



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 70 49

Fax : +91 431 252 07 19

Email : [csguna@bheltry.co.in](mailto:csguna@bheltry.co.in)

Web : [www.bhel.com](http://www.bhel.com)

#### TWO PART BID

Tender to be submitted in two parts.

**Enquiry  
Number:**

**2621000143**

**Enquiry  
Date:**

**15.11.2010**

**Due date for submission  
of quotation:**

**15.12.2010**

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	Delivery (Item required at BHEL on)
10	<b>30 Ton Variable Speed Mechanised Rotators</b> as per the technical specification, general guidelines instructions & 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> )	<b>8 Nos.</b>	30.08.2011

#### Important points to be taken care during submission of offer

1. Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
2. Subsequent to the hosting of this Enquiry, any corrigendum to the Enquiry that may be hosted in the BHEL Web-site as well as Government Tenders-portal shall be viewed by the vendors regularly to know the details of corrigendum. In case if any vendor without seeing the corrigendum quoted as per original Enquiry and intimate that they have wrongly quoted will not be considered and rejected. However as per the appropriate Policy of BHEL action will be taken on them in this regard.

BHEL's General guidelines / instructions (refer MM/CE/GT/001) 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 "2621000143".

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 / MM / Capital Equipment

**PART A.****QUALIFYING CRITERIA FOR THE SUPPLY OF ROTATORS****SECTION – I**

The BIDDER has to necessarily provide the following details, for making an assessment of the firm's capability and competency :

[The BIDDER is expected to give complete details against each clause in the table given below and wherever necessary an additional sheet may be attached (giving clear reference number) to cover the required details]

<b>S.No.</b>	<b>PARTICULARS</b>	<b>VENDOR's RESPONSE</b>
<b>1.0</b>	Number of Years of Experience of the BIDDER in the field of Design, Manufacture & Supply of JOB ROTATORS for Heavy Fabrication Industries	
<b>2.0</b>	Number of ROTATORS supplied till date in the following category (Classification based on CAPACITY and Construction based on PART-B Specifications ) : a) Upto 20 Tons b) 30 Tons and Above	
<b>3.0</b>	Number of ROTATORS supplied till date for the following category of CUSTOMERS a) Heavy Fabrication Industries outside INDIA b) Heavy Fabrication Industries within INDIA	
<b>4.0</b>	Details on International or Indian Standards or Codes followed in the Design & Manufacture of Job Rotators	
<b>5.0</b>	Details of Manufacturing Facilities for Rotator Frame and Components : a) Fabrication Facilities b) Machining Facilities c) Heat Treatment Facilities c) Assembly & Testing Facilities	
<b>6.0</b>	Details of Quality Assurance System followed for Material Procurement, Fabrication and Non-Destructive Testing of Weldments & other Processes involved	
<b>7.0</b>	Details on Stages of Internal Inspection and Inspection by External Agencies [other than Customer Inspection]	

<b>S.No.</b>	<b>PARTICULARS</b>	<b>VENDOR's RESPONSE</b>
<b>8.0</b>	Details of Electrical/Electronic Control Panel Manufacturing and Testing Facilities	
<b>9.0</b>	Details on Network or Set-Up built up for the AFTER-SALES-SERVICE needs by BHEL / Thirumayam Plant	

## **SECTION – II**

The BIDDER has to compulsorily meet the following requirements to get qualified for submitting an offer for the ROTATORS :

<b>S.No.</b>	<b>REQUIREMENTS</b>	<b>VENDOR's COMMENTS</b>
<b>10.0</b>	The BIDDER shall have a minimum of TEN Years of Continuous Experience of in the Field of Design, Manufacture & Supply of Heavy Duty Variable Speed Rotators	
<b>11.0</b>	The BIDDER might have supplied atleast TEN Sets of ROTATORS with 30 Ton and above Capacity.	
<b>12.0</b>	The bidding FIRM should have 'in-house' or 'self-owned' facility for FABRICATION and TESTING at the rated capacity	
<b>13.0</b>	Reference List of Customers (including contact addresses) with the specification of rotators supplied to them, to be furnished for cross reference by BHEL. In case of any false data or information furnished might lead to disqualification of the Technical Offer.	
<b>14.0</b>	Performance Certificate from CUSTOMERS (minimum TWO Customers) with details of CONTACT PERSON, for whom ROTATORS of Capacity 30 Tons and above have been supplied, in the FORMAT given under ANNEXURE-A	

