



## Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

An ISO 9001  
Company

<b>ENQUIRY</b>	Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : <a href="mailto:tvenkat@bheltry.co.in">tvenkat@bheltry.co.in</a> Web : <a href="http://www.bhel.com">www.bhel.com</a>
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	<b>Enquiry Number:</b> <b>2620700037</b>	<b>Enquiry Date:</b> <b>24.07.2007</b>	<b>Due date for submission of quotation:</b> <b>08.09.2007</b>
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Your 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 Schedule
10	Variable Speed Drum Shell Rotators – 150 T Capacity 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> )	2 Nos.	20.03.2008

**BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats along with technical specifications 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 “2620700037”.**

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  Manager / Capital Purchase / MM / Manufacturing
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**PART A.****QUALIFYING CRITERIA FOR THE SUPPLY OF ROTATORS****SECTION – I**

The BIDDER has to necessarily provide complete details pertaining to each clause in the table given below and wherever necessary additional sheets 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 / VENDOR in the field of Design, Manufacture & Supply of ROTATORS for machine welding or similar applications in Heavy Engg. / Fabrication Industries	
<b>2.0</b>	Number of ROTATORS supplied till date in the following category (Classification based on CAPACITY ) : a) Above 150 Tons b) 100 to 150 Tons	
<b>3.0</b>	Number of ROTATORS (with capacity rating) supplied till date for the following category of CUSTOMERS, for machine welding or similar applications : a) Heavy Fabrication Industries in Countries outside INDIA b) Heavy Fabrication Industries within INDIA	
<b>4.0</b>	Details on International Standards or Codes followed in the Design of Rotators	[Elaborate Details are to be compulsorily provided]
<b>5.0</b>	Details of Manufacturing Facilities for Rotator Frame and Components : a) Fabrication Facilities b) Heat Treatment Facilities c) Heavy Machining Facilities d) Assembly & Load Testing Facilities	
<b>6.0</b>	Details of Quality System (with Stages of Internal Inspection) followed for the Fabrication and Non-Destructive Testing (NDT) of Weldments	
<b>7.0</b>	Details on NDT Facilities – like X Ray, MPI and Ultrasonic Testing	
<b>8.0</b>	Details of Electrical/Electronic Control Panel Design, Manufacturing and Testing Facilities	
<b>9.0</b>	Details on AFTER-SALES-SERVICE Set-Up in INDIA for providing timely service support to BHEL	

## **SECTION – II**

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

[Additional Sheets shall be attached with the OFFER, to provide requisite details]

<b>S.No.</b>	<b>REQUIREMENTS</b>	<b>VENDOR's RESPONSE</b>
<b>10.0</b>	The BIDDER / VENDOR 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>	Profile of the Company bringing-out the years of Experience and Capability of the BIDDER in the field of design, manufacture and supply of Custom Built Job Rotators (variable speed) .	
<b>12.0</b>	The BIDDER / VENDOR might have supplied atleast two numbers of ROTATORS with 150 Ton or above Capacity, for machine welding or similar applications.	
<b>13.0</b>	Performance Certificate in the enclosed FORMAT for a period, not less than one year, from CUSTOMERS and Reference List of Customers with full contact details of CONTACT PERSON, who are the End Users of the Variable (by Electronics) Speed Job Rotators of Capacity 100 Ton and above, are to be provided.	
<b>14.0</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 get rejected.	
<b>15.0</b>	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in India, to be furnished compulsorily.	

### **SECTION – III**

The BIDDER / VENDOR 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>16.0</b>	The BIDDER shall submit the offer in TWO PARTS - Technical [with <b>PART A &amp; PART B</b> ] & Commercial and Price Bid.	
<b>17.0</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. A just 'YES' or 'CONFIRMED' or 'NO-DEVIATION' or 'COMPLIES' or 'ACCEPTED' 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 of the inclusion of all the accessories, tooling, attachments, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements.	
<b>20.0</b>	Earlier performance & field experience (service support) with BHEL (if any) for the VENDOR's Equipment, will be a reckoning factor for the technical qualification of the OFFER.	

