



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

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

SHRI GURMIT SINGH AGM(PPX-CAP)

PHONE NO. :-

E-MAIL ID :-

ENQUIRY
NO.

DUE DATE

SUPPLIER'S
QTN NO.

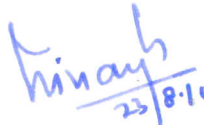
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TECHNICAL SPECIFICATION OF 225 TON CAPACITY SELF ALIGNED MOTORISED ROTATOR SET
Specification no. EMT- 6789 REV. 00


NOTE :-


1. Vendor (OEM) must submit complete information against clause no. 16 (Qualifying condition). The offer meeting this clause would only be processed (OEM : Original Equipment Manufacturer).
2. This technical specification is for one set of 225 Ton Rotators.
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 :-


(N.S.RANA)
MGR(EMT)


(R.K.VERMA)
MGR(WEX-1)


(P.K.GUPTA)
Dy.MGR(WEX-I)


(U.K.SINGH)
SR..MGR(BL-I)

TECHNICAL SPECIFICATION FOR "225 TON CAPACITY SELF-ALIGNED MOTORISED ROTATOR SET"
SPECIFICATION NO. EMT- 6789 REV-00

SL.N O.	DESCRIPTION OF BHEL REQUIREMENT	QUANTITY	OFFERED	DEVIATION
1.0	PURPOSE :-			
1.1	One set of self aligned rotators will be used for the rotation of the wound stator core of medium and larger size air /hydrogen cooled Turbo Generators to facilitate winding & laying operation. The maximum weight of wound core will be 225 Tons.	Vendor to note		
1.2	One set of 225 Ton capacity self aligned motorized rotator set is available at BHEL works. The same can be examined by the vendor before submitting the offer, if desired.			
2.0	SCOPE OF SUPPLY:-			
	The scope of supply includes design, manufacturing, supply, erection, commissioning and proving of one set of 225 Tons self aligned rotator at BHEL haridwar works as per technical specification at sl. No 4.0.	One set		
3.0	DIMENSIONAL DETAILS OF THE ROTOR & JOB REQUIREMENT :-			
3.1	Outer dia of rings of stator core : 2100 mm min; 3500mm max Overall length of core : 3000 mm min.; 5500 mm max. Minimum distance between rings of core which will rotate on the rotators :- 2500 mm (minimum) Weight of wound stator core : 225 ton maximum Rotation of job (wound core) for maximum diameter (3500 mm) -- 0.1 RPM.	Vendor to note		
3.2	Drawing no. 01350401042 for 250 MW is enclosed with this specification. Offered rotator set must be capable to rotate this core (from rings Dia 3060 mm) during winding stage.(Along with other cores with parameters given in clause no. 3.1) Vendor must take care that any part of the rotator must not foul with any other part of core, during rotation. For concept of position of rotators wrt to core rings, refer Annexure-I .	Vendor to confirm		
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			

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[Signature]

	company.			
4.0	TECHNICAL SPECIFICATION :-			
4.1	DESIGN CONSIDERATION :- The rotator set should be designed with minimum 1.5 times safety factor. Operating load is 225 Ton maximum. i.e. rotator set should be designed for minimum 337.5 Ton capacity. Each rotator block shall have operating load carrying capacity of 112.5 Ton. However, each rotator block should be designed to minimum 168.75 Ton capacity.	Vendor to confirm		
4.2	OPERATIONAL DETAILS :			
4.2.1	Rotator shall be suitable for both clockwise and anticlockwise rotation of the job. Suitable arrangement shall be provided on each rotator to avoid thrust on the worm shaft during immediate requirement of changing the direction of rotation of the job.	Vendor to confirm & furnish details in the offer.		
4.2.2	Provision for operating the rotator set from either end, shall be made. Safety provision i.e. inter locking shall be provided so that the rotator set is operated from one end, the rotator can not be operated from the other end at the same time. All controls like directional control, interlocking, inching, overloading etc must be through suitable control panels. Two number operator friendly pendent should be provided on both ends of rotator set.	Vendor to confirm		
4.2.3	The driving roller of the rotator block shall be motor operated through gears, worm wheel & worm shaft and bearing arrangement. Chain pulley or belt driven arrangements shall not be accepted.	Vendor to confirm		
4.3	STRUCTURE OF ROTATOR BLOCK:-			
4.3.1	Fabricated steel structure shall be provided in the manufacture of rotator block, duly stress relieved after fabrication. Certificate in this regard is to be submitted along with the supporting documents before despatch of the rotator.	Vendor to confirm		
4.3.2	The holes for pin for self alignment of the wheels should be machined in both the front and rear plates, in one setting. The variation in the centre to centre distance in both the plates should not exceed the tolerance + / - 0.03 mm. Inspection report in this regard, is to be submitted to BHEL before despatch of the rotator.	Vendor to confirm		
4.3.3	Suitable lifting Hooks / Eye bolts are to be provided at suitable	Vendor to confirm		

