



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

Web : www.bhel.com

TWO PART BID

Tender to be submitted in two parts.

**Enquiry
Number:**

2620900156

**Enquiry
Date:**

25.08.2009

**Due date for submission
of quotation:**

09.10.2009

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	300 Ton Variable Speed Rotator as per the technical specification, general guidelines instructions & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 No.
20	150 Ton Variable Speed Rotator as per the technical specification, general guidelines instructions & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 No.

Important points to be taken care during submission of offer

1. Delivery required 8 months from the date of purchase order.
2. Grace period of 2 months beyond the above delivery period will be considered.
3. Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.

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 "2620900156".

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
VARIABLE SPEED ROTATOR

SECTION – I : QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer:

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	<p>Only those vendors (OEMs), who have designed, supplied and commissioned at least TWO VARIABLE SPEED ROTATOR for a Capacity of 300 T or higher in the past ten years (from the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (from the date of opening of Tender) should quote.</p> <p>However, if such machine had already been supplied to BHEL, then that machine should be presently working satisfactorily for more than six months after it's commissioning and acceptance (from the date of opening of Tender).</p>	
	The vendor should submit following information where similar machine has been supplied for qualification of their offer.	
1.1	Name and postal address of the customer or company where similar machine is installed.	
1.2	Name and designation of the contact person of the customer.	
1.3	Phone, FAX no and email address of the contact person of the customer.	
1.4	Month and Year of commissioning of the machine.	
1.5	Application for which the machine is supplied	
1.6	Along with the Technical offer, the Vendor should submit one Performance certificate from the customer for the satisfactory performance of the machine supplied to them. For obtaining the Performance certificate, a suggestive format is provided in SECTION – IV .	
1.7	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.	
2.0	<p>DELIVERY - The bidder shall quote the best possible delivery. However the delivery shall not exceed 8 months with an additional grace period of 2 months. The additional grace period will attract a penalty which is explained in the commercial terms of the enquiry.</p> <p>The delivery period shall be reckoned from date of purchase order to despatch from the vendor works.</p>	

SECTION – I I

The BIDDER / VENDOR is requested to provide the following information:

S. No.	REQUIREMENTS	VENDOR's RESPONSE
3.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address, details of contact person, where Variable Speed Rotator have been supplied in the past.	
4.0	Details of Variable Speed Rotator supplied to other BHEL units, if any. (Year of commissioning, Capacity)	
5.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in South India.	
6.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

SECTION – III

The BIDDER to note:

S. No.	PARTICULARS	VENDOR'S RESPONSE
7.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS. 1. Technical Offer [with PART A & PART B] & commercial offer 2. Price Bid.	
8.0	The Technical Offer shall contain a comparative statement of Technical Specifications demanded by BHEL and Offer Details submitted by the Bidder , against each clause. A just 'CONFIRMED' or 'COMPLIED' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement where specific details are required may lead to disqualification of the Technical Offer.	
9.0	The Technical Offer shall be supported by product Catalogues & Data Sheets and also technical details of Bought-Out-Items with copies of Product Catalogue to the extent possible.	
10.0	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.	

SECTION – IV

The performance certificate should be produced **on Customer's Letter Head.**

PERFORMANCE CERTIFICATE

1. Supplier of the machine		
2. Make & Model of the M/C		
3. Month & Year of Commissioning		
4. Application for which M/C is used		
5	a) Length b) Width c) WT. Carrying Capacity	
6. Performance of the Machine (Strike off whichever is not applicable)		Satisfactory / Good / Average / Not Satisfactory
7. After sales service (Strike off whichever is not applicable)		Satisfactory / Good / Average / Not Satisfactory
8. 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]-300T**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
1.0	APPLICATION	<ul style="list-style-type: none"> a. For use 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 to help to rotate the job in either direction. 	
2.0	SCOPE OF SUPPLY	<ul style="list-style-type: none"> 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 12 months, from the date of commissioning. g. O & M Manuals and related documents 	

