>3.5.2</b> | Auxiliary Hoist                 | 15.0 mtrs./minute.   |   |
| <b>3.5.3</b> | Cross Travel (CT)               | 30.0 mtrs./minute.   |   |
| <b>3.5.4</b> | Long Travel (LT)                | 70.0 mtrs./minute.   |   |
| <b>3.6.0</b> | MOTOR RATINGS                   | Electric Drive Motor Ratings & Frame Sizes                 |   |
| <b>3.6.1</b> | Main Hoist                      | 55 kW ; Frame Size – VD280 M / 6 Pole                      |   |
| <b>3.6.2</b> | Auxiliary Hoist                 | 30.4 kW ; Frame Size – VD250 M / 6 Pole                    |   |
| <b>3.6.3</b> | Cross Travel (CT)               | 14 kW ; Frame Size – VD200 L / 6 Pole                      |   |
| <b>3.6.4</b> | Long Travel (LT)                | 2 x 26 kW ; Frame Size – VD225 M / 6 Pole                  |   |
| <b>3.7.0</b> | GEAR BOX                        | Gear Box Size  |   |
| <b>3.7.1</b> | Main Hoist                      | HR 850   |   |
| <b>3.7.2</b> | Auxiliary Hoist                 | HR 650   |   |
| <b>3.7.3</b> | Cross Travel (CT)               | VR 500   |   |
| <b>3.7.4</b> | Long Travel (LT)                | HR 500   |   |

| S.No.         | PARTICULARS                       | BHEL SPECIFICATIONS                               | VENDOR's TECHNICAL OFFER<br>(With Complete Details) |
|---------------|-----------------------------------|---|---|
| <b>3.8.0</b>  | ACCELERATION                      |   |   |
| <b>3.8.1</b>  | Cross Travel (CT)                 | 300 mm / sec.sq.                                  |   |
| <b>3.8.2</b>  | Long Travel (LT)                  | 300 mm / sec. sq.                                 |   |
| <b>3.9.0</b>  | HOIST ROPE<br>DETAILS             | Size and Number of Falls of Rope                  |   |
| <b>3.9.1</b>  | Main Hoist                        | Dia. 22 mm ; Falls - 8                            |   |
| <b>3.9.2</b>  | Auxiliary Hoist                   | Dia. 18 mm ; Falls - 4                            |   |
| <b>3.10.0</b> | CONTROL                           | Cabin Operation and Remote Control                |   |
| <b>3.11.0</b> | Type of Control                   | Master Control and Radio Remote Control           |   |
| <b>3.12.0</b> | Control Voltage                   | 110 V AC  |   |
| <b>3.13.0</b> | Input Power Supply                | 415 $\pm$ 10% Volts , 50 $\pm$ 3% Hz, 3 Phase- AC |   |
| <b>3.14.0</b> | Duty Class                        | Class – 3 [Indoor Service]                        |   |
| <b>3.15.0</b> | Mechanism Group<br>Classification | M 6   |   |
| <b>3.16.0</b> | DESIGN STANDARD                   | IS – 807 & 3177 / 1999                            |   |
| <b>3.17.0</b> | Runway Rail Size                  |   |   |
| <b>3.17.1</b> | Cross Travel (CT)                 | ISR 60 Lbs./Yard                                  |   |
| <b>3.17.2</b> | Long Travel (LT)                  | C R 80  |   |
| <b>3.18.0</b> | Wheel Size                        |   |   |
| <b>3.18.1</b> | Cross Travel (CT)                 | Dia. 320 mm                                       |   |
| <b>3.18.2</b> | Long Travel (LT)                  | Dia. 630 mm                                       |   |
| <b>3.19.0</b> | Brake Drum Size                   | Hoist Brake Drum Sizes                            |   |
| <b>3.19.1</b> | Main Hoist                        | Dia. 300 mm                                       |   |
| <b>3.19.2</b> | Auxiliary Hoist                   | Dia. 300 mm                                       |   |
| <b>3.19.3</b> | Cross Travel (CT)                 | Dia. 160 mm                                       |   |
| <b>3.19.4</b> | Long Travel (LT)                  | Dia. 200 mm                                       |   |