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	location of rotator block for lifting / handling the rotator block with the help of overhead crane.			
4.4	WHEELS AND DRIVE			
4.4.1	Each rotator block shall be complete with 2 nos. of driving wheel and 2 nos. idler wheel. There will be 4 nos. wheels in one rotator block and thus there will be two motors in one rotator block. A set of two such rotator blocks will form one complete set of rotators. Idler wheel should have provision to rotate the wheel by hand (using detachable handle), for checking free movement manually.	Vendor to confirm		
4.4.2	WHEEL DIMENSION : - Diameter - 500 mm (approximately); Width – 145 mm; Load bearing width- 125 mm with 20 mm thick collar (tapered) at one end. Dimension of wheel is to be indicated in the General Arrangement Drawing (Ref. Cl. no. 5.1) Note:- (1) RPM of wheels corresponding to required RPM of job as per Clause 3.1, to be furnished by vendor in the offer.	Vendor to submit the details in the offer as per Cl. No. 5.1		
4.4.3	All the 8 wheels for one set of rotators will be forged steel-material C55Mn75 .	Vendor to submit the Grade and Specification of the wheels, in the offer		
4.4.4	NOTE : Material Certificate of the wheels, is to be submitted to BHEL before despatch of the rotator set.	Vendor to confirm		
4.4.5	The inner wheels must not touch the bottom base of the frame at NO LOAD CONDITION.	Vendor to confirm		
4.4.6	Suitable capacity of motor Siemens / Bharat Bijlee / Kirloskar make is to be provided on the rotator. Technical Specification of motor is to be indicated in General Arrangement Drawing (Ref. Cl. No.5.1). The motor shaft will be coupled to heli-worm reducer with suitable speed reduction ratio.	Vendor to submit the details in the offer		
4.4.3	Design calculation for the selection of drive motor capacity for the rotation at 0.1 RPM for operating load=225 Ton with minimum 1.5 times safety factor (i.e. 337.5 Ton) and maximum diameter 3500 mm, is to be furnished.	Vendor to submit the details in the offer		

4.5	WORM & WORM SHAFT:-			
4.5.1	All the heli-worm units should be of shanthi / New Allenberry / Radicon / Elecon make. The gears, worm Wheel, Worm Shaft and Bearing arrangement should be properly splash lubricated with suitable lubricating oil with suitable double seal system for preventing the leakage / seepage of oil. The uncovered parts of the worm & the worm shaft assembly are to be properly lubricated with suitable grade of grease.	Vendor to confirm		
4.6	BEARING:-			
	Only SKF/FAG/NTN/INA make bearing will be acceptable in the rotators. The details are to be furnished in the offer. Suitable covers are to be provided for dust of the bearings.	Vendor to confirm		
4.7	Rotator blocks shall be portable and the same will be handled with the help of overhead crane. Each rotator block shall be placed directly on the concrete floor of the work shop without any concrete grouting. Distance between the rotator blocks will be the adjusted with the help of overhead crane and set as per the requirement of the length of stator core. Proper lifting brackets are to be suitably provided on each rotator block for handling with overhead crane. Both rotator blocks shall be connected with each other with some suitable arrangement (like telescopic beam etc which can be adjusted for different lengths of cores) and shall be adjusted for distances 2722, 3320 & 4520 mm (distance between the rings which will rotate on these rotators).	Vendor to submit the details in the offer		
5.0	GENERAL ARRANGEMENT DRAWING OF 225 TON CAPACITY SELF-ALIGNED MOTORIZED ROTATOR SET :-			
5.1	General arrangement drawing of 225 Ton capacity Self Aligned Motorized Rotator indicating all the details such as overall size and weight of each rotator block, centre height of the wound stator core (for diameter 3500 mm maximum and 2100 mm minimum) when placed on the rotator, wheel dimensions (4.4.2), location of motor and gear box, make and article number of the bearings, location of control panel, total power requirement etc. are to be furnished.	Vendor to submit the details in the offer.		
5.2	NOTE: Permissible center height of job (core) is to be maintained at a height 2200 mm (maximum) from the floor when rings of core (operating diameter 3060 mm) is placed on the rotator. Accordingly, the height of rotator block	Vendor to confirm & furnish details in offer		