CABS-3-27- Variable speed Rotator-300T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
3.0	TECHNICAL SPECIFICATIONS / ROTATOR DRIVE UNIT		
3.1	Carrying Capacity	200 Metric Tons (minimum capacity for design)	
3.2	Rotating Capacity	300 Metric Tons	
3.3	Eccentric Loading	10 % of the Job Weight	
3.4	Wheel Surface Speed	60 mm to 1200 mm / minute, with stepless speed variation	
3.5	Wheel Drive Mechanism	Electronically Controlled Drive System giving mechanical drives for each wheel through independent electric motor.	
3.6	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.	
3.7	Rotator Operation	Through Main Control and Remote Control with option for control selection	
3.8	Remote Control Unit	A hand held remote control box with 15 M long cable to be provided for Speed Variation, ON & OFF, Emergency Off , Forward & Reverse Rotation functions	
3.9	Equipment Configuration	The enclosed ANNEXURE - A [DRAWING No. MPE: E: 168: 001] gives the sketch showing the desired machine configuration and ANNEXURE – B giving critical dimensions so that the job does not foul with any equipment part while rotation and suitable for the application in BHEL Shopfloors.	
3.10	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.	

CABS-3-27- Variable speed Rotator-300T-Part-B

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	TECHNICAL SPECIFICATIONS / ROTATOR IDLER UNIT		
4.1	Carrying Capacity	200 Metric Tons (minimum capacity for design)	
4.2	Eccentric Loading	10 % 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.	
5.0	GENERAL FEATURES / INPUTS for DESIGN & FABRICATION		
5.1	Diameter Range of Job	1000 mm to 8000 mm – Outer Diameter	
5.2	Weight of Job	Ranging from 20 Ton to 300 Tons	
5.3	Job Clearance and critical dimensions	All critical dimensions shown in ANNEXURE-B to be maintained. Vendor to provide GA drawing showing the same along with offer.	
5.4	Wheel Diameter	1050 mm	
5.5	Wheel Material	Solid Steel Forging	
5.6	Wheel Width at surface	150 mm (maximum) with crowning surface profile	
5.7	Wheel Contact Surface Hardness	300-350 BHN	
5.8	Wheel Surface Profile	Crowning Surface	

CABS-3-27- Variable speed Rotator-300T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
5.9	Wheel Adjustment	Each wheel assembly with Housing/Bracket and Integral Drive Unit shall be movable on the Rotator Base Frame, through a fixed speed motorized driven screw-rod in Drive Unit and hand driven screw-rod in Idler Unit. It shall be possible to locate and lock each wheel assembly on the Rotator Base Frame at required pitches to cover the job diameter range. The drive arrangement to be designed to avoid loading on the screw-rod while loading / after loading the job on the wheels.	
5.10	Hardness and finish of Base frame slide	The sliding surfaces of the base frame in Drive and idler units shall be hardened and ground.	
5.11	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.	
5.12	Wheel Positioning	There shall be suitable provision for locking the wheel assembly with the base frame, to prevent movement under working/loading conditions.	
5.13	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	
5.14	Wheel Support	Wheels are to be supported on Heavy Duty Roller Bearings	
5.15	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.	

CABS-3-27- Variable speed Rotator-300T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
5.16	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. The thickness of the cover plate shall be minimum 3mm.	
5.17	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.	
5.18	Job Temperature	The ROTATORS will be used in the Fabrication Shop floors, 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.	
5.19	Electric Power Input	Electric Input Power through a 3 Phase AC, 415 ± 10% V, 50 ± 2% Hz, 3 Wire System with 4 th Wire for Protective Earthing.	
5.20	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.	

CABS-3-27- Variable speed Rotator-300T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
5.21	Control Voltage	Bidder to Specify [preferably 24 V]	
5.22	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 / ALLEN BRADLEY make. d. The Gear boxes shall be of Greaves / Elecon / Bonfiglioli or any other reputed make acceptable to BHEL.	
6.0	STRUCTURAL FABRICATION		
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.	