### **SECTION – III**

The BIDDER has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser :

<b>S.No.</b>	<b>REQUIREMENTS</b>	<b>VENDOR's COMPLIANCE</b>
<b>15.0</b>	The BIDDER / VENDOR shall submit the offer in TWO PARTS - Technical & Commercial and Price Bid. The Technical Offer shall be in line with the BHEL Technical Specifications and the Guidelines or Annexures mentioned, wherever applicable.	
<b>16.0</b>	The Technical Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause of the specifications.	
<b>17.0</b>	A just '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>18.0</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>19.0</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>20.0</b>	The expected delivery period is six months from the date of issue of Purchase Order by BHEL. Delayed delivery will draw the Penalty Clause. The basic design drawings and general arrangement drawings are to be submitted for BHEL Approval, prior to taking up of manufacture.	

ANNEXURE-A

**PERFORMANCE CERTIFICATE – [SAMPLE FORMAT]**

(On Customer's Letter Head with Additional Sheet – if necessary)

1. Supplier of the Equipment :
2. Make & Model of the Equipment :
3. Month & Year of Commissioning :
4. Application for which the Equipment is used :
5.
  - a. Equipment Serial Number :
  - b. Pipe Handling Capacity – Dia. Range & Weight :
  - c. Power Rating of the Drive Mechanism :
  - d. Speed Control Mechanism & Other Features :
  - e. List of Accessories procured with the Equipment :
6. Performance of the Equipment : Satisfactory /  
Good /  
Average /  
Not Satisfactory
7. Feed- back on 'After Sales Service' by the Supplier :
8. Remarks / Reasons for Recommendations to BHEL :

Date:

Signature & Seal of the Authority  
Issuing the Performance Certificate

**PART – B.**

**TECHNICAL SPECIFICATIONS VARIABLE SPEED MOTORIZED ROTATORS  
of CAPACITY 30 Tons**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER'S TECHNICAL OFFER (with Complete Details)
1.0	APPLICATION	<ul style="list-style-type: none"> <li>a. For use in a heavy engineering industry for the fabrication of very high pressure pipe line components - cylindrical in shape and welded with attachments and nozzles.</li> <li>b. The Rotator has to be supplied with one Drive Unit and One Idler Unit, to form a set – which in combination help rotating the job in either direction.</li> </ul>	
2.0	SCOPE OF SUPPLY	<ul style="list-style-type: none"> <li>a. Detailed Design, Manufacture and supply as per BHEL SPECIFICATIONS.</li> <li>b. Assembly and Testing before Despatch</li> <li>c. Supply of Electric &amp; Mechanical Spares</li> <li>d. Erection (Assembly), Commissioning and Performance Prove-Out at BHEL</li> <li>e. Training on Maintenance for BHEL Staff</li> <li>f. Performance Guarantee for 12 months, from the date of commissioning.</li> <li>g. O &amp; M Manuals and related documents</li> </ul>	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
<b>3.0</b>	<b>TECHNICAL SPECIFICATIONS / ROTATOR DRIVE UNIT</b>		
<b>3.1</b>	Carrying Capacity	30 Metric Tons (minimum capacity for design)	<b>(design specifically for 30 Tons and above, to withstand impact loading possibility)</b>
<b>3.2</b>	Rotating Capacity	30 Metric Tons	
<b>3.3</b>	Eccentric Loading	20 % of the Job Weight	
<b>3.4</b>	Wheel Surface Speed	100 mm to 900 mm / minute, with stepless speed variation	
<b>3.5</b>	Wheel Drive Mechanism	Electronically Controlled Drive System giving mechanical drives for each wheel through independent electric motor (to avoid common drive shaft with chain drive).	
<b>3.6</b>	Electric Motor & Drive	AC Motor with suitable Variable Speed Drive, to take care of eccentric loading with feedback system and synchronization for uniform job rotation.	
<b>3.7</b>	Rotator Operation	Through Main Control and Remote Control with option for control selection	
<b>3.8</b>	Remote Control Unit	A hand held remote control box with 10 Metre long cable to be provided for Speed Variation, ON & OFF, Emergency Off, Forward & Reverse Rotation functions	
<b>3.9</b>	Equipment Configuration	The enclosed <b>ANNEXURE -1</b> gives only the indicative machine configuration. <b><i>[Bidder has the freedom to present an improved design]</i></b>	
<b>3.10</b>	Electro-Mechanical Drive Details	BIDDER to give details on the mode of power transmission from the electric motor to the gear-box driving the rotator wheel along with offer.	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
3.11	Gear Box Details	BIDDER to furnish complete technical details of the Gear Box used for mechanical power transmission. BHEL prefers vendor to use standard gear boxes rather than built in gear boxes. Planetary Gears not permitted	
4.0	<b>TECHNICAL SPECIFICATIONS / ROTATOR IDLER UNIT</b>		
4.1	Carrying Capacity	30 Metric Tons (minimum capacity for design)	(design specifically for 30 Tons and above, to withstand impact loading possibility)
4.2	Eccentric Loading	20 % of the Job Weight	
4.3	Earth Return Arrangement	To provide 1200 amps. (DC) Earth Return Arrangement contacting Idler Unit's Steel Wheels, as welding is the main operation for which the rotators are intended. Vendor to provide details along with offer.	
4.4	Equipment Configuration	The enclosed <b>ANNEXURE - 1</b> gives the indicative machine configuration . <b><i>[Bidder has the freedom to present an improved design].</i></b>	
5.0	<b>GENERAL FEATURES / INPUTS for DESIGN &amp; FABRICATION</b>		
5.1	Diameter Range of Job	400 mm to 1064 mm – Outer Diameter	
5.2	Weight of Job	Ranging from 2 Ton to 30 Tons	
5.3	Wheel Diameter	Preferred to be around 400 mm	
5.4	Height of Rotators	Rotator Wheel Crown (Top) to be at a height of 1200 mm (maximum) from the floor level.	
5.5	Wheel Material	Solid Steel Forging	
5.6	Wheel Width at surface	150 mm (maximum) with crowning surface profile	