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	is to be designed.			
5.3	General Arrangement Drawing with details as mentioned in Clause No. 5.1, is to be submitted for BHEL approval within one month after placement of Purchase Order.	Vendor to confirm		
6.0	OPERATIONAL & MAINTENANCE MANUAL OF 225 TON CAPACITY SELF ALIGNED MOTORIZED ROTATOR :-			
6.1	5 sets of Operational & Maintenance manual in English language, will be supplied with the 225 Ton capacity self aligned motorized rotator. Out of 5 sets, one set shall be supplied in CD.	Vendor to confirm		
6.2	NOTE : In addition to other information, O&M Manual should contain the following also :	Vendor to confirm		
6.2.1	Erection Manual	Vendor to confirm		
6.2.2	Detail Operation Manual	Vendor to confirm		
6.2.3	Detail Maintenance Manual having complete kinematic diagrams and instruction for assembly and dis-assembly of the main items of 225 Ton capacity self aligned motorized rotator.	Vendor to confirm		
6.2.4	Electrical wiring circuit of the rotator .	Vendor to confirm		
6.2.5	Constructional and general arrangement drawing (Sl. no. 5.1) of the rotator set.	Vendor to confirm		
6.2.6	Make, article no. and technical specification details of the motor.	Vendor to confirm		
6.2.7	Sectional views of worm and worm wheel with details including the module, number of teeth, centre distances of gears and worm - worm wheels etc.	Vendor to confirm		
6.2.8	Make and details of worm wheel, worm shaft.	Vendor to confirm		
6.2.9	Material specification and dimensional details of the wheel.	Vendor to confirm		
6.2.10	Make and specification details of the grease and lubricating oil.	Vendor to confirm		
6.2.11	Make, part number and specification of the bearings provided in the rotator set.	Vendor to confirm		
6.2.12	Safety instruction for the operation of the 225 Ton capacity self aligned motorized rotator.	Vendor to confirm		
7.0	POWER SUPPLY :-			
7.1	BHEL will provide input power supply 3 phase, 3 wire, 415 + / - 15% volt, 50 + / - 3% Hz to Isolator Switch (BHEL scope) nearby control panel of the 225 Ton self aligned motorized	Vendor to note this point		

	rotator set. Cable connection from isolator switch to control panel and remaining cabling / wiring for the 225 Ton self aligned motorized rotator and other equipment if any, will be in the scope of vendor. There will be no neutral wire and Earthing will be provided through shop structure column.			
8.0	SPARES :-			
8.1	List of spares required for 2 years trouble free operation of the 225 Ton capacity self aligned motorized rotator, to be furnished	Vendor to submit the details in offer		
8.2	The offer for the spares should be valid for 2 years after erection and commissioning of the 225 Ton capacity self aligned motorized rotator.	Vendor to confirm		
8.3	Following optional spares are to be supplied with rotators:- (Item wise price to be quoted)	Vendor to confirm		
8.3.1	Gear box as specified in clause no. 4.2.3. (Qty=01 number)			
8.3.2	Bearings as specified in clause no. 4.6 (Qty=2 nos of each type.)			
8.3.3	Worm shaft and worm wheel as specified in clause no. 4.5.1(Qty=01 set)			
9.0	PAINTING :			
9.1	225Ton capacity self aligned motorized rotator and control panel will be painted to RAL 7038 Grey paint or mutually agreed. The capacity of rotator is to be written/ painted/ embossed on the rotator sets.	Vendor to confirm		
9.2	NOTE : Vendor will repair the paint with original paint in case the same is damaged in transit/erection, before commission - ing the 225 Ton capacity self aligned motorized rotator .	Vendor to confirm		
10.0	PRE-ACCEPTANCE OF 225 TON CAPACITY MOTORIZED ROTATOR SET AT VENDOR'S WORKS :			
10.1	225 Ton capacity motorized 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, location of motor and coupling arrangement, make and specification of motor, details of worm wheel-worm shaft etc with reference to the approved General Arrangement Drawing (Cl. no. 5.1).	Vendor to confirm		
10.1.2	All operations of the rotator sets to be checked.			
10.1.3	Functions like interlocking, rpm of wheels as mentioned in			