CABS-3-27- Variable speed Rotator-300T-Part-B

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. Random MPI / LPI to be shown to BHEL inspectors at the time of inspection at vendor's works.	
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 μ 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 μ and intermittent curing of 16 hours.	

CABS-3-27- Variable speed Rotator-300T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
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	SPARES SUPPLY		
7.1	Spares	<p>BIDDER to Quote for the following spares along with the rotator:</p> <p>a) Bearings for each wheel assembly – 2 Sets.</p> <p>b) Seals, gaskets & Belts used in the Rotator – 1 Set.</p> <p>c) Pulleys & Couplings used in the Rotator – 1 Set.</p> <p>d) Variable Frequency AC Drive – 1 No.</p>	
8.0	DRAWINGS / DOCUMENTS / DETAILS:		
8.1	Drawings and Documents along with offer:	<p>The following documents and details are to be submitted along with offer for technical evaluation of the ROTATORS.</p> <p>a. GA Drawing of the ROTATOR.</p> <p>b. GA Drawing of Wheel Drive Mechanism</p> <p>c. GA Drawing of Electric/Electronic System.</p> <p>d. Sub-Assembly Drawing for Wheels.</p> <p>e. Calculations for Selection of Electric Motors, Gear Reducers, etc.</p> <p>f. Weight of the ROTATOR (Drive Unit & Idler Unit separately) including all Electrical Equipment.</p> <p>Note: All the drawings should have the major & critical dimensions and list of bought out items with make and specification.</p>	

CABS-3-27- Variable speed Rotator-300T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
8.2	Drawings and Documents for Approval:	<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"> GA Drawing of the ROTATOR. GA Drawing of Wheel Drive Mechanism. GA drawing of wheel shifting mechanism in Drive & Idler Units. GA Drawing of Electric/Electronic System. Sub-Assembly Drawing for Wheels. Calculations for Selection of Electric Motors, Gear Reducers, etc. Wiring Diagram with Logic Circuits. Weight of the ROTATOR (Drive Unit & Idler Unit separately) including all Electrical Equipment. <p>Note: All the drawings should have the major & critical dimensions and list of bought out items with make and specification.</p>	
8.3	Drawings and Documents along with Equipment supply: (O & M MANUALS)	<p>Each ROTATOR shall be provided with THREE Copies of Erection/Assembly, Operation & Maintenance Manual, containing the following technical details :</p> <ol style="list-style-type: none"> General Arrangement and Sub-assembly Drawings Electrical Wiring Schematics Detailed Wiring Diagrams for Control Panels and Remote Control Rotator Wheel Sub- Assembly Drawing Gear Box Details / Drawings. 	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
8.3	Drawings and Documents along with Equipment supply: (O & M MANUALS)	f. Specifications / Ratings of Bought-Out Items g. Warranty Card for all Bought-Out Items h. Trouble Shooting Chart for all Sub-Systems i. Variable speed Drive manual. j. Mechanical manufacturing drawings for all wearing components. k. Operation & Maintenance manual with complete specification of the equipment and Preventive Maintenance check list. Note: 1) One soft copy of the entire documents stated above to be provided in Pen drive. 2) 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.	
9.0	INSPECTION	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. Wheel alignment as per clause 5.10. d. Idle Run Test and Test under simulated conditions (on mutually agreed norms). e. Verification of O&M Manuals as per clause 8.3.	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
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 12 months from the date of performance acceptance at BHEL Works or 18 Months from the date of supply whichever is earlier.	

ENCLOSURE:**ANNEXURE - A** [DRAWING No. MPE: E: 168: 001] and **ANNEXURE- B**

PART B.