| S.No.        | PARTICULARS                   | BHEL SPECIFICATIONS  | VENDOR's TECHNICAL OFFER<br>(With Complete Details)  |
|--------------|-------------------------------|--|--|
| <b>4.0.0</b> | <b>MAIN FEATURES</b>          | Crane Operational Features   |  |
| <b>4.1.0</b> | Control System                | Frequency Converter type for all motions   |  |
| <b>4.2.0</b> | Remote Control                | Radio Remote Control for all motions   |  |
| <b>4.3.0</b> | End Clearance                 | End Clearances to be fixed to suit the workshop building clearances [Refer to Drawing No. <b>M&amp;S:PD:07:108</b> ] – Drawing enclosed with the tender as <b>ANNEXURE-1</b> .                               | Bidder to give the Clearance Dimensions with the Technical Offer, as per the style in the drawing mentioned. |
| <b>4.4.0</b> | Crane Operation               | Through Cabin Control and Radio Remote Control with option for control selection   |  |
| <b>5.0.0</b> | <b>STRUCTURAL FABRICATION</b> | Crane Structure Constructional Details   |  |
| <b>5.1.0</b> | Bridge / Girder               | Box type Construction for Girders  |  |
| <b>5.2.0</b> | 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.             |  |
| <b>5.3.0</b> | Welded Joints                 | To be followed for Girder Fabrication  |  |
| <b>5.3.1</b> | Number of Joints allowed      | For Span upto 23 mtrs. - Two joints<br>For Span 23 mtrs. to 32 mtrs. - Three joints  |  |
| <b>5.3.2</b> | Welding Electrodes            | a. For all Horizontal Welding E 7018 Electrode only should be used.<br>b. For all Vertical Welding E 7048 Electrode only should be used.   |  |
| <b>5.3.3</b> | Welded Joint Testing          | All Butt Welded Joints (both compression / tension and flanges / web joints) shall be subjected to 100% X-Ray Testing and X-Ray Films to be produced for BHEL evaluation and form part of the documentation. |  |



| S.No.  | PARTICULARS                      | BHEL SPECIFICATIONS  | VENDOR's TECHNICAL OFFER<br>(With Complete Details) |
|--------|----------------------------------|--|---|
| 5.4.0  | Splice Joints                    | NO SPLICE JOINT IS ALLOWED IN GIRDER FABRICATION [Girder has to be of SINGLE PIECE only].  |   |
| 5.5.0  | Platform on Girders              | The Platforms provided on both the Girders shall be fixed through BOLTED JOINTS only.  |   |
| 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. [Refer to BHEL Drawing No. <b>3-M-02R-0011993</b> . Drawing is enclosed and given as <b>ANNEXURE -2</b> ].   |   |
| 5.7.0  | Heat Treatment & NDT Examination | The Trolley shall be Stress Relieved after welding and NDT examinations. 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 :<br>a. One coat of Primer with 25 microns of DFT (Dry Film Thickness) and 48 hours of compulsory curing after painting.<br>b. Two coats of Enamel Paint (Colour – Tractor Orange) each with a DFT of 25 microns and intermittent curing of minimum 16 hours. |   |