	clause 4.4.2 etc are to be checked. Rotation of wheels also to be checked wrt clause no.4.4.1. Location of lifting hooks as per clause 4.3.3 to be checked.			
10.1.4	Certificates like stress relieving of fabricated steel structure (clause no. 4.3.1), material grade of rollers (clause no.4.4.4.) etc. to be checked.			
10.1.5	Inspection report of tolerances of holes for pin for self alignment of wheels in front and rear plates as per clause no. 4.3.2 to be checked.			
10.1.6	Availability of spare as per clause 8.3 to be checked. If applicable.			
11.0	ERECTION & COMMISSIONING OF THE 225 TON CAPACITY SELF ALIGNED MOTORIZED ROTATOR SET :			
11.1	Vendor shall take full responsibility for carrying out the erection and commissioning the rotator set, at BHEL Haridwar works.	Vendor to confirm		
11.2	BHEL will provide overhead crane facility, compressed air and electrical supply (refer Cl. no. 7.1).	Vendor to confirm		
12.0	JOB PROVING AND FINAL ACCEPTANCE OF THE 225 TON CAPACITY SELF ALIGNED ROTATOR SET AT BHEL HARIDWAR WORKS :	Vendor to confirm		
12.1	Final acceptance of 225 Ton capacity self aligned motorized rotator set, shall be made at BHEL Haridwar works with any available core (which will be provided by BHEL) and final acceptance will be made after completion of job proving of 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 :			
	Guarantee for the 225 ton capacity self aligned motorized rotator and other supplied items for 24 months from the date of final acceptance (Cl. no. 12.1) of the rotator set.	Vendor to confirm		
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 all the items of 225 Ton	Vendor to confirm		

	capacity self aligned motorized rotator, Control Panel and other accessories to avoid any damage / loss in transit. All small and loose items like spares etc., should be suitably packed in wooden boxes.			
16.0	Qualifying Conditions :			
16.1	Only those vendors (OEMs) should ^{or above} quote who have commissioned at least one 225 Ton capacity self aligned motorized rotator set in the past ten years (on the date of opening of Tender) and referred rotators set is presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender). 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 <i>Hinay</i>		
	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		