**PERFORMANCE CERTIFICATE – [SAMPLE FORMAT]**

(On Customer's Letter Head)

1. Supplier of the Equipment/Rotator :
  
2. Make & Model of the Equipment :
  
3. Month & Year of Commissioning :
  
4. Application for which Rotator is used :
  
5. a. Equipment Serial Number :  
b. Size of Jobs [Diameter Range & Weight] :  
c. Capacity of Rotator in Metric Tons :
  
6. Performance of the Machine : Best in the market /  
(with reasons for recommendation) Satisfactory /  
Good /  
Average /  
Not Satisfactory
  
7. Any other Remarks :

Date:

Signature & Seal of the Authority  
Issuing the Performance Certificate

**PART B.****TECHNICAL SPECIFICATIONS FOR ELECTRONICALLY CONTROLLED  
VARIABLE SPEED JOB ROTATORS [with TWIN DRIVE SYSTEM]**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
1.0	<b>APPLICATION</b>	a. For use (circumferential welding by mechanization) in heavy fabrication of Pressure Vessels, Heat Exchangers and Boiler Drums, which are cylindrical in shape and welded with attachments and nozzles.  b. The Rotator has to be supplied in pair with one Drive Unit and one Idler Unit, in combination help to rotate the job in either direction.	
2.0	<b>SCOPE OF SUPPLY</b>	a. Detailed Design, Manufacture and supply as per BHEL SPECIFICATIONS.  b. Assembly and Testing before Despatch  c. Supply of Electric & Mechanical Spares  d. Erection (Assembly), Commissioning and Performance Prove-Out at BHEL  e. Training on Maintenance for BHEL Staff  f. Performance Guarantee for 24 months, from the date of commissioning.  g. O & M Manuals and related documents	