**TECHNICAL SPECIFICATIONS FOR ELECTRONICALLY CONTROLLED
VARIABLE SPEED JOB ROTATORS [with TWIN DRIVE SYSTEM]-150T**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
1.0	APPLICATION	<ul style="list-style-type: none"> a. For use 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 to help to rotate the job in either direction. 	
2.0	SCOPE OF SUPPLY	<ul style="list-style-type: none"> 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 12 months, from the date of commissioning. g. O & M Manuals and related documents 	

CABS-3-27- Variable speed Rotator-150T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
3.0	TECHNICAL SPECIFICATIONS / ROTATOR DRIVE UNIT		
3.1	Carrying Capacity	100 Metric Tons (minimum capacity for design)	
3.2	Rotating Capacity	150 Metric Tons	
3.3	Eccentric Loading	10 % of the Job Weight	
3.4	Wheel Surface Speed	60 mm to 1200 mm / minute, with stepless speed variation	
3.5	Wheel Drive Mechanism	Electronically Controlled Drive System giving mechanical drives for each wheel through independent electric motor.	
3.6	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.	
3.7	Rotator Operation	Through Main Control and Remote Control with option for control selection	
3.8	Remote Control Unit	A hand held remote control box with 15 M long cable to be provided for Speed Variation, ON & OFF, Emergency Off, Forward & Reverse Rotation functions	
3.9	Equipment Configuration	The enclosed ANNEXURE - A [DRAWING No. MPE: E: 168: 001] gives the sketch showing the desired machine configuration and ANNEXURE – B giving critical dimensions so that the job does not foul with any equipment part while rotation and suitable for the application in BHEL Shopfloors.	
3.10	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	TECHNICAL SPECIFICATIONS / ROTATOR IDLER UNIT		
4.1	Carrying Capacity	100 Metric Tons (minimum capacity for design)	
4.2	Eccentric Loading	10 % 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.	
5.0	GENERAL FEATURES / INPUTS for DESIGN & FABRICATION		
5.1	Diameter Range of Job	1000 mm to 8000 mm – Outer Diameter	
5.2	Weight of Job	Ranging from 20 Ton to 150 Tons	
5.3	Job Clearance and critical dimensions	All critical dimensions shown in ANNEXURE-B to be maintained. Vendor to provide GA drawing showing the same along with offer.	
5.4	Wheel Diameter	1050 mm	
5.5	Wheel Material	Solid Steel Forging	
5.6	Wheel Width at surface	150 mm (maximum) with crowning surface profile	
5.7	Wheel Contact Surface Hardness	300-350 BHN	
5.8	Wheel Surface Profile	Crowning Surface	

CABS-3-27- Variable speed Rotator-150T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
5.9	Wheel Adjustment	Each wheel assembly with Housing/Bracket and Integral Drive Unit shall be movable on the Rotator Base Frame, through a fixed speed motorized driven screw-rod in Drive Unit and hand driven screw-rod in Idler Unit. It shall be possible to locate and lock each wheel assembly on the Rotator Base Frame at required pitches to cover the job diameter range. The drive arrangement to be designed to avoid loading on the screw-rod while loading / after loading the job on the wheels.	
5.10	Hardness and finish of Base frame slide	The sliding surfaces of the base frame in Drive and idler units shall be hardened and ground.	
5.11	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.	
5.12	Wheel Positioning	There shall be suitable provision for locking the wheel assembly with the base frame, to prevent movement under working/loading conditions.	
5.13	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	
5.14	Wheel Support	Wheels are to be supported on Heavy Duty Roller Bearings	
5.15	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.	

CABS-3-27- Variable speed Rotator-150T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
5.16	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. The thickness of the cover plate shall be minimum 3mm.	
5.17	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.	
5.18	Job Temperature	The ROTATORS will be used in the Fabrication Shop floors, 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.	
5.19	Electric Power Input	Electric Input Power through a 3 Phase AC, 415 ± 10% V, 50 ± 2% Hz, 3 Wire System with 4 th Wire for Protective Earthing.	
5.20	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.	

CABS-3-27- Variable speed Rotator-150T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
5.21	Control Voltage	Bidder to Specify [preferably 24 V]	
5.22	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 / ALLEN BRADLEY make. d. The Gear boxes shall be of Greaves / Elecon / Bonfiglioli or any other reputed make acceptable to BHEL.	
6.0	STRUCTURAL FABRICATION		
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. Random MPI / LPI to be shown to BHEL inspectors at the time of inspection at vendor's works.	
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 μ 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 μ and intermittent curing of 16 hours.	