<b>S.No.</b>	<b>PARTICULARS</b>	<b>BHEL SPECIFICATIONS</b>	<b>VENDOR's TECHNICAL OFFER (With Complete Details)</b>
<b>5.7</b>	Wheel Contact Surface Hardness	300-350 BHN	
<b>5.8</b>	Wheel Surface Profile	Crowning Surface	
<b>5.9</b>	Wheel Adjustment	Each wheel assembly with Housing/Bracket and Integral Drive Unit shall be movable on the Rotator Base Frame, so as to locate & lock each wheel assembly on the Rotator Base Frame at required pitches to cover the job diameter range.	
<b>5.10</b>	Hardness and finish of Base frame slide	The sliding surfaces of the base frame in Drive and idler units shall be hardened and ground.	
<b>5.11</b>	Wheel Alignment	The alignment of the wheel face in the plane perpendicular to the wheel shaft axis to be maintained within 1mm for the entire stroke of the wheel assembly positions on the base frame.	
<b>5.12</b>	Wheel Positioning	There shall be suitable provision for locking the wheel assembly with the base frame, to prevent movement under working/loading conditions.	
<b>5.13</b>	Wheel Shaft Assembly	The high grade shafts are to be shrunk fit into wheel assemblies / with shrink disc, to eliminate the provision of key arrangement	
<b>5.14</b>	Wheel Support	Wheels are to be supported on Heavy Duty Roller Bearings	
<b>5.15</b>	Lifting Hook	Four numbers of Lifting Hook are to be provided at suitable locations for facilitating lifting the entire rotator unit by EOT Crane in a geometrically balanced state.	
<b>5.16</b>	Cover for Gears	Suitably profiled outer-covers (easily replaceable) are to be provided for the spur gears, to protect from welding flux, slag and foreign particles, while in operation. The thickness of the steel cover plate shall be minimum 3mm.	