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	75 Metric Tons (minimum capacity for design)	
<b>3.2</b>	Rotating Capacity	150 Metric Tons	
<b>3.3</b>	Eccentric Loading	10 % of the Job Weight	
<b>3.4</b>	Wheel Surface Speed	60 mm to 1200 mm / minute, with stepless speed variation	
<b>3.5</b>	Wheel Drive Mechanism	Electronically Controlled Drive System giving mechanical drive for each wheel through independent electric motor.	
<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 15 M long cable to be provided for Speed Variation, ON & OFF, Forward & Reverse Rotation functions	
<b>3.9</b>	Equipment Configuration	The enclosed <b>ANNEXURE - A</b> [DRAWING No. CABS: 2: 28: 002] and <b>ANNEXURE - B</b> give the sketch showing the desired machine configuration, so that the job does not foul with any equipment part while rotation and suitable for the application in BHEL Shopfloors.	
<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.	
<b>3.11</b>	Gear Box Details	BIDDER to furnish complete technical details of the Gear Box used for mechanical power transmission	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
<b>4.0</b>	<b>TECHNICAL SPECIFICATIONS / ROTATOR IDLER UNIT</b>		
<b>4.1</b>	Carrying Capacity	75 Metric Tons (minimum capacity for design)	
<b>4.2</b>	Eccentric Loading	10 % of the Job Weight	
<b>4.3</b>	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.	
<b>5.0</b>	<b>GENERAL FEATURES / INPUTS for DESIGN &amp; FABRICATION</b>		
<b>5.1</b>	Diameter Range of Job	<b>700 mm to 3000 mm – Outer Diameter</b> [ANNEXURE-A has to be read with 700 mm as minimum diameter and 3000 mm as maximum diameter]	
<b>5.2</b>	Weight of Job	Ranging from 10 Ton to 150 Tons	
<b>5.3</b>	Job Clearance	450 mm - Clearance between Job Periphery and Top of Rotator Base Frame	
<b>5.4</b>	Wheel Diameter	1060 mm	
<b>5.5</b>	Wheel Material	Solid Steel Forging	
<b>5.6</b>	Wheel Width at surface	150 mm (maximum) with crowning surface profile	
<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, through a hand driven screw-rod for IDLER Unit and motorized drive for Drive Unit.	
<b>5.10</b>	Wheel Positioning	There shall be suitable provision for locking the wheel assembly with the base frame, to prevent movement under working/loaded conditions.	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
5.11	Wheel Shaft Assembly	The high grade shafts are to be shrunk fit into wheel assemblies, to eliminate the provision of key arrangement	
5.12	Wheel Support	Wheels are to be supported on Heavy Duty Roller Bearings	
5.13	Lifting Hook	Four numbers of Lifting Hook are to be provided at suitable locations for facilitating lifting by EOT Crane in a geometrically balanced state.	
5.14	Cover for Gears	Suitably profiled steel outer-covers (with easily replaceable provisions) are to be provided for the spur gears, to protect from welding flux, slag and other foreign particles, while in operation	
5.15	Job Temperature	The ROTATORS will be used in the Fabrication Shopfloors, where the jobs are pre-heated to a temperature of maximum 200 ° C and hence the mechanical parts coming in contact with the jobs are to be designed to withstand this high temperature.	
5.16	Electric Power Input	Electric Input Power through a 3 Phase AC, 415 ± 10% V, 50 ± 2% Hz, 3 Wire System with 4 <sup>th</sup> Wire for Protective Earthing.	
5.17	Ambient Condition	Indoor Working Environment with temperature upto 50 ° C and Humidity upto 85 %, but both not occurring simultaneously. Hence, the offered equipment shall be of tropicalised in design.	
5.19	Control Voltage	Bidder to Specify [preferably lower than 110 V]	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
5.20	Bought-Out Items	a. BIDDER has to list down all the Bought-Out Items and their makes / brand names with technical specifications. 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. c. The Variable Speed Drive shall be of ABB / SIEMENS / L&T or any other reputed make acceptable to BHEL.	
5.21	Plug / Socket for Hand Lamps	2 Nos. of 24 Volt Plug / Socket with Switch & Fuse Unit with a separate transformer, to be provided in the Control Panel of the Drive Unit	
5.22	Job Diameter Chart	Engraved name-plate, showing the Chart for Roller Position Vs. Job Diameter, to be given.	
<b>6.0</b>	<b>STRUCTURAL FABRICATION</b>		
6.1	Rotator Base Frame and Wheel Bracket / Housing	Heavy Steel Fabrication Procedures to be followed	
6.2	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.	
6.3	Welded Joints	NO Butt Joints are allowed for Plate Build-Up to increase effective length	
6.4	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.	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
6.5	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.	
6.6	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.	
6.7	Machining Operation	All mechanical mating sliding surfaces are to be machined and ground to the required finish after heat treatment and protected	
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.	

