



BHARAT HEAVY ELECTRICAL LIMITED
HEAVY ELECTRICAL EQUIPMENT PLANT
RANIPUR, HARIDWAR – 249403, UTTARANCHAL
INDIA

CONTACT PERSON'S NAME / DESIGNATION/
PHONE/ E-MAIL
(FROM PURCHASE DEPARTMENT)

PHONE NO. :-

E-MAIL ID :-

ENQUIRY NO.

DUE DATE

SUPPLIER'S
QTN NO.


DATE

TECHNICAL SPECIFICATION OF 15 TON CAPACITY ROTATOR SET
Specification no. EMT- 6803 REV. 01

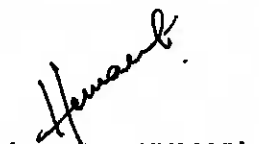
NOTE :-

1. Vendor must submit complete information against Pre Qualifying Requirement (PQR). The offer meeting PQR would only be processed.
2. This technical specification is for one 15 Ton Rotator set.
3. The following format must be completely filled and deviations mentioned in the appropriate columns. Inadequate /incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
4. The offer and all documents enclosed with offer should be in English language only.

Name & address of supplier :-


(KAPIL MAHESHWARI)

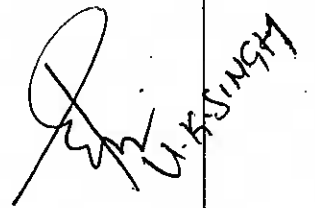
SR. ENGINEER (WEX-Mech,BL-1)


(HEMANT KUMAR)

ENGINEER(BL-1)


(SHWETA)

ENGINEER (EMT)


U.K. SINGH

TECHNICAL SPECIFICATION FOR "15 TON CAPACITY ROTATOR SET" SPECIFICATION NO. EMT- 6803 REV-01

SL.NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION
1.0	PURPOSE :-			
1.1	One manually operated rotator set having load carrying capacity of 15 Tons (i.e. each rotator to carry 7.5 Tons) for rotation of exciter rotor of TARI, THRI and THDF during various stages of manufacturing. These rotators will be rotated manually through a lever handle.	Vendor to confirm.		
1.2	ONE ROTATOR SET CONSISTS OF :			
1.2.1	One manually operated Rotator block (Capacity 7.5 Tons).	Vendor to confirm.		
1.2.2	One free (Without manual control) Rotator block (Capacity 7.5 Tons).	Vendor to confirm.		
1.3	Similar rotator sets are available in BHEL Haridwar. The supplier may study the same, if so required, before submitting the offer.	Vendor to confirm.		
2.0	SCOPE :-			
	The scope of supply includes design, manufacturing and supply of complete rotator set. The scope also includes commissioning & performance proving of rotators at BHEL works.	One 15 Ton capacity rotator set, will consist of two nos. rotator block capacity 7.5 Tons each.		
3.0	DIMENSIONAL DETAILS OF THE EXCITER ROTOR & JOB REQUIREMENT :			
3.1	Length of rotor : 5500 mm maximum; Weight : 15 Ton maximum; Seating diameter of rotor on the rotator : 200 mm minimum & 400 mm maximum	Vendor to confirm.		
3.2	Exciter rotor assembly sketch no. EMT-6803(a) and EMT-6803(b) for THRI, THDF (500 MW) are enclosed with this specification. Offered rotator set must be capable to rotate these exciter rotor assemblies during manufacturing stage. Exciter rotor shaft will be placed on rollers of rotators at the positions "A" and "B" specified	Vendor to confirm.		