| S.No.        | PARTICULARS                | BHEL SPECIFICATIONS   | VENDOR's TECHNICAL OFFER<br>(With Complete Details) |
|--------------|----------------------------|---|---|
| <b>6.0.0</b> | <b>MECHANICAL ELEMENTS</b> |   |   |
| <b>6.1.0</b> | Gears                      | Gears in all the Stages shall be helical in design and to be of machined & lapped and hardened if necessary.  |   |
| <b>6.2.0</b> | Gear Box Casing            | Shall be of fabricated type and stress relived by thermal heat-treatment process, prior to machining.   |   |
| <b>6.3.0</b> | Rope Drum                  | Shall be of fabricated type and stress relieved. The circumferential weld joints shall be tested by 100 % X-Ray for quality assurance.                                      |   |
| <b>6.4.0</b> | Type of Coupling           | Only GEARED COUPLING to be used<br>a. between Electric Motor and Gear Box<br>b. between Gear Box and Rope Drum<br>c. between Gear Box and Trolley Wheels                    |   |
| <b>6.5.0</b> | Wheels                     | The Wheels shall be of Forged and Wheel Tread hardened to 300/350 BHN. Wheels shall be fitted with L-Type Bearings  |   |
| <b>6.6.0</b> | Mechanical Joints          | Fit Bolts as per IS 3640-1982 for all joints coming in main members platform supports.  |   |
| <b>6.7.0</b> | Pulley Dimension           | Rope Pulley diameter shall be 23 times that of Rope diameter  |   |
| <b>6.8.0</b> | Hook                       | Hook latch shall be provided for both hooks   |   |
| <b>7.0.0</b> | <b>ELECTRICAL ELEMENTS</b> |   |   |
| <b>7.1.0</b> | Operational Controls       | The Crane shall be provided with the following controls :<br>a. Cabin Control [Master Control]<br>b. Radio Remote Control [Micro processor based Two Step Push Button Type] |   |
|              |                            |   |   |

| S.No. | PARTICULARS         | BHEL SPECIFICATIONS   | VENDOR's TECHNICAL OFFER<br>(With Complete Details) |
|-------|---------------------|---|---|
| 7.2.0 | Control Voltage     | 110 V AC  |   |
| 7.3.0 | Type of Brakes      | a. Main Hoist - DC Brake<br>b. Auxiliary Hoist - DC Brake<br>c. Cross Travel - Thruster Brake<br>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.   |   |
| 7.6.0 | Electric Contactors | All Panels shall have only SIEMENS 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.   |   |
| 7.8.0 | Long Travel Motion  | A 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 under the Bridge<br>b. All Electric Panels shall be provided with suitable illumination for visibility and trouble shooting. |   |

| S.No.  | PARTICULARS                            | BHEL SPECIFICATIONS  | VENDOR's TECHNICAL OFFER<br>(With Complete Details) |
|--------|--|--|---|
| 7.10.0 | Controller Steps                       | A 5-Step Controller has to be provided for<br>a. Main Hoist<br>b. Auxiliary Hoist<br>c. Long Travel<br>d. Cross Travel                           |   |
| 7.11.0 | Frequency Converter                    | The VVVF Drive shall be supplied with suitable DBR for all motions.  |   |
| 7.12.0 | 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 metres to 10.0 metres. |   |
| 7.13.0 | Load Cell                              | a. Load Weighing System with LOAD CELL to be fixed / provided at the equalizer pulley.<br>b. The display shall be of 100 mm size (JUMBO)         |   |
| 7.14.0 | Crab Wiring                            | Junction box shall be avoided for wiring of crab and in bridge end.  |   |
| 7.15.0 | Hoist limit                            | Each hoist shall be provided with both rotary and counter weight limits  |   |
| 7.16.0 | Cabin                                  | Light, fan, warning bell and emergency push pushbutton shall be provided in the cabin  |   |
| 8.0.0  | <b>SELECTION of BOI and COMPONENTS</b> | 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  |   |