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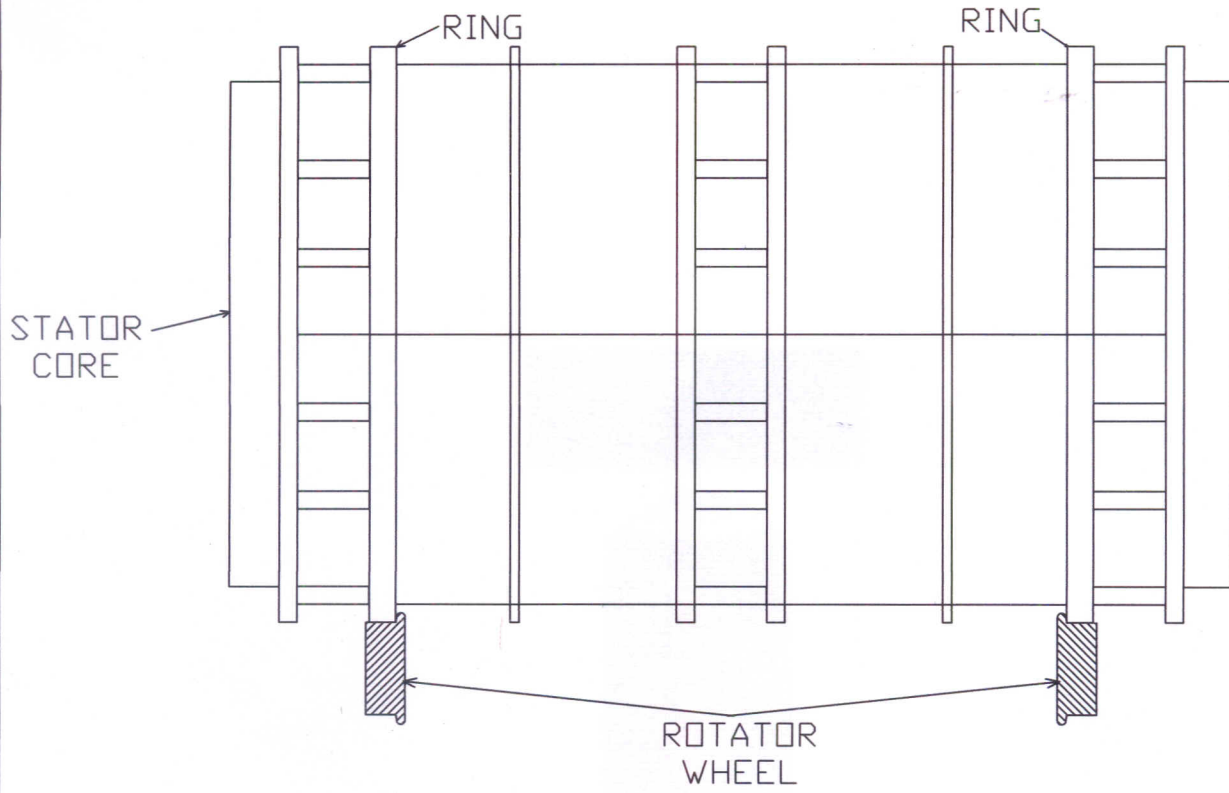
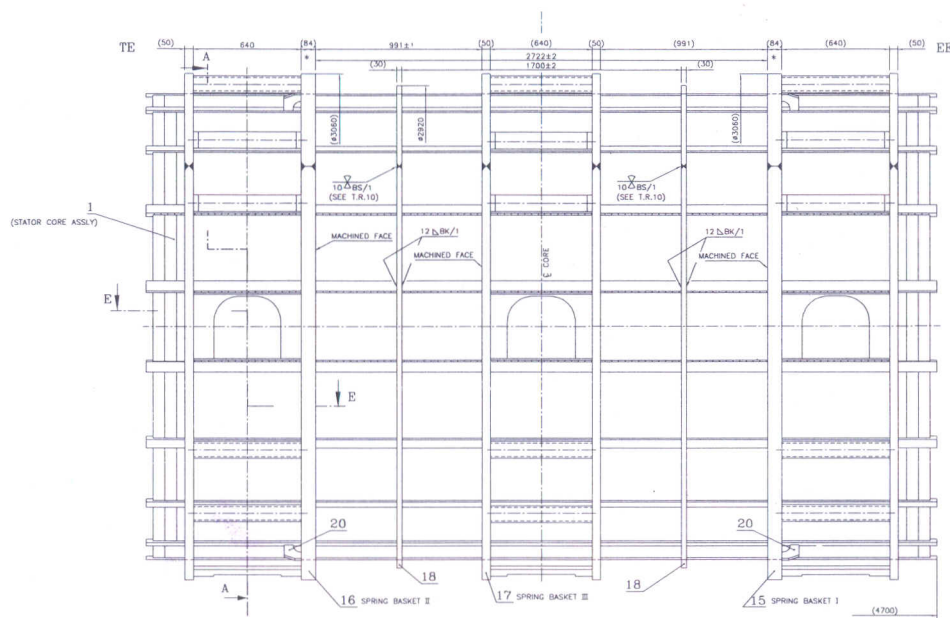


FIGURE FOR REFERENCE ONLY

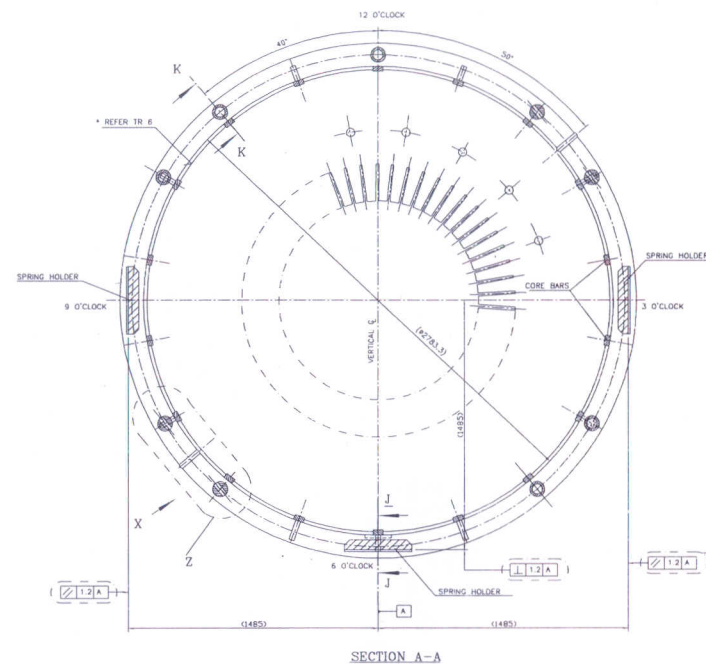
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*IMPORTANT NOTE -
POSITION OF ROLLER RINGS.