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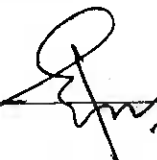
	in sketch. Position for supporting the rotor on rollers will change depending upon the assembly stage as shown in enclosed sketch EMT-6803(a) and EMT-6803(b). Vendor must take care that any part of the rotator must not foul with any other assembly on the exciter rotor shafts, during rotation.			
3.3	The information on these documents is the property of BHARAT HEAVY ELECTRICAL LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of company.	Vendor to confirm.		
4.0	TECHNICAL SPECIFICATION OF 15 TON CAPACITY ROTATOR SET			
4.1	DESIGN CONSIDERATION: The rotator set should be designed for 20 Ton load with operating load 15 Ton i.e each rotator block shall have operating load carrying capacity of 7.5 Ton. However, each rotator block shall be designed for 10 Ton load capacity.	Vendor to confirm.		
4.1.1	OPERATIONAL DETAILS :			
4.1.1.1	Rotator set shall be suitable for both clockwise and anticlockwise rotation of the job. Rotator blocks will be kept directly on the floor without any grouting.	Vendor to confirm.		
4.1.1.2	The driving roller of the rotator block shall be operated through worm wheel, worm shaft & bearing arrangement.	Vendor to confirm.		
4.1.1.3	The rotators would be operated manually through lever handle.	Vendor to confirm.		
4.1.1.4	Top surface of rotator body should have threaded holes(M16) for clamping rotor.(Eight on each rotator block)	Vendor to submit sketch showing position of holes in G A drawing as per S no 6.1		
4.2	STRUCTURE OF ROTATOR BLOCK: Fabricated steel structure shall be used for manufacturing rotator blocks, duly stress relieved after fabrication. A certificate in this regard is to be submitted along with the supporting documents before dispatch of the rotator. During working, if any small thing such as any tool or spanner falls inside the fabricated structure, there should be provision of its removal through a small hole on the walls fabricated structure.	Vendor to confirm.		
4.2.1	Suitable lifting hooks are to be provided at suitable location of rotator block for lifting the rotator block (with rotor and without rotor as per requirement) by the help of EOT/overhead crane.	Vendor to confirm.		
4.2.2	Size of bottom supporting base shall be approx 700X700X55(in mm)	Vendor to confirm.		

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4.2.3	The rotation lever arrangement should be fitted so that it does not foul with the job supported on it. For reference see enclosed sketch EMT-1478.			
4.2.4	Worm wheel and worm shaft arrangement should occupy minimum possible space so that it does not foul with rotor mountings (Dim "x" and "y" in enclosed sketch no. EMT-1478). These dimensions x and y should be mentioned in general arrangement drawing as mentioned in clause 6.1.	Vendor to confirm & submit the details in the offer as per Sl. No. 6.1		
4.3	ROLLERS and DRIVE :			
4.3.1	One Rotator block (as per 1.2.1) shall be designed with one driving roller and one idler roller. Thus, there will be total two rollers in this rotator block to drive exciter rotors in either direction (clockwise or anticlockwise). The driving roller will be connected to worm wheel and worm shaft arrangement, which will be driven manually through a lever handle.	Vendor to confirm & submit the details in the offer as per Sl. No. 6.1		
4.3.2	One Rotator block (as per 1.2.2) shall be designed with two idler rollers i.e without any manual control for free movement of exciter rotors in either direction (clockwise or anticlockwise).	Vendor to confirm & submit the details in the offer as per Sl. No. 6.1		
4.3.3	ROLLER DIMENSIONS : a) Roller diameter - 250 mm approx. b) Roller length - 130 mm approx. c) Horizontal centre to centre distance in between the rollers- 300 mm approx. d) Centre height of rollers from the base of the rotator block : <ul style="list-style-type: none"> • e) For idle rotator- 500 mm approx. • f) For drive rotator (With lever)- 550 mm approx.(Because the roller seating surface at both sides of exciter shaft is different) Note: These parameters are given for reference .However vendor may select better parameters to achieve intended performance of the system. It will be sole responsibility of vendor to prove the performance at BHEL works, Haridwar.	Vendor to submit the details in the offer as per Sl. No. 6.1.Also the dimension as offered, is to be furnished in General Arrangement drawing as per Sl. No. 6.1		
4.3.4	Material grade of rollers : Rollers shall be manufactured using suitable grade of Alloy Steel Forging.	Vendor to inform material grade.		