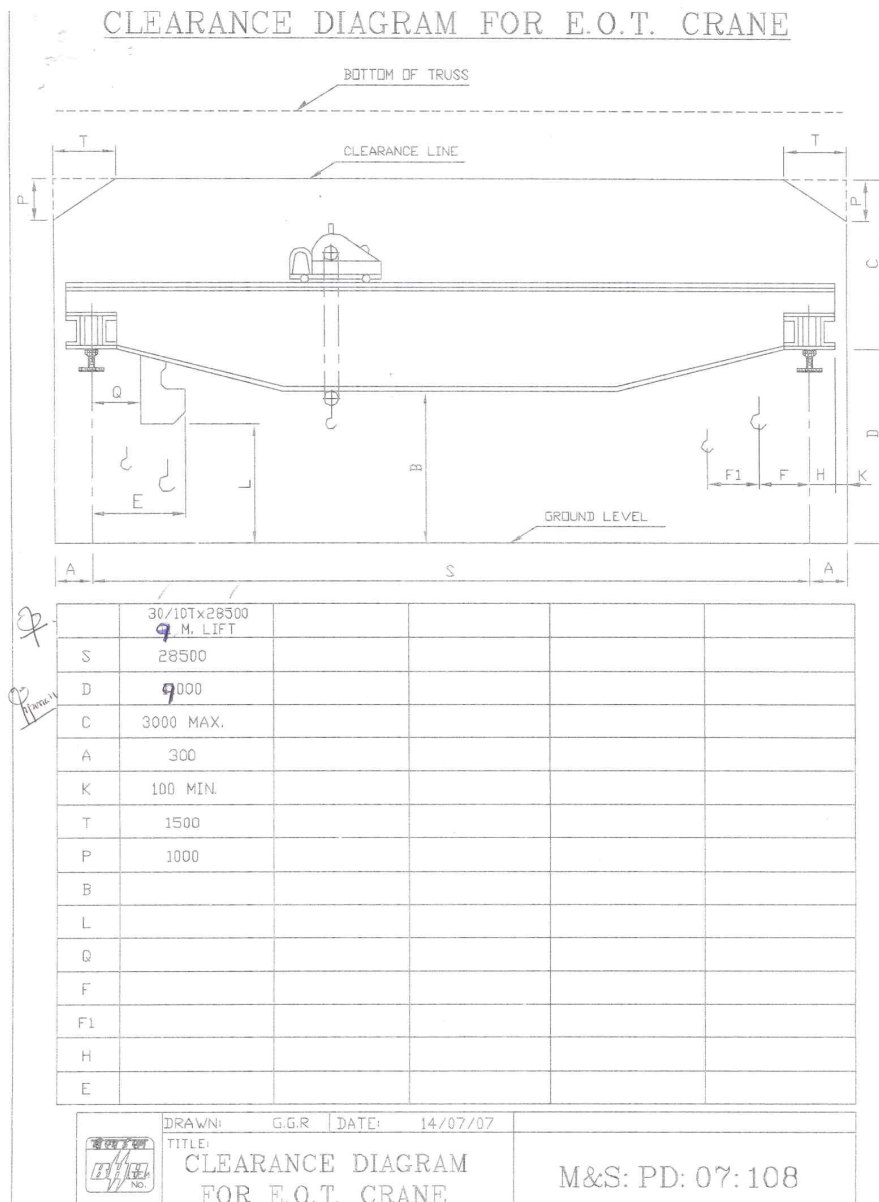
| S.No.  | PARTICULARS                    | BHEL SPECIFICATIONS                                 | VENDOR's TECHNICAL OFFER<br>(With Complete Details) |
|--------|--------------------------------|---|---|
| 8.3.0  | Electric Motors                | GEC / BHARAT BIJLEE / SIEMENS / KEC                 |   |
| 8.4.0  | DC Brake Unit                  | Only BCH make                                       |   |
| 8.5.0  | Radio Remote Control           | Only TELECRANE make                                 |   |
| 8.6.0  | Thruster Brake Unit            | ELECTROMAG / SPEED-O-CONTROL /<br>OMEGA             |   |
| 8.7.0  | Limit Switch<br>(Gravity Type) | SIEMENS / INDUSTRIAL SYNDICATE /<br>BCH / SKC / SOC |   |
| 8.8.0  | Contactors                     | Only SIEMENS make                                   |   |
| 8.9.0  | Over-Load-Relay                | SIEMENS (THERMAL TYPE)                              |   |
| 8.10.0 | HRC Fuses                      | ENGLISH ELECTRIC / L&T /SIEMENS                     |   |
| 8.11.0 | Rotary limit switch            | SIEMENS / OMEGA / SOC /<br>INDUSTRIAL SYNDICATE     |   |
| 8.12.0 | Switch fuse unit               | ENGLISH ELECTRIC / SIEMENS / GEC                    |   |
| 8.13.0 | Moulded case C.B               | SIEMENS / L&T                                       |   |
| 8.14.0 | Pneumatic Time Delay           | Only BCH make                                       |   |
| 8.15.0 | Push - Buttons                 | SIEMENS / L&T /AIRON                                |   |
| 8.16.0 | Connectors                     | Only ELMAX make                                     |   |
| 8.17.0 | Couplings                      | WMI / FENNER / ALFEX                                |   |
| 8.18.0 | Bearings                       | SKF / NBC / ZKL                                     |   |
| 8.19.0 | Cables                         | Reputed Makes & ISI Approved                        |   |
| 8.20.0 | Bridge Light Fittings          | PHILIPS / GE / CROMPTON                             |   |
| 8.21.0 | Load Cell                      | Only IPA make                                       |   |
| 8.22.0 | VVVF Drives                    | ABB / SIEMENS / L&T                                 |   |

