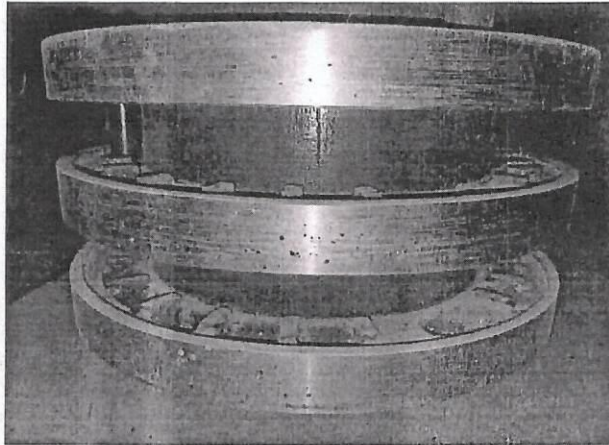


ANNEXURE-I

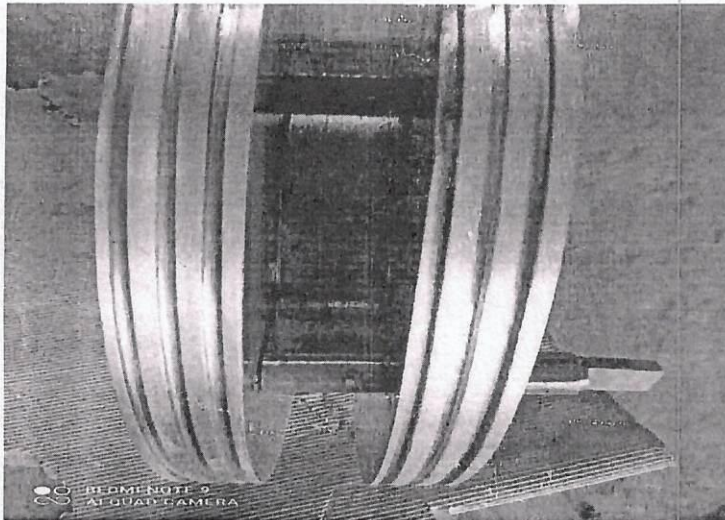
SCOPE OF WORK FOR ADDITIONAL SPIRAL GROOVES FORMATION

- 1) TRANSPORTATION AND INSURANCE FROM EMRP TO VENDOR WORKS IN SCOPE OF EMRP
- 2) IR & HV MUST BE OK AFTER MACHINING
- 3) ADDITIONAL SPIRAL GROOVES FORMATION

MATERIAL -- ISSUED AS PER IMAGE.



PROCESS REQUIRED AS PER THIS IMAGE.





BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
STANDARD QUALITY PLAN FOR SLIPRING ASSEMBLY

Quality Plan No. : QA/MT/BOI/020 REV No. 00 DATE : 25.10.2005

PAGE 1 of 4

Sl No.	Component / Operation	Characteristics	Class	Type Of Check	Quantum Of Check	Ref. Doc.	Acc. Norm	Format Of Record	AGENCY		Remarks
									M	C	
1.0	RAW MATERIAL										
1.1	SLIP RING										
1.1.1		CHEM. COMPOSITION	MAJOR	TEST	{ONE {SAMPLE/ {LOT	DRG/ PS	DRG/ PS	TC	V	V	
1.1.2		MECH PROPERTIES	MAJOR	TEST		DRG/ PS	DRG/ PS	TC	V	V	
1.2	SUPPORT RING										ONLY IF PROVIDED
1.2.1		CHEM. COMPOSITION	MAJOR	TEST	{ONE {SAMPLE/ {LOT	DRG/ PS	DRG/ PS	TC	V	V	
1.2.2		MECH PROPERTIES	MAJOR	TEST		DRG/ PS	DRG/ PS	TC	V	V	
1.3	SLIP RING HUB										
1.3.1		CHEM. COMPOSITION	MAJOR	TEST	{ONE {SAMPLE/ {LOT	DRG/ PS	DRG/ PS	TC	V	V	
1.3.2		MECH PROPERTIES	MAJOR	TEST		DRG/ PS	DRG/ PS	TC	V	V	
1.4	SLIP RING STUD										
1.4.1		CONDUCTIVITY	MAJOR	TEST	100%	DRG/ PS	DRG/ PS	TC	V	W	WITNESS ON SURVEILLANCE BASIS
1.4.2		HARDNESS	MAJOR	TEST	100%	DRG/ PS	DRG/ PS	TC	V	W	
1.5	BRAZING ALLOY										
1.5.1		CHEM. COMPOSITION	MAJOR	TEST	100%	DRG/ PS	DRG/ PS	TC	V	V	