CABS-3-27- Variable speed Rotator-150T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
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	SPARES SUPPLY		
7.1	Spares	<p>BIDDER to Quote for the following spares along with the rotator:</p> <p>a) Bearings for each wheel assembly – 2 Sets.</p> <p>b) Seals, gaskets & Belts used in the Rotator – 1 Set.</p> <p>c) Pulleys & Couplings used in the Rotator – 1 Set.</p> <p>d) Variable Frequency AC Drive – 1 No.</p>	
8.0	DRAWINGS / DOCUMENTS / DETAILS:		
8.1	Drawings and Documents along with offer:	<p>The following documents and details are to be submitted along with offer for technical evaluation of the ROTATORS.</p> <p>a. GA Drawing of the ROTATOR.</p> <p>b. GA Drawing of Wheel Drive Mechanism</p> <p>c. GA Drawing of Electric/Electronic System.</p> <p>d. Sub-Assembly Drawing for Wheels.</p> <p>e. Calculations for Selection of Electric Motors, Gear Reducers, etc.</p> <p>f. Weight of the ROTATOR (Drive Unit & Idler Unit separately) including all Electrical Equipment.</p> <p>Note: All the drawings should have the major & critical dimensions and list of bought out items with make and specification.</p>	

CABS-3-27- Variable speed Rotator-150T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
8.2	Drawings and Documents for Approval:	<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"> GA Drawing of the ROTATOR. GA Drawing of Wheel Drive Mechanism. GA drawing of wheel shifting mechanism in Drive & Idler Units. GA Drawing of Electric/Electronic System. Sub-Assembly Drawing for Wheels. Calculations for Selection of Electric Motors, Gear Reducers, etc. Wiring Diagram with Logic Circuits. Weight of the ROTATOR (Drive Unit & Idler Unit separately) including all Electrical Equipment. <p>Note: All the drawings should have the major & critical dimensions and list of bought out items with make and specification.</p>	
8.3	Drawings and Documents along with Equipment supply: (O & M MANUALS)	<p>Each ROTATOR shall be provided with THREE Copies of Erection/Assembly, Operation & Maintenance Manual, containing the following technical details :</p> <ol style="list-style-type: none"> General Arrangement and Sub-assembly Drawings Electrical Wiring Schematics Detailed Wiring Diagrams for Control Panels and Remote Control Rotator Wheel Sub- Assembly Drawing Gear Box Details / Drawings. 	

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
8.3	Drawings and Documents along with Equipment supply: (O & M MANUALS)	<p>f. Specifications / Ratings of Bought-Out Items g. Warranty Card for all Bought-Out Items h. Trouble Shooting Chart for all Sub-Systems i. Variable speed Drive manual. j. Mechanical manufacturing drawings for all wearing components. k. Operation & Maintenance manual with complete specification of the equipment and Preventive Maintenance check list.</p> <p>Note: 1) One soft copy of the entire documents stated above to be provided in Pen drive. 2) 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.</p>	
9.0	INSPECTION	<p>The following Schedule of Inspection is to be carried out, prior to dispatch from the Supplier's Works :</p> <p>a. Verification of Test Certificate for Raw Materials & Bought-Out Items used. b. Random Testing on the Welds, by physical examination and NDT. c. Wheel alignment as per clause 5.10. d. Idle Run Test and Test under simulated conditions (on mutually agreed norms). e. Verification of O&M Manuals as per clause 8.3.</p>	