| S.No.        | PARTICULARS                           | BHEL SPECIFICATIONS  | VENDOR's OFFER |
|--------------|---------------------------------------|--|----------------|
| <b>9.0.0</b> | <b>DOCUMENTS/DETAILS for APPROVAL</b> | The following documents and details are to be submitted for BHEL Approval, prior to taking up the manufacture of the crane.  |                |
| <b>9.1.0</b> | Drawings and Documents                | <ul style="list-style-type: none"> <li>a. GA Drawing of the Crane.</li> <li>b. GA Drawing of Crab with Trolley</li> <li>c. GA Drawing of Individual Mechanisms.</li> <li>d. Drawings of Bridge, End-Carriage and their connection.</li> <li>e. Sub-Assembly Drawing for Wheels, Hook Blocks, Gear Boxes &amp; Hoist Drums.</li> <li>f. Calculations for Selection of Electric Motors, Gear Reducers, Brakes, Couplings, etc.</li> <li>g. Calculations for Bridge Girder, Crab, End - Carriage and their connections.</li> <li>h. Wiring Diagram with Logic Circuits.</li> <li>i. Cable Selection based on Current Rating.</li> </ul> |                |
| <b>9.2.0</b> | Technical Details                     | <ul style="list-style-type: none"> <li>a. Total Weight of the Crane including all Electrical Equipment</li> <li>b. Total Weight of Trolley including all Electrical Equipment</li> <li>c. Weight of each Bridge assembled and ready for erection with and without Mechanical and Electrical Equipment.</li> <li>d. Weight of each End - Carriage assembled and ready for erection</li> <li>e. Total Weight of Structural, Mechanical and Electrical Equipment and indicated separately also.</li> <li>f. Weight of Operator's Cabin together with all Equipment mounted in it.</li> </ul>  |                |

| S.No.  | PARTICULARS                       | BHEL SPECIFICATIONS   | VENDOR's OFFER |
|--------|-----------------------------------|---|----------------|
| 10.0.0 | INSPECTION                        | The following Schedule of Stage Inspections is to be strictly adhered to, prior to dispatch from the Supplier's Works   |                |
| 10.1.0 | STAGE – I                         | <ul style="list-style-type: none"> <li>a. Verification of Test Certificate for Raw Materials used for Girders, End-Carriages, Trolleys, Gear Box Casings, etc.</li> <li>b. Verification of X-Ray Report of Butt-Joints coming in the Girders and Random Testing on the Welds, by physical examination.</li> <li>c. Box Girder setting before closing of the Bottom Flanges – for inspecting the quality of welding and presence of waviness</li> <li>d. Trolley Frame Fabrication before setting the Mechanisms</li> <li>e. End – Carriage Fabrication</li> </ul> |                |
| 10.2.0 | STAGE – II                        | <ul style="list-style-type: none"> <li>a. Inspection of Bridges and End – Carriages with Wheel Assembly and Alignment checking.</li> <li>b. Verification of Span &amp; Diagonal Dimensions, Checking of Wheel Alignment, Mechanical Assemblies and Total Alignment.</li> <li>c. Free running of the all the Mechanisms.</li> </ul>  |                |
| 10.3.0 | STAGE – III<br>[Final Inspection] | <ul style="list-style-type: none"> <li>a. Measurement of CAMBER in the Bridges.</li> <li>b. Full / Rated Load Test and Deflection Test.</li> <li>c. Deflection and Permanent Set Measurement.</li> <li>d. 25% OVER-LOAD Lifting Ability Check.</li> </ul>   |                |

