Government of India
Ministry of Railways
Research, Designs & Standards Organisation
Manak Nagar, Lucknow - 226 011

No. EL/3.2.5 Dated 3.1.1997

MODIFICATION SHEET NO. RDSO/WAM4/194

1. Title :

Improved interconnector layout for TAO 659 Traction Motors with potted single section field coils.

2. Application :

On all TAO-659 Traction Motors.

3. Object :

Railways have reported large cases of inter-connectors failure of TAO-659 Traction Motor. These interconnectors failures are due to earthing under the clamps. Cracking and open circuiting at their brazed joints.

It is also observed that while brazing of interconnectors with their respective field coils terminal leads, the terminal leads of the field coils are pressed with the help of wooden mallet to create a space for inserting the brazing tong in the proper position. This develops stresses in the lead portion of field coils. At present most of the conventional Traction Motors are having their interconnectors of main pole coils and compole coils on commutator end side.

To improve the performance of Traction Motor and also to minimize the interconnectors failure in service. It is decided that existing conventional TAO 659 Traction Motors should be modified by incorporating following features :

- Adoption of potted single coil design of field coils as per RDSO Drg. No. SKEL - 4386 & 4387.
- Shifting the main pole connections on PE side.
- Adoption of 150 sq. mm. Fluonlex cable or equivalent 1500 V cables and short solid copper strips, for field coils.
- Adoption of 80 sq. mm Fluonlex flexible cables or equivalent 1500V cable for brush holder revolving ring inter-connectors.

- Improved interconnectors layout as per RDSO Drg. NO. SKEL - 4388 & 4389.
- Interconnectors and clamps etc. as per RDSO Drg. No. SKEL - 4394 &4395.
- Adoption of C-clamps similar to Hitachi Traction Motors. The terminal arrangement should be as per RDSO Drg. No. SKEL - 4390.

This MS supersedes earlier MS No. 169 and 174.

The above arrangement has following advantages over the existing conventional scheme.

- Since overlap is avoided and the length/number of interconnectors are reduced, this results in less failures of insulating on interconnectors due to rubbing.
- Reduced copper length of interconnectors means saving in copper and less copper losses.
- Due to shifting of main pole coils interconnectors on pinion end side, sufficient space will be available in both commutator and pinion end side for doing the brazing of short solid copper strips and flexible cable with the terminal leads of field coils.
- Provision of C-clamp similar to Hitachi Traction Motor will avoid touching of interconnectors with stator body. It will result in lesser failures due to earthing of interconnectors.

4. Details of modifications :

- Remove M-seal/RTV silicone sealing compound by breaking from poles fixing bolts head and 'U' clamp fixing screws head used for interconnectors.
- Remove all interconnectors by debrazing
- Remove all poles fixing bolts and 'U' clamp screws
- Remove all main pole and compole core assemblies along with their coils.
- Remove the mild steel cover plate from air outlet of the magnet frame just above and adjacent to pinion end suspension bearing housing. This will make space available to take out main fields flexible cable leads from pinion end side.
- Make a hole of proper size in the terminal box towards pinion end side as shown in RDSO DRg. NO. SKEL - 4390 to accommodate the main poles flexible cable 'E' and 'F'.
- Clean the complete stator by the compressed air.
- Prepare the flexible cable interconnectors and copper strips of required size and length for main pole and compole coils.
- Prepare 'C' clamps of required dimensions as per RDSO Drg. No. SKEL. 4394 and 4395 and weld these clamps at the required places as shown in RDSO Drg. No. SKEL - 4388 & 4389.
- Block the existing holes used for fixation of existing U clamps by M-seal/RTV silicon sealing compound.

- Mount the main pole core assemblies along with their potted single coil design of field coils on the magnet frame in such a way that terminal leads should be towards pinion end side of Traction Motor.
- Mount the main pole core assemblies along with their potted single coil design of field coils on the magnet frame in such a way that their terminal leads should be towards comutator end side of Traction Motor.
- Tighten the fixation bolts of main pole and compole core assembly with the help of torque wrench at the specified value and also check the equi-distance of 'MP' to 'MP', 'CP' to 'CP' and 'MP' – 'CP' and their eccentricity.
- Braze the pre-prepared flexible cables and copper strips with their respective field coils leads as shown in RDSO Drg. NO.SKEL. 4388 & 4389 with the help of electric resistance heating using carbon block in the specially designed brazing tong. During brazing of copper connector for main pole coils. If any discrepancies are noticed between the terminal leads of both main pole coils, then insert copper spacer of required size between copper connector and main pole coil terminal leads.
- Brazing all the interconnectors with their respective field coils leads should be done with silver brazing rod, rupatam coil with suitable flux.
- Clean the brazed joint properly and inspect the brazed joint.

Insulation of connections(Pinion end side) :

A. Insulation over the brazed terminal leads with copper connector :-

- Apply a coat of 'silicon rubber compound (KE 45RTV-R)' over the untrimmed 15 mm portion on flexible cables.
- Level the step of connection by silicon rubber tape type HTV-HBT-H5, size 0.15 mm thick x 25 mm wide.
- After leveling both sides, apply 2 layers 1/2 lap of silicon rubber HTV-HBT-H5, size 0.5mm thick x 25 mm wide.
- Apply 1 layer 1/2 lap of fibre glass previously impregnated in varnish DC996/metroark 1996 or equivalent varnish.

B **<u>Binding method of brazed insulated terminal lead with C-clamp :</u>.**

- Put one/two pieces of polyamide non-woven mat-type EH2411-019 mm thick/EH3511-1.3 mm thick treated with solventless silicone varnish DC 996/metroark 140 C or equivalent in between C clamp and connector.
- After it, bind them with 4 layers 1/2 lap of fibre glass tape type size 0.25 mm thick x 255 mm wide.

C. Insulation over the brazed terminal leads with flexible cable :

- Apply a coat of silicone rubber compound (KE 45RTV-R) over the untrimmed 15 mm portion of flexible cables.
- Level the step of connection by silicone rubber tape HTV-HBT-H5, size 0.5 mm thick x 25 mm wide.
- After leveling both sides, apply 1 layer 1/2 lap of fibre glass tape size 0.25 mm thick x 25 mm wide previously impregnated in SI 996 varnish/equivalent varnish.

Insulation of connection(Commutator end side) :

Same as above [(A), (B) and (C)].

5. <u>REFERENCE DRAWINGS :</u>

RDSO Drawing Nos. :
SKEL. 4386, 4387, 4388, 4389, 4390, 4394 and 4395.

6. <u>Material required for insulation of connections :</u>

- Silicone rubber compound (KE45RTV-R)
- Silicone rubber tape type HTV-HBT-H5, size 0.5 mm thick x 25 mm wide.
- Fibre glass tape, size 0.25 mm thick x 25 mm wise.
- Polymide non-woven mat type EH-2411, size 0.9 mm thick/EH3511 size 1.3 mm thick .
- Varnish solventless silicone varnish DC 996/Si996/SI40C or equivalent.
- ‘C’ clamps of required dimensions.

7. Source of supply of material :

i) For silicone rubber tape (HTV-HBT-H5 size 0.55 mm thick x 25 mm wide; and Polyamide no-woven EH2411, size 0.9 mm thick/EH3511 size 1.3 mm thick.

M/s Hitachi Works of Hitachi Ltd.,
3-1-1, Saiwai-Cho, Hitachi-Si, Ibra kai-Ken, Japan

ii) For 1500 V 150 sq. mm Fluonlex cable :
M/s Hitachi cable Ltd., Japan.

For the material under 7(i) and 7(ii), CLW/BHEL may be contacted by the Railways.

iii) For silicone rubber compound (KE 45 RTV-R)

M/s ACRA BOND ADHESIVE SEALANTS,
17, Raghunath Dadaji Street,
Maruti Lane, 47th floor, Fort,
Mumbai-400001.

iv) Fibre glass tape size 0.25 mm thick x 25 mm wide, copper strips and varnishes DC 996 Metroark 1996/Metroark 140C.

- Railways may procure the materials from their existing approved suppliers/CLW approved suppliers.

8. PRECAUTIONS :

The terminal arrangement of TAO 659 Traction Motor with single section of field coils is different from the conventional TAO-659 Traction Motor having split coil design of field coils. Therefore, it is advised that care should be taken while replacing the conventional TM's with the modified TM's to avoid cross connections of power cables and the shafts should be advised accordingly.

9. SCHEDULE OF IMPLEMENTATION :

- During annual overhaul/repair
- During rehabilitation of stator.

10. Distribution :

As per enclosed list.

Rajiv Kumar

(R. K. ulshrestha)

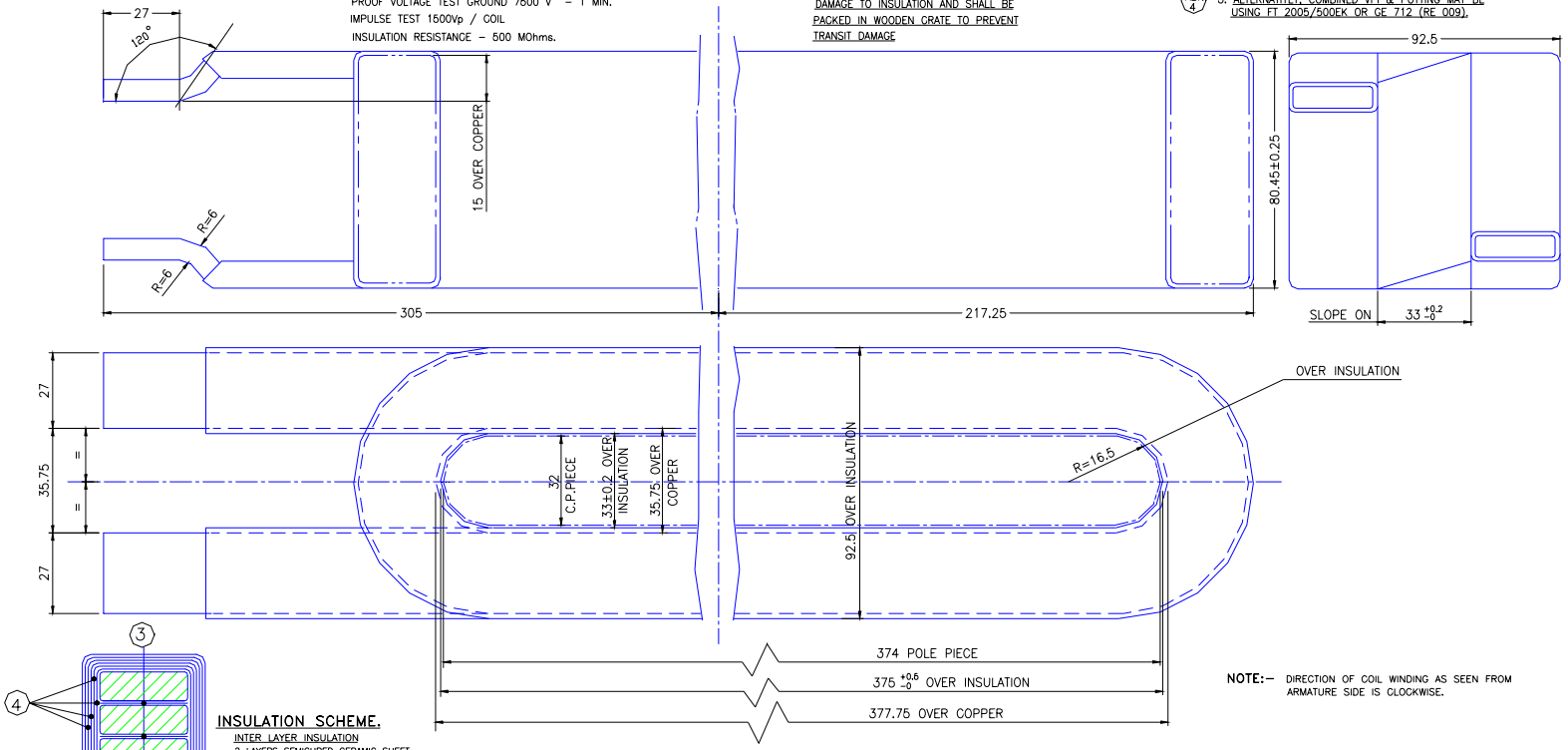
Encl : As Above **for Director General(Elect.)**

INSULATION TEST–

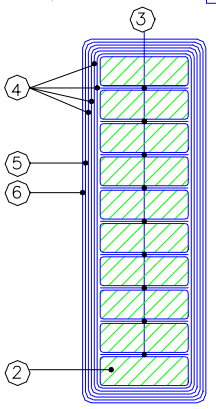
HIGH FREQUENCY TEST INTERTURN 20V. HF 1000Hz – 5 Secs.
PROOF VOLTAGE TEST GROUND 7500 V – 1 MIN.
IMPULSE TEST 1500Vp / COIL
INSULATION RESISTANCE – 500 MOhms.

NOTE–

1. THE COILS SHALL BE SUITABLY COVERED WITH PROTECTIVE TAPE TO PREVENT DAMAGE TO INSULATION AND SHALL BE PACKED IN WOODEN CRATE TO PREVENT TRANSIT DAMAGE
2. THE COILS MAY BE POTTED WITH THE POLE CORE USING EPOXY COMPOUND TYPE HEW 821 AS PER HITACHI SPECN . NO. A0116.
3. (ALT 4) ALTERNATIYLY, COMBINED VPI & POTTING MAY BE USING FT 2005/500EK OR GE 712 (RE 009).



NOTE:– DIRECTION OF COIL WINDING AS SEEN FROM ARMATURE SIDE IS CLOCKWISE.



INSULATION SCHEME.

INTER LAYER INSULATION
2 LAYERS SEMICURED CERAMIC SHEET 0.16 THK. (REF: . 3)

GROUND INSULATION

– 4 LAYERS 1 / 2 LAP GLASS BACKED UNIFORM (ALT 2) MICA TAPE 0.13x20mm WIDE (REF.4)/2 LAYERS 1/2 LAP G.B.FLEX. MICA TAPE –0.13mm THICK & 2 LAYERS 1/2 LAP 'B' STAGE VARNISHED GLASS TAPE SIZE 0.13 MM THICK REF: 7 & 8.
– 1 LAYER 1/2 LAP TETRA FLUOROETHYLENE TAPE 0.038x19mm TREATED WITH SODIUM ON BOTH SIDES (REF.5)
– 1 LAYER 1/2 LAP F.G. TAPE 0.13x20mm WIDE (REF.6)
– COIL TO BE V.P.I. WITH Dr. BECK'S FT 2005/500 EK OR GE 712 (RE 009). (ALT 4)

COIL CHARACTERISTICS–

NUMBER OF TURNS..... 10.
DIMENSIONS OF CONDUCTORS ..... 27±0.1 x 7.5 ± 0.1 = 1.6 mm
MEAN LENGTH OF TURN ..... 881mm (APPROX.).
WT. OF COPPER PER COIL ..... 16 KG.
RESISTANCE AT 25° ..... 0.00078± 5% OHMS. (ALT 3)

ALTERNATIVELY

– 1 LAYER 1/2 LAP KAPTON TAPE . SIZE 0.05mm THK.x20mm WIDE (REF.1). (ALT 4)
– 3 LAYERS 1/2 LAP GLASS BACKED UNIFORM MICA TAPE 0.13x20mm WIDE(REF.4).
– 1 LAYER 1/2 LAP SODIUM TREATEDTETRA FLUORO ETHYLENE TAPE. SIZE 0.038x19mm. (REF.5)
– 1 LAYER 1/2 LAP FIBRE GLASS TAPE. SIZE 0.18x20mm WIDE (REF.6)

REF. No.	PART No.	DESCRIPTION	DETAIL DRG.	No./EMU	MATL.SPECN
8		'B' STAGED VARNISHED GLASS TAPE 0.13mm THICK			M/S ROTOMAC–765 ROG
7		GLASS BACKED FLEX. (PROCESSED) MICA TAPE .13 mm THICK			M/S ROTOMAC–779 R5C
6		FG. TAPE,SIZE 0.13 mm/0.18x 20mm		RQ	BS:3779–1974
5		TETRA FLUORO ETHYLENE TAPE 0.038x19mm		RQ	HITACHI'S SPECN NO. A 0214
4		GLASS BACKED UNIFORM MICA TAPE 0.13x20mm		RQ	CLW SPECN NO. 4 TMS 092–114
3		SEMICURED CERAMIC SHEET 0.15mm THK.		RQ	CLW SPECN NO. 4 TMS 092–116
2		H.O.E. COPPER CONDUCTOR SIZE 27 +0.1 −0.1 x7.5 +0.1 −0.1 r=1.6		RQ	CLW. SPECN. NO. 4TMS.092.004 ALT.6
1		KAPTON TAPE. SIZE 0.06x20		RQ	KAPTON CR–200 OF M/S DUPONT. USA.

REF. CLW DRG. No. 2TWD. 092.664 | SCALE 1:1 | APPD. BY (FOR DG.)

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