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4.3.5	The rollers shall be shrink fitted with 20 mm thick bronze lining locked externally from both sides by locking rings. Material Certificate of the rollers & bronze lining is to be submitted to BHEL before despatch of the rotator set.	Vendor to confirm.		
4.3.6	All the Worm shaft and worm wheel units should be of reputed make (Shanti / New Allenberry / Radicon/Elecon). Worm shaft arrangement should be properly covered to avoid entry of foreign items.	Details of the worm wheel and worm shaft, is to be furnished in General Arrangement of drawing (Sl. No. 6.1)		
4.3.7	The worm wheels, worm shaft and bearing arrangement should be lubricated properly with suitable lubricating grease / oil. First filling of bearing grease to be supplied by the supplier. Suitable provision (comprising of nipples etc) for relubrication/refilling of grease without removing worm wheels, worm shaft and bearing arrangement shall be there.	Vendor to confirm.		
4.3.8	Maximum run out of 0.2 mm is permissible on each roller when rotated under full load.	Vendor to confirm.		
4.4	BEARING: Only SKF / FAG/ NTN / INA make bearings shall be used. Suitable arrangement should be provided for dust protection of bearings.	Vendor to confirm & Relevant details to be furnished in the offer.		
5.0	TEST CERTIFICATES TO BE FURNISHED WITH 15 TON CAPACITY ROTATOR SET:			
5.1	The test certificate furnished by vendor must include	Vendor to confirm.		
	a) Report on all tests as per agreed quality plan.			
	b) Report on shrink fitting of bronze lining on steel rollers (Providing information on shrink fitting, interference etc).			
	c) Stress relieving of structure as per clause 4.2.			
	d) Report of hardness of steel rollers before shrink fitting of bronze lining as per clause 4.3.5.			
6.0	GENERAL ARRANGEMENT DRAWING OF 15 TON CAPACITY ROTATOR SET:			

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6.1	General arrangement drawing of 15 Ton capacity Rotator set indicating details such as overall size, weight, dimensional details of fabricated body, roller dimensions, location of worm shaft arrangement, assemblies, sub-assemblies, parts, make and article number of the bearings, location of lifting hook (Sl. no. 4.2.1) etc. are to be furnished in the offer.	Vendor to submit the details in the offer		
6.2	General Arrangement Drawing with details as mentioned in Sl. No. 6.1, is to be submitted for BHEL approval within thirty days after issue of Purchase Order.	Vendor to confirm.		
7.0	OPERATIONAL & MAINTENANCE MANUAL OF 15 TON CAPACITY ROTATOR SET			
7.1	Two sets of Operational & Maintenance manual in English language shall be supplied for the 15 Ton capacity rotator set.	Vendor to confirm.		
7.2	NOTE : In addition to other information, O&M Manual should contain the following also :	Vendor to confirm.		
7.2.1	Detail Operation Manual			
7.2.2	Detail Maintenance Manual, instruction for assembly and dis-assembly of the main items of 15 Ton capacity rotator set.			
7.2.3	Constructional and general arrangement drawing of the rotator set.			
7.2.4	Complete assembly drawing of the worm wheel and worm shaft arrangement.			
7.2.5	Make and details of worm wheel			
7.2.6	Material specification and dimensional details of the rollers			
7.2.7	List of bought out items, their purchase specifications and suppliers.			
7.2.8	Make and specifications of the parts like worm wheels, worm shaft, bearings, seals etc. are to be provided in the parts list with cross reference to the assembly drawing of rotator set.			
7.2.9	Make, specification details and frequency of replacement of the bearing grease.			
8.0	MANDATORY SPARES :-			
8.1	Following spares are to be supplied with two rotator sets:-	Vendor to confirm.		
8.1.1	Bearings as specified in clause no. 4.3.6 (Qty: 01 no. of each type)			
8.1.2	Worm shaft and worm wheel as specified in clause no. 4.3.6 (Qty: 01 set of each type)			