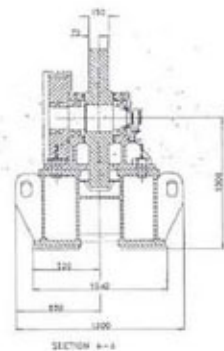
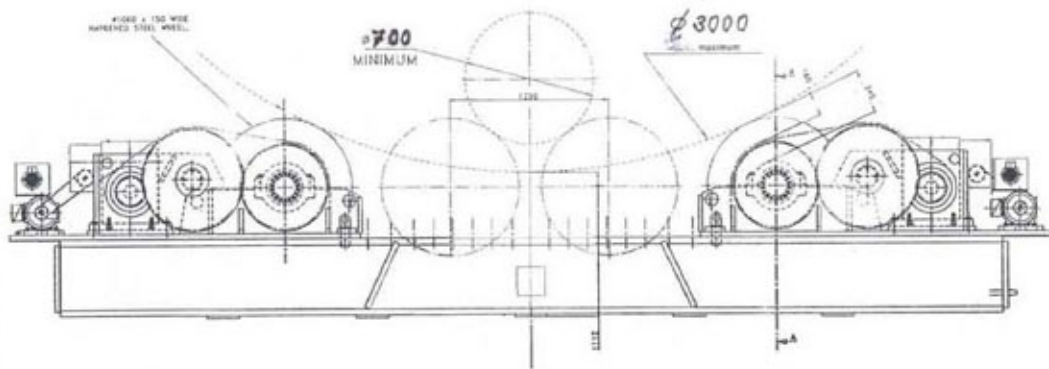
S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
<b>7.0</b>	<b>SPARES SUPPLY</b>		
7.1	Electrical / Electronic Spares	BIDDER has to list down the Electrical and Electronic Elements those are forming part of the Rotator Construction and to DEMARK the items (including Printed Circuit Boards) which are to be procured as SPARES with the Rotators, for a trouble free operation in three shifts, for a period of two years. Spare <b>Variable Speed Drive</b> to be quoted separately	
7.2	Mechanical Spares	BIDDER has to RECOMMEND the list of Mechanical Pats (like Bushes, Bearings, Seals / Gaskets, Couplings, Gears, Drive Belts, Stopper Pins, Bearing Plates, etc.) which are to be procured as SPARES with the Rotators, for a trouble free operation in three shifts, for a period of two years. <b>Spare Set of All Bearings</b> (meant for 1 Drive Unit and 1 Idler Unit) to be quoted separately.	
<b>8.0</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 ROTATORS.	
8.1	Drawings and Documents	<ul style="list-style-type: none"> <li>a. GA Drawing of the ROTATOR.</li> <li>b. GA Drawing of Wheel Drive Mechanism</li> <li>c. GA Drawing of Electric/Electronic System.</li> <li>d. Sub-Assembly Drawing for Wheels.</li> <li>e. Calculations for Selection of Electric Motors, Gear Reducers, etc.</li> <li>f. Wiring Diagram with Logic Circuits.</li> <li>g. Weight of Drive Unit &amp; Idler Unit to be given separately including all accessories.</li> </ul>	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
9.0	<b>INSPECTION</b>	The following Schedule of Inspection is to be carried out, prior to dispatch from the Supplier's Works : a. Verification of Test Certificate for Raw Materials & Bought-Out Items used. b. Random Testing on the Welds, by physical examination and NDT. c. Idle Run Test and Test under simulated conditions (on mutually agreed norms).	
<b>10.0</b>	<b>ROTATOR ERECTION &amp; COMMISSIONING</b>		
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.	
<b>11.0</b>	<b>O &amp; M MANUALS</b>		
11.1	Drawings & Details	Each ROTATOR shall be provided with THREE Copies of Erection/Assembly, Operation & Maintenance Manual, containing the following technical details a. General Arrangement Drawing b. Electrical Wiring Schematics c. Detailed Wiring Diagrams for Control Panels and Remote Control f. Rotator Wheel Assembly Drawing g. Gear Box Assembly Drawing j. Specifications / Ratings of Bought-Out Items k. Warranty Card for all Bought-Out Items l. Trouble Shooting Chart for all Sub-Systems	