Legends : - AGENCY CODE :

M - MANUFACTURER

C - BHEL /BHEL APPOINTED INSPECTION AGENCY



Quality Plan No. : QA/MT/BOI/020 REV No. 00 DATE : 25.10.2005

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Quality Plan No. : QAMT/BOI/020 REV No. 00 DATE : 25.10.2003												
Sl No.	Component / Operation	Characteristics	Class	Type Of Check	Quantum Of Check	Ref. Doc.	Acc. Norm	Format Of Record	AGEN CY		Remarks	
									M	C		
2.0	IN PROCESS CHECKS											
2.1	HUB											
2.1.1		O.D. BEFORE INSULATION	MAJOR	MEAS	100%	DRG	DRG	TC	P	V		
2.1.2		STEEL COVERING - SMOOTHNESS OF EDGES	MAJOR	VIS	100%	--	--	TC	P	--		
2.1.3		INSULATION FOR COVERING (MFR. TC WITH DETAILS OF TOTAL THICKNESS, NOMEX THICKNESS AND COVERING POLYESTER THICKNESS)	CRITICAL	VIS	100%	DRG/ PS	DRG/ PS	TC	V	V	Vendor report shall give the details of no. of layers used.	
2.2	SUPPORT RING										ONLY IF PROVIDED	
2.2.1		USE OF DRILL PLATE FOR STUD HOLES	CRITICAL	VIS	100%	DRG	DRG	TC				
2.2.2		DIMENSIONS	MAJOR	MEAS	100%	DRG	DRG	TC				
2.3	BRAZING	PLACEMENT OF FOIL	MAJOR	VIS	100%	TEX 393123	TEX 393123	QCR	P	W		
2.4		MALLET TEST	MAJOR	MECH	100%	--	(**)	QCR	P	W	(**) - Mechanical Bonding between stud & ring to be checked by malletting the studs in axial direction by two normal manual strokes.	

Sl No.	Component / Operation	Characteristics	Class	Type Of Check	Quantum Of Check	Ref. Doc.	Acc. Norm	Format Of Record	AGENCY		Remarks
									M	C	
3.0	FINAL INSPECTION										
3.1	VISUAL CHECKS										
3.1.1		SURFACE CONDITION (OD)	MAJOR	MEAS	100%	DRG	0.8 microns	TC	P	W	
3.1.2		KEY WAY LOCATION WITH RESPECT TO STUDS	MAJOR	MEAS	100%	DRG	DRG	TC	P	W	
3.2	DIMENSIONS										
3.2.1		INCLINED SLIT (IF PROVIDED)	MAJOR	MEAS	100%	DRG	DRG	TC	P	W	
3.2.2		COCENTRICITY OF HUB ID & SLIP RING OD	MAJOR	MEAS	100%	DRG	DRG	TC	P	W	0.05 mm max., if not specified.
3.2.3		STUDS EQUI-DISTANT SPACING (120 DEG APART)	MAJOR	MEAS	100%	DRG	DRG	TC	P	W	
3.2.4		KEY WAY DIMENSIONS	MAJOR	MEAS	100%	DRG	DRG	TC	P	W	
3.2.5		AXIAL RUN OUT OF SLIP RING FACES	MAJOR	MEAS	100%	--	0.20 mm	TC	P	W	
3.3	ELECTRICAL TESTS										
3.3.1		RESISTANCE MEASUREMENT BETWEEN EACH STUD & RING	MAJOR	MEAS	100%	--	Maximum 35 micro-ohms (at room temp.)	TC	P	W	
3.3.2		IR (1 min.) BEFORE HV TEST	MAJOR	MEAS	100%	--	50 Mega-ohm Min.	TC	P	W	
3.3.3		HV TEST (AC for 1 min.) ON EACH STUD WITH OTHER STUDS & HUB CONNECTED TO EARTH	MAJOR	MEAS	100%	DRG	DRG	TC	P	W	
3.3.4		IR (1 min.) AFTER HV TEST	MAJOR	MEAS	100%	--	50 Mega-ohm Min.	TC	P	W	