| S.No.         | PARTICULARS                               | BHEL SPECIFICATIONS  | VENDOR's OFFER |
|---------------|---|--|----------------|
| <b>11.0.0</b> | <b>CRANE ERECTION &amp; COMMISSIONING</b> |  |                |
| <b>11.1.0</b> | Mechanical Erection                       | Erection of the Crane will be done by BHEL, as per the guidelines furnished in the Erection Manual given by the Supplier   |                |
| <b>11.2.0</b> | Crane Commissioning                       | Commissioning of the Crane and Performance Prove –Out for the Crane's Capacity and Smooth Functioning of the Crane (at BHEL Works) shall be the RESPONSIBILITY of the supplier.  |                |
| <b>12.0.0</b> | <b>O &amp; M MANUALS</b>                  | Each Crane shall be provided with complete set of tools required for maintenance, THREE Copies of Erection, Operation & Maintenance Manual hard copy and soft copy in CD, containing the following technical details   |                |
| <b>12.1.0</b> | Drawings & Details                        | <ul style="list-style-type: none"> <li>a. Crane GA Drawing</li> <li>b. Crab Assembly Drawing</li> <li>c. Total Crane Wiring Schematics</li> <li>d. Detailed Wiring Diagrams for Sub-Systems /Panels</li> <li>e. VVVF Drive's Logic Circuits</li> <li>f. Wheel Assembly Drawings</li> <li>g. Bottom Block Assembly Drawing</li> <li>h. Gear Box Assembly Drawings</li> <li>i. Coupling Drawing and Details</li> <li>j. Specifications/Ratings of All Bought-Out-Items</li> <li>k. Warranty/Guarantee Card for all BoughtOut-items</li> <li>l. Trouble Shooting Chart for all Systems</li> </ul> |                |
| <b>13.0.0</b> | <b>PERFORMANCE GUARANTEE</b>              | The Performance of the Total Crane and/or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a minimum period of twelve months from the date of performance acceptance at BHEL Works.  |                |