<b>S.No.</b>	<b>PARTICULARS</b>	<b>BHEL SPECIFICATIONS</b>	<b>VENDOR's TECHNICAL OFFER (With Complete Details)</b>
<b>5.17</b>	Cover for base frame	Suitably profiled steel covers (with easily replaceable provisions) are to be provided to cover the sliding surface (top face) of the base frame, to protect from welding flux, slag and other foreign particles falling on it, while in operation. The thickness of the cover plate shall be minimum 3mm.	
<b>5.18</b>	Electric Power Input	Electric Input Power through a 3 Phase AC, 415 $\pm$ 10% V, 50 $\pm$ 2% Hz, 3 Wire System with 4 <sup>th</sup> Wire for Protective Earthing (No neutral).	
<b>5.19</b>	Ambient Condition	Indoor Working Environment with temperature up to 50 ° C and Humidity up to 85 %, but both not occur simultaneously. Hence, the offered equipment shall be of tropicalised in design.	
<b>5.20</b>	Control Voltage	Bidder to Specify [preferably 24 V]	
<b>5.21</b>	Bought-Out Items	<ul style="list-style-type: none"> <li>a. BIDDER has to list down all the Bought-Out Items and their makes / brand names with technical specifications.</li> <li>b. BHEL prefers to have only Bought-Out Items / Components supplied by reputed companies, like ABB / SIEMENS / GE / BALDOR for Electric Motors and TIMKEN / SKF for Bearings. All electrics shall be of reputed make like Siemens / L&amp;T / BCH / Telemecanique.</li> <li>c. The variable speed drive shall be of ABB / SIEMENS / ALLEN BRADLEY make.</li> <li>d. The Gear boxes shall be of Greaves / Elecon / Bonfiglioli or any other reputed make acceptable to BHEL.</li> </ul>	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
<b>6.0</b>	<b>STRUCTURAL FABRICATION</b>		
<b>6.1</b>	Rotator Base Frame and Wheel Bracket / Housing	Heavy Steel Fabrication Procedures to be followed	
<b>6.2</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>6.3</b>	Welded Joints	No Butt Joints are allowed for Plate Build-Up to increase effective length	
<b>6.4</b>	Welding Electrodes	a. For all Horizontal Welding E 7018 Electrode/higher grade shall be used. b. For all Vertical Welding E 7048 Electrode/higher grade shall be used.	
<b>6.5</b>	Welded Joint Testing	All Fillet Welded Joints shall be subjected to Non Destructive Testing like Liquid Penetrant Test (LPI) and Magnetic Particle Inspection (MPI). Testing Documents to be produced for BHEL evaluation and form part of the documentation. Random MPI / LPI to be shown to BHEL inspectors at the time of inspection at vendor's works.	
<b>6.6</b>	Heat Treatment & NDT Examination	The Structural Items (Base Frame / Wheel Housing, etc.) shall be Stress Relieved by thermal heat-treatment process after welding and NDT examinations. All weldings shall be tested by NDT means [MPI or LPI] after Stress Relieving operation.	
<b>6.7</b>	Machining Operation	All mechanical mating sliding surfaces are to be machined and ground to the required finish after heat treatment and protected	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
6.8	Surface Cleaning	All steel parts are to be shot blasted or chemically treated for surface cleaning, after completion of all operations but prior to painting.	
6.9	Painting	The ROTATORS are to be painted as follows : a. One coat of Primer (Zinc Chromate) with 25 $\mu$ of DFT (Dry Film Thickness) and 48 hours of compulsory curing after painting. b. Two coats of Enamel Paint [Ethyl Zinc Silicate of Colour – International Tractor Orange] each with a DFT of 25 $\mu$ and intermittent curing of 16 hours.	
6.10	Frame Dimensions	BIDDER has to indicate the tentative DIMENSIONS for the Base Frame of Drive and Idler Units and Wheel Brackets, to check for the operational suitability at BHEL Works.	
7.0	<b>SPARES SUPPLY</b>		
7.1	Spares	BIDDER to Quote for the following spares along with the rotator: a) Bearings for each wheel assembly – 2 Sets. b) Seals, gaskets & Belts used in the Rotator – 1 Set. c) Pulleys & Couplings used in the Rotator – 1 Set. d) Variable Frequency AC Drive – 1 No.	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
8.0	<b>DRAWINGS / DOCUMENTS / DETAILS:</b>		