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9.0	PAINTING :			
9.1	15 Ton capacity rotator set will be painted to RAL 7038 Grey paint or as mutually agreed.	Vendor to confirm.		
9.2	NOTE: Vendor will repair the paint with original paint in case the same is damaged in transit / erection, before commissioning the 15 Ton capacity rotator set .	Vendor to confirm.		
10.0	PRE-ACCEPTANCE OF 15 TON CAPACITY ROTATOR SET AT VENDOR'S WORKS :			
10.1	15 Ton capacity rotator set will be inspected by BHEL engineers on following points at vendor's works :-	Vendor to confirm.		
10.1.1	Overall dimensions of each rotator block, roller dimensions, location of worm shaft arrangement, make and article number of the bearings, location of lifting hook with reference to the approved General Arrangement Drawing (Sl. no. 6.1).			
10.1.2	All operations of the rotator sets to be checked.			
10.1.3	Functions as mentioned in clause 4.1.1 are to be checked. Rotation of rollers also to be checked wrt clause no. 3.2. Location of lifting hooks as per clause 4.2.1. to be checked.			
10.1.4	Certificates like stress relieving of fabricated steel structure (clause 4.2), material grade of rollers and bronze lining (clause 4.3.4 and 4.3.5) etc. to be checked.			
10.1.5	Availability of spare as per clause 8.1 to be checked. If applicable.			
11.0	COMMISSIONING OF 15 TON CAPACITY ROTATOR SET:			
11.1	Vendor shall take full responsibility for carrying out the commissioning the rotator set at BHEL Haridwar works.	Vendor to confirm.		
12.0	JOB PROVING AND FINAL ACCEPTANCE OF THE 15 TON CAPACITY ROTATOR SET AT BHEL HARIDWAR WORKS :	Vendor to confirm.		
12.1	Final acceptance of 15 Ton capacity rotator set shall be made at BHEL Haridwar works with any available exciter rotor (which will be provided by BHEL) and final acceptance will be made after completion of the job proving of the rotator set.	Vendor to confirm.		
12.2	First filling of all oils, grease etc. shall be in the vendor's scope of supply.	Vendor to confirm.		
13.0	GUARANTEE/WARRANTY :			
	Guarantee/Warranty for the 15 ton capacity rotator set for 12	Vendor to confirm.		

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	months from the date of final acceptance of the rotator set. Any spares required during the guarantee/warranty period shall have to be arranged by the vendor free of cost (up to BHEL Haridwar stores) and duty levied have to be borne by the vendor			
14.0	QUALITY PLAN :			
	Vendor shall submit Quality Plan within one month after issue of Purchase Order.	Vendor to confirm.		
15.0	PACKING :			
	Rigid packing shall be provided for each rotator block of 15 Ton capacity rotator set to avoid any damage / loss in transit. All spares other loose items if any, should be suitably packed in separate wooden boxes.	Vendor to confirm.		



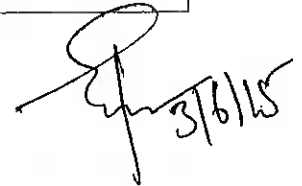
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SR. ENGINEER (WEX-Mech, BL-1)



(HEMANT KUMAR)
ENGINEER (BL-1)



(SHWETA)
ENGINEER (EMT)



BHEL**PRE QUALIFYING REQUIREMENT (PQR)
TECHNICAL PURCHASE SPECIFICATION****EMT-6803 Rev 01**

DESCRIPTION OF BHEL REQUIREMENT	TO BE SUPPLIED/ CONFIRMED/ SUBMITTED BY	OFFERED	DEVIATION	REMARKS
Only those OEMs or its authorized agencies, who have supplied and commissioned at least one 10 or more Ton capacity rotator set in the past fifteen year and such rotator was working satisfactorily for more than one year after commissioning, should quote. The period should be prior to tender opening date. The following information should be submitted by the vendor about the companies where similar rotator set(s) have been supplied. This is required from all the vendors for qualification of their offer.	Vendor to accept & confirm			
1. Name of the customer / company where referred rotator set is installed.	Vendor to inform.			
2. Complete postal address of the customer.	Vendor to inform.			
3. Month & Year of commissioning	Vendor to inform.			
4. Parameters of rotator set supplied (parameters specified in clause 16.1 above) and application for which the rotator set is supplied.	Vendor to inform.			
5. Name and designation of the contact person of the customer.	Vendor to inform.			
6. Phone, FAX no. and email address of the contact person of the customer.	Vendor to inform.			
7. Performance certificate from the customers regarding satisfactory performance of rotator set supplied to them (Original Certificate or Through E-mail directly from the customer). The original performance certificate may be returned after verification by BHEL, if required.	Vendor to submit.			
8. 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.	Vendor to accept & confirm.			

Kapil Maheshwari
31/7/15

(KAPIL MAHESHWARI)
DY. MANAGER (WEX-Mech, BL-1)

Hemant Kumar
31/7/15

(HEMANT KUMAR)
SR. ENGINEER (BL-1)

U. K. Singh
30/7/15

(U. K. SINGH)
DGM (EMT)

Shweta
30/07/15