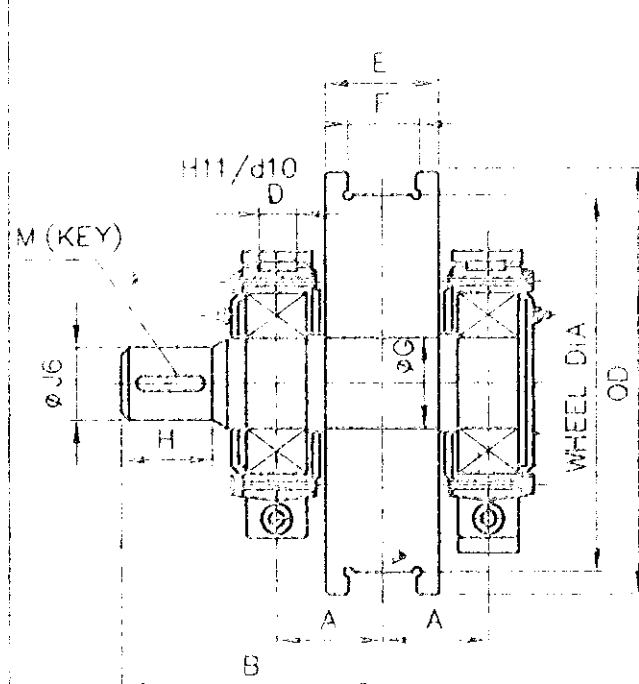




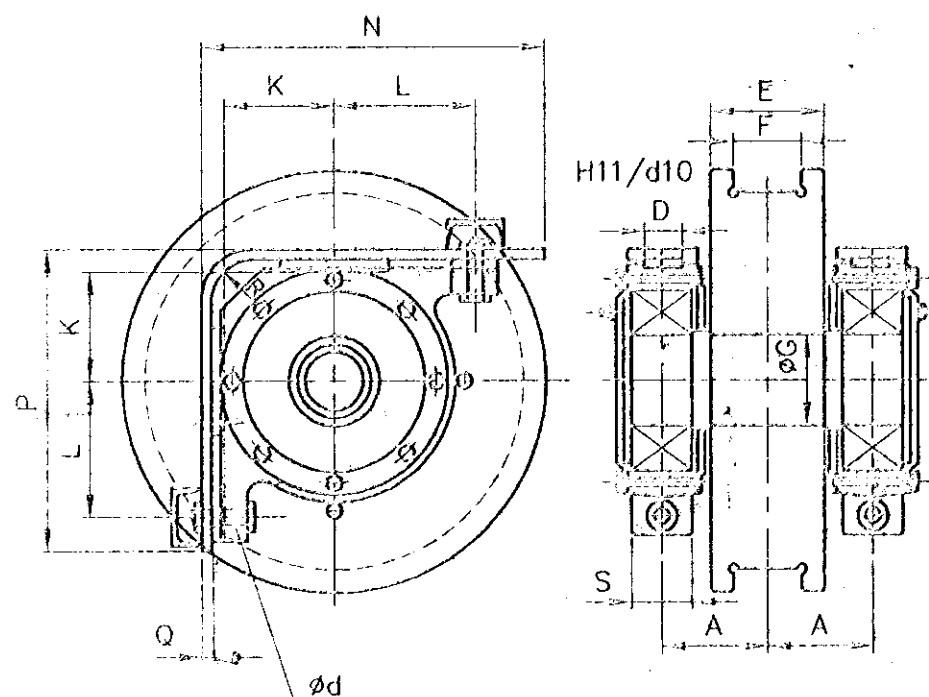
THIS DRAWING IS OUR SOLE PROPERTY AND SHOULD NOT BE USED IN ANY FORM FOR ANY PURPOSE WITHOUT THE WRITTEN PERMISSION OF SHARAT HEAVY ELECTRICALS LIMITED TRICHIRAPPALLI - 620 014.

ALL DIMENSIONS ARE IN MM

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



DRIVING WHEEL ASSY



IDLE WHEEL ASSY

MATERIAL :- SHAFT - 45CB/IS:7283.  
WHEEL - 55CB/IS:5517.  
FORGED.  
THREAD PORTION WHEEL HARDNESS 300 TO 350 (BHN)

|                                     |             |            |                    |                                 |                    |             |
|-------------------------------------|-------------|------------|--------------------|---------------------------------|--------------------|-------------|
| No. of<br>Pieces                    | DESCRIPTION | MATERIAL   | STANDARD           | NET.WT.IN KGS.                  | DRAWING No.        | ITEM<br>No. |
| REFERENCE                           |             |            | COMPONENT CODE: 29 |                                 | EQUIPMENT CODE: 00 |             |
| SCALE                               | DRAWN       |            | ALTERATIONS:       | DCN. REF                        | DATE               | SIGN.       |
|                                     | CHECKED     |            |                    |                                 |                    | INDEX       |
|                                     | APPROVED    |            |                    |                                 |                    |             |
|                                     | DATE        | 20-10-2000 |                    |                                 |                    |             |
| MACHINE: CRANE WHEEL ASSY           |             |            |                    | TYPE: GENERAL                   |                    |             |
| TITLE: STANDARD<br>CRANE WHEEL ASSY |             |            |                    | DRAWING No. 00<br>3-M-02R-11993 |                    |             |
| No. of Sheets                       |             |            |                    | Sheet No.                       |                    |             |
|                                     |             |            |                    | REV.                            |                    |             |