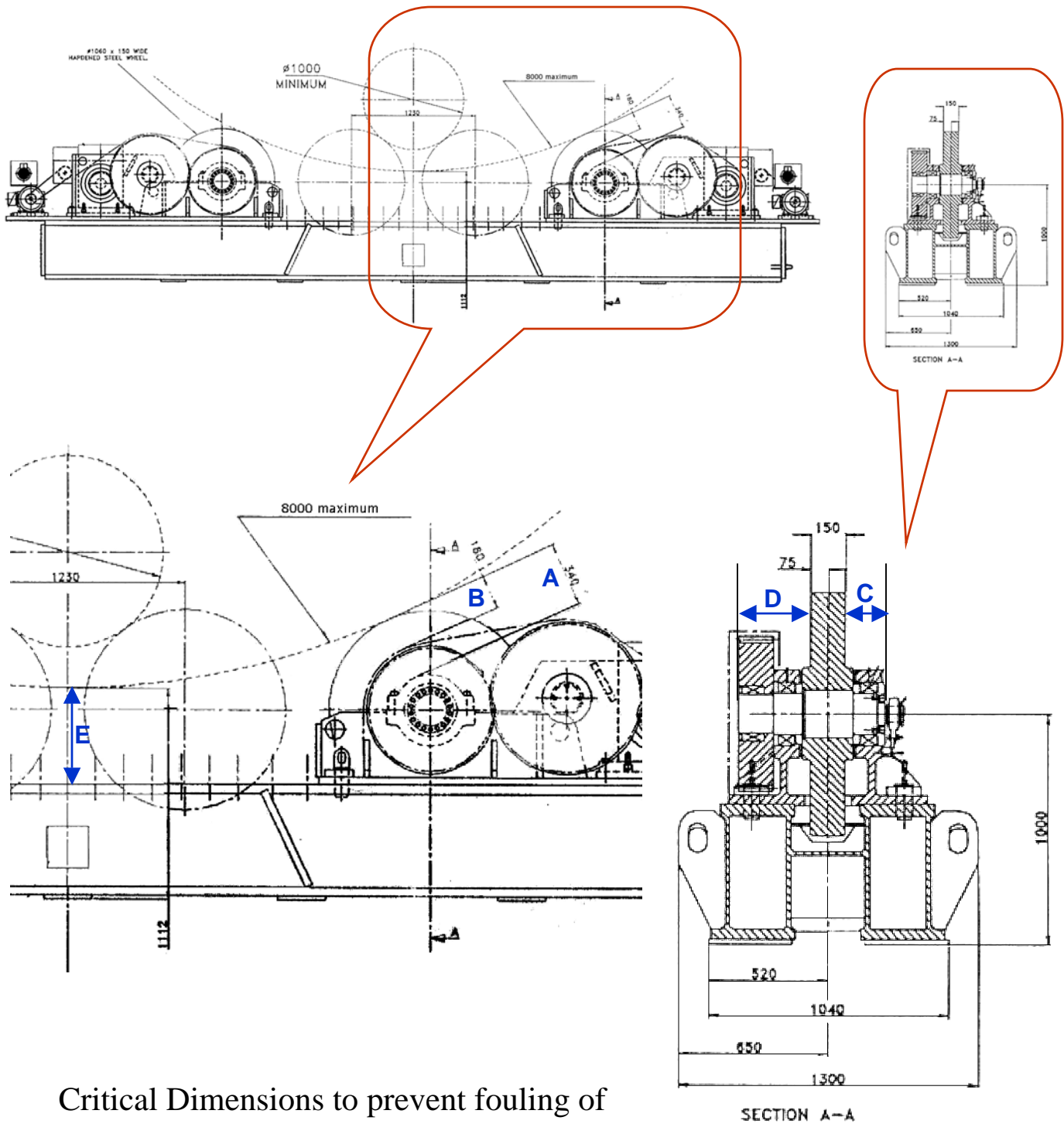
S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
12.0	<b>PERFORMANCE GUARANTEE</b>	The Performance of the ROTATOR in Total and / or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a minimum period of twenty-four months from the date of performance acceptance at BHEL Works.	

**ENCLOSURES :**      **ANNEXURE - A** [DRAWING No. CABS:2:28:002]  
                                 **ANNEXURE - B** [DRAWING for Critical Dimensions]

# ANNEXURE - A



DRAWING No. CABS:2:28:002



Critical Dimensions to prevent fouling of job while rotating  
(Required dimensions in mm)

A(min)	B(min)	C(max)	D(max)	E(min)
340	180	170	310	450