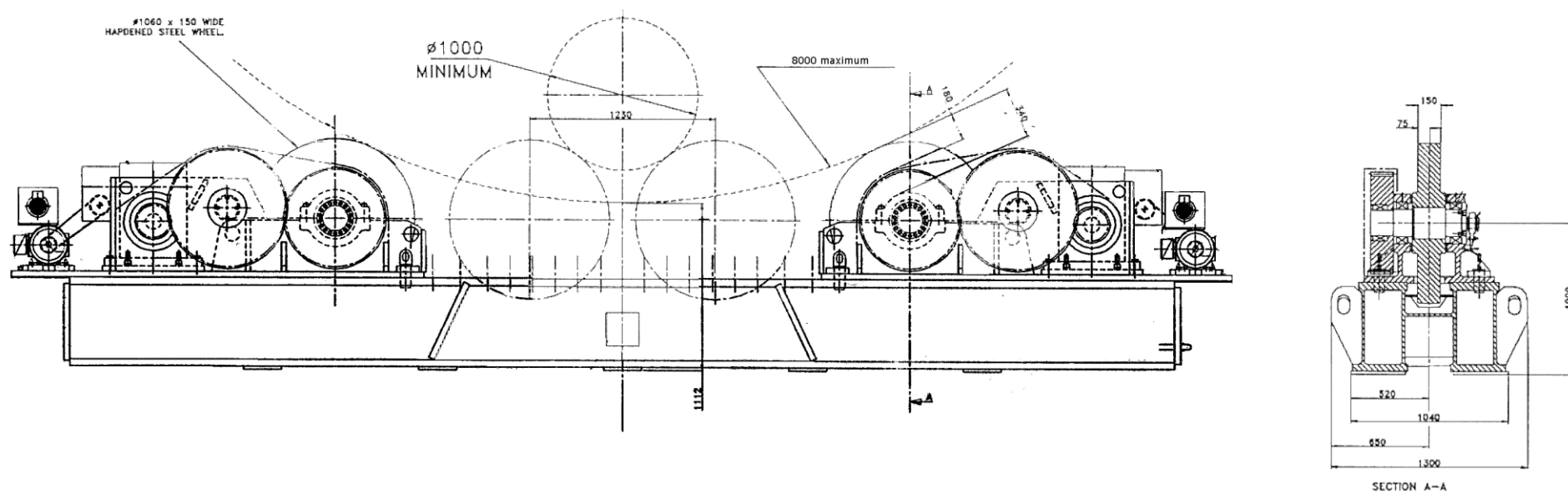
CABS-3-27- Variable speed Rotator-150T-Part-B

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's TECHNICAL OFFER (With Complete Details)
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 12 months from the date of performance acceptance at BHEL Works or 18 Months from the date of supply whichever is earlier.	

ENCLOSURE:

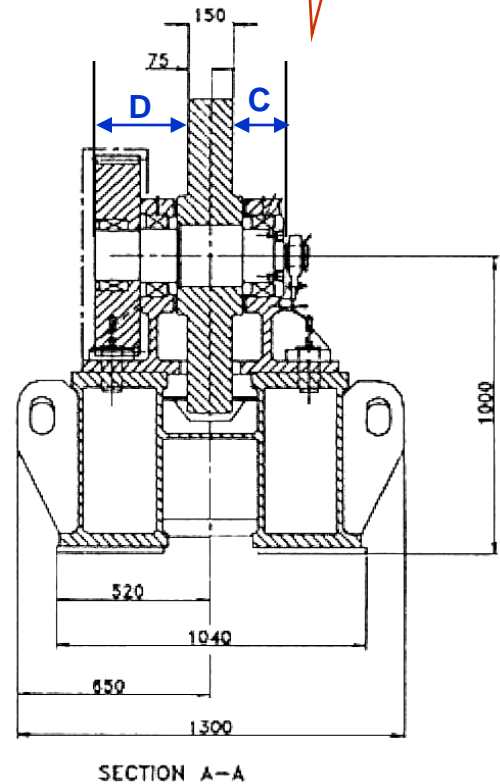
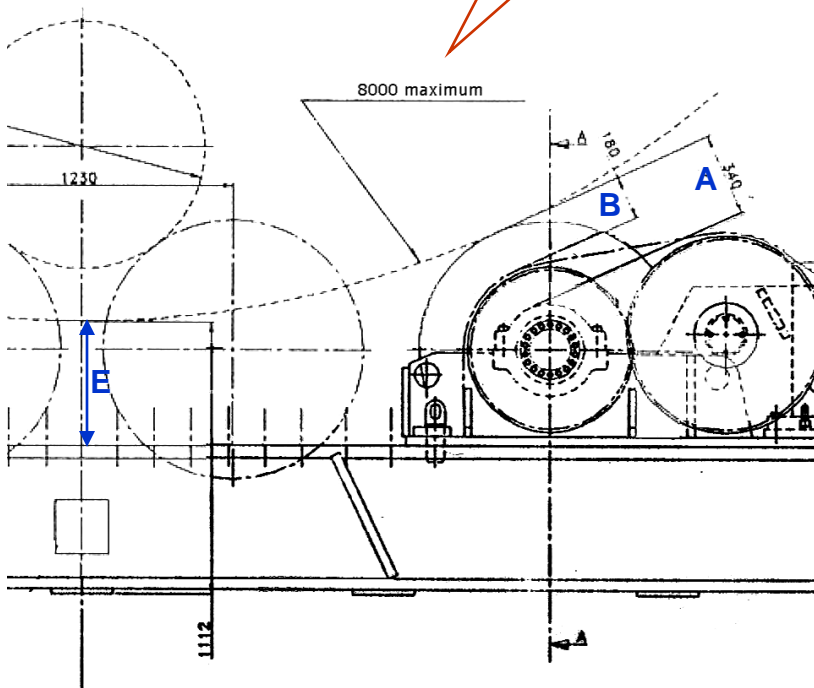
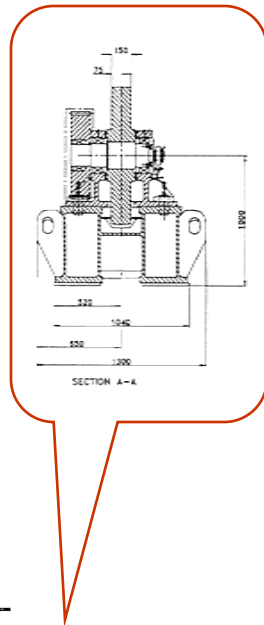
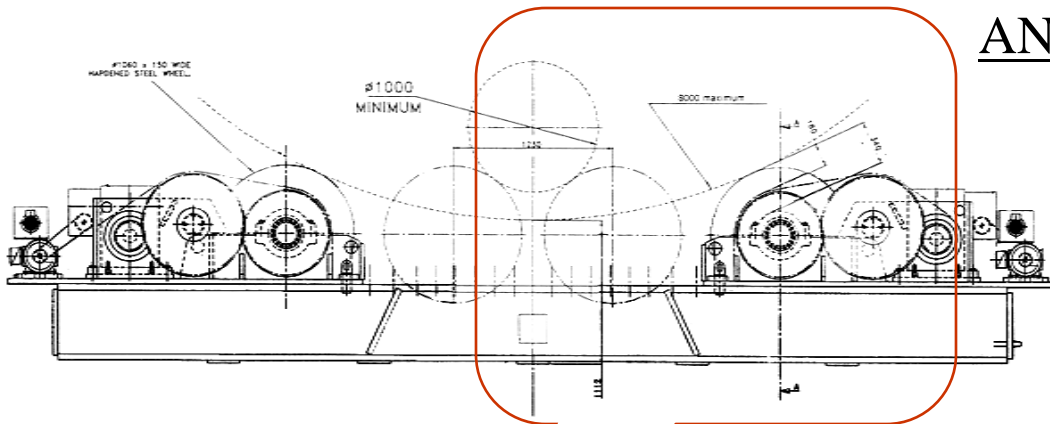
ANNEXURE - A [DRAWING No. MPE: E: 168: 001] **and ANNEXURE- B**

ANNEXURE - A



DRAWING No. MPE : E : 168 : 001

ANNEXURE - B



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