8.1	<b>Drawings and Documents along with offer:</b>	<p>The following documents and details are to be submitted along with offer for technical evaluation of the ROTATORS.</p> <ol style="list-style-type: none"> <li>GA Drawing of the ROTATOR.</li> <li>GA Drawing of Wheel Drive Mechanism</li> <li>GA Drawing of Electric/Electronic System.</li> <li>Sub-Assembly Drawing for Wheels.</li> <li>Calculations for Selection of Electric Motors, Gear Reducers, etc.</li> <li>Weight of the ROTATOR (Drive Unit &amp; Idler Unit separately) including all Electrical Equipment.</li> </ol> <p><b>Note:</b> All the drawings should have the major &amp; critical dimensions and list of bought out items with make and specification.</p>	
8.2	<b>Drawings and Documents for Approval:</b>	<p>The following documents and details are to be submitted for BHEL Approval, prior to taking up the manufacture of the ROTATORS.</p> <ol style="list-style-type: none"> <li>GA Drawing of the ROTATOR.</li> <li>GA Drawing of Wheel Drive Mechanism.</li> <li>GA Drawing of Electric/Electronic System.</li> <li>Sub-Assembly Drawing for Wheels.</li> <li>Calculations for Selection of Electric Motors, Gear Reducers, etc.</li> <li>Wiring Diagram with Logic Circuits.</li> <li>Weight of the ROTATOR (Drive Unit &amp; Idler Unit separately) including all Electrical Equipment.</li> </ol> <p><b>Note:</b> All the drawings to have the major &amp; critical dimensions and list of bought out items with make and specification.</p>	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
8.3	<b>Drawings and Documents along with Equipment supply:</b>  <b>(O &amp; M MANUALS)</b>	<p>Each ROTATOR shall be provided with THREE Copies of Erection/Assembly, Operation &amp; Maintenance Manual, containing the following technical details :</p> <ol style="list-style-type: none"> <li>General Arrangement and Sub-assembly Drawings</li> <li>Electrical Wiring Schematics</li> <li>Detailed Wiring Diagrams for Control Panels and Remote Control</li> <li>Rotator Wheel Sub- Assembly Drawing</li> <li>Gear Box Details / Drawings.</li> </ol> <hr/> <ol style="list-style-type: none"> <li>Specifications / Ratings of Bought-Out Items</li> <li>Warranty Card for all Bought-Out Items</li> <li>Trouble Shooting Chart for all Sub-Systems</li> <li>Variable speed Drive manual.</li> <li>Mechanical manufacturing drawings for all wearing components.</li> <li>Operation &amp; Maintenance manual with complete specification of the equipment and Preventive Maintenance check list.</li> </ol> <p><b>Note:</b></p> <ol style="list-style-type: none"> <li>One soft copy of the entire documents stated above to be provided in Pen drive.</li> <li>One Hard copy and one soft copy to be submitted at the time of inspection at suppliers works for checking the sufficiency of the documents. If any additional requirements are found needed for maintenance, it should be provided.</li> </ol>	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
9.0	INSPECTION	<p>The following Schedule of Inspection is to be carried out, prior to dispatch from the Supplier's Works :</p> <ul style="list-style-type: none"> <li>a. Verification of Test Certificate for Raw Materials &amp; Bought-Out Items used.</li> <li>b. Random Testing on the Welds, by physical examination and NDT.</li> <li>c. Wheel alignment as per clause 5.10.</li> <li>d. Idle Run Test and Load Test (on mutually agreed norms).</li> <li>e. Verification of O&amp;M Manuals as per Specification Clause No.8.3.</li> </ul>	
10.0	ROTATOR ERECTION & COMMISSIONING		
10.1	Erection / Assembly	Erection / Assembly of the ROTATORS will have to be done by the Qualified Technical Representative of the Supplier at BHEL Works	
10.2	Commissioning	Commissioning of the ROTATOR and Performance Prove –Out for Carrying & Rotating Capacity and Smooth Functioning of the ROTATOR (at BHEL Works) shall be the RESPONSIBILITY of the supplier.	
11.0	PERFORMANCE GUARANTEE	The Performance of the ROTATOR in Total and / or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a period of <b>TWELVE Months</b> from the date of performance acceptance at BHEL Works.	

ENCLOSURE:

ANNEXURE – 1



**TYPICAL PIPE BUTT WELDING ROTATOR**