Quality Plan No. : QA/MT/BOI/020 REV No. 00 DATE : 25.10.2005

PAGE 4 OF 4

Sl No.	Component / Operation	Characteristics	Class	Type Of Check	Quantum Of Check	Ref. Doc.	Acc. Norm	Format Of Record	AGENCY		Remarks
									M	C	
3.4	DESPATCH										
3.4.1	STUD PRO-TECTION (FOR SLIPRINGS WITH ROUND STUDS ONLY)	TO PREVENT DAMAGE DURING TRANSIT / HANDLING, OVERHANG PORTION OF STUD TO BE PROTECTED USING PLATE / DISC SHAPED FIXTURE DULY BOLTED TO HUB.	MAJOR	VIS	100%	--	--	--	P	W	
3.4.2	PACKING	SLIPRING ASSY TO BE PACKED & TRANSPORTED IN VERTICAL CONDITION ONLY, WITH OVERHANG STUDS VERTICALLY UP.	MAJOR	VIS	100%	--	--	--	P	W	Packing Case to have arrow marks pointing the TOP.

Abbreviations : CHEM = Chemical, Drg. = Drawing, QR = Quality Record, MAJ = Major, MECH = Mechanical Test, MEAS = Measurement, PS = Purchase Specification, V = Verification of records, TC = Test Certificate of Mfr or Supplier, TR = Test Record

PREPARED BY :  S C MALTARE (QA - MOTORS)	APPROVED BY : SD/- A.K.Vinodia Mgt.(QA - MOTORS)	APPROVED BY : SD/- S BALAKRISHNAN (AME)
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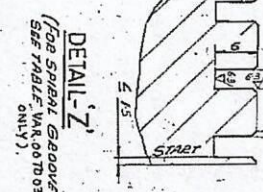
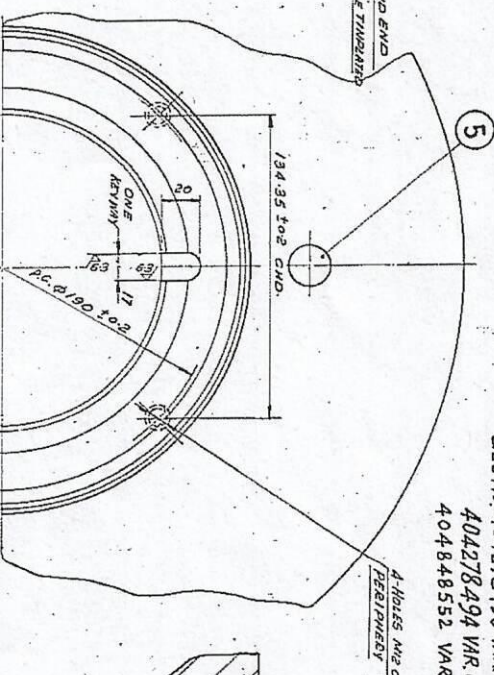
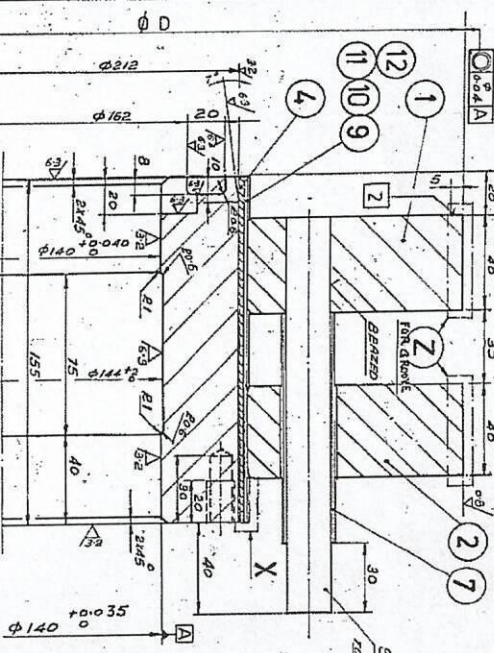
100 078072 ON DRD

FIRST ANGLE PROJECTION

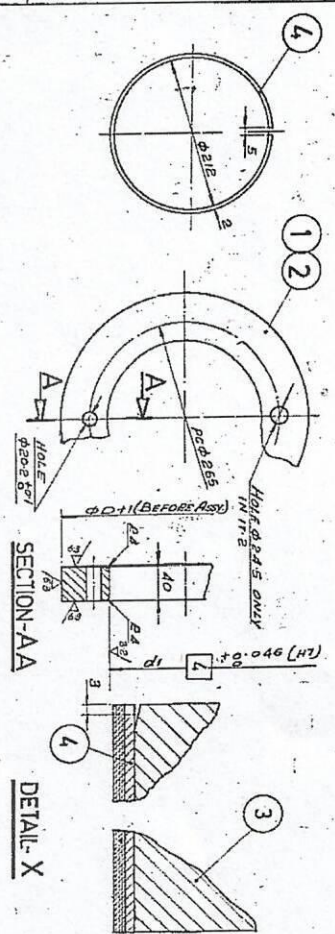
(ALL DIMENSIONS ARE IN mm.)

GES No. 404278493 VAR. 01
404278494 VAR. 03
404848552 VAR. 07.

TOOL LIST		1	2
SL NO.	TOOL NO.	DESCRIPTION	
1	151286	MANDREL FOR TURNING OF S.S. ON ASSY.	
2	151285	FIXTURE FOR ASSEMBLY OF TURNING WITH INSUL.	
3	151287	GROOVING TOOL 20 WIDE X 80 DEEP	
4	151288	DRILL ϕ 20.2 TO 1	



DETAIL-Z		1	2
Without Grooves	With Grooves		
01	01	403844200	360
02	02	403844200	400
03	03	403844200	450
04	04	403844200	500
05	05	403844200	550
06	06	403844200	600
07	07	403844200	650



TECH. REQUIREMENTS:-

1. COUNT OF IT'S ARE STAGGERED AGAINST EACH OTHER BY APPROX 90°.
2. HERE RADIALLY ABOVE THE STUD NUMBER OF THE CORRESPONDING SLIPRING IS STAGGERED.
3. FOR BRAZING REF. FTU 052651, PART 39.
4. PINS INNER DIAMETER ϕ 1 = ACTUAL ϕ ITEM 3 + 2 x ACTUAL TH. OF ITEM 4 + 6 x ACTUAL THICKNESS OF ITEM 5 + 2 x ACTUAL THICKNESS OF ITEM 3 - 5 MIN. DIMENSIONS OF 0.45 mm.
5. TEST VOLTAGE - 3500 V
6. CURRENT (MAX) - 800 A.

STATUS OF DRAWING		1	2
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REVISIONS		1	2
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