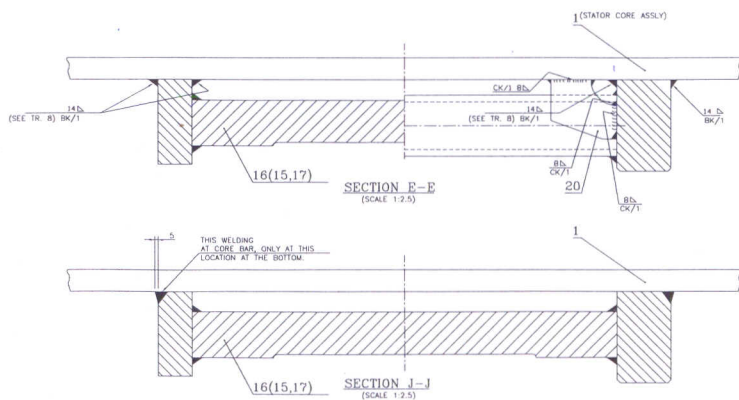


NOTE 1: TIGHTENING FORCE 2×10^4 N WHEN COMBINING THE TWO RINGHALVES.

WELD-TABLE								①
SYMBOL AND SITE OF WELD SEAM	8d.	12d.	14d.	10 X	18X	25X	8d.	
SEAM LENGTH IN M	1.3	4.5	13.6	0.55	2.1	1.1	1.3	
WL. OF DEPOSITED METAL IN KG	① 0.325	2.54	10.52	0.40	2.66	2.5	0.325	
TYPE OF ELECTRODE	E-309 CB			E-7018				①

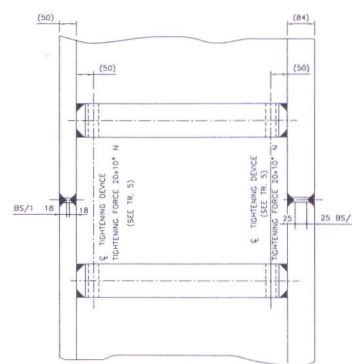


SECTION A-A

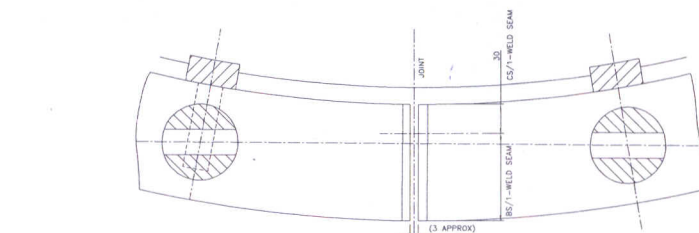


SECTION E-E

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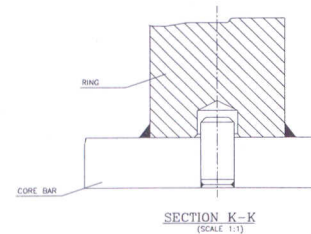
VIEW X
(SCALE 1:5)



DETAIL 2

TECHNICAL REQUIREMENTS

1. IDENTIFICATION AS PER HW 0400-397.
2. CLASSIFICATION OF GROUPS ACCORDING TO HW 0620-195, BK/CJ/BK/CSAS SHOWN.
3. TEST SCOPE ACCORDING TO HW 0850-199, CATEGORY OF SERVIC REQUISMENTS-1.
4. 100% OF TOP SURFACE TO BE DONE ON ALL FILLET WELDS, ROOT RUN TO BE 100% OF TESTED.
5. PAIRS OF HALF SPINNING BASKETS SHALL BE WELDED UNDER STRETCHED CONDITION CLAMPING FORCE ON THE TIGHTENING DEVICE TO BE 200 KN FOR EACH JOINT (ITEM 15, 16, 17).
6. * MARKED SURFACE TO BE SATISFIED PROTECTED DURING WELDING.
7. THERE SHOULD BE NO WELD SPATTERS PRESENT ANY-WHERE IN THE ASSEMBLY.
8. THIS WELDING(14.5) BETWEEN CORE BAR AND RING NOT TO BE DONE AT LOCATIONS BEHIND SPACING HOLDERS AT 3,6, AND 9 O'CLOCK LOCATIONS.
9. DIMENSIONS IN BRACKETS ARE FOR REFERENCE ONLY.
10. TIGHTENING FORCE 2×10^4 N WHEN COMBINING TWO RING HALVES (ITEM 18). ONLY.



SECTION K-K
(SCALE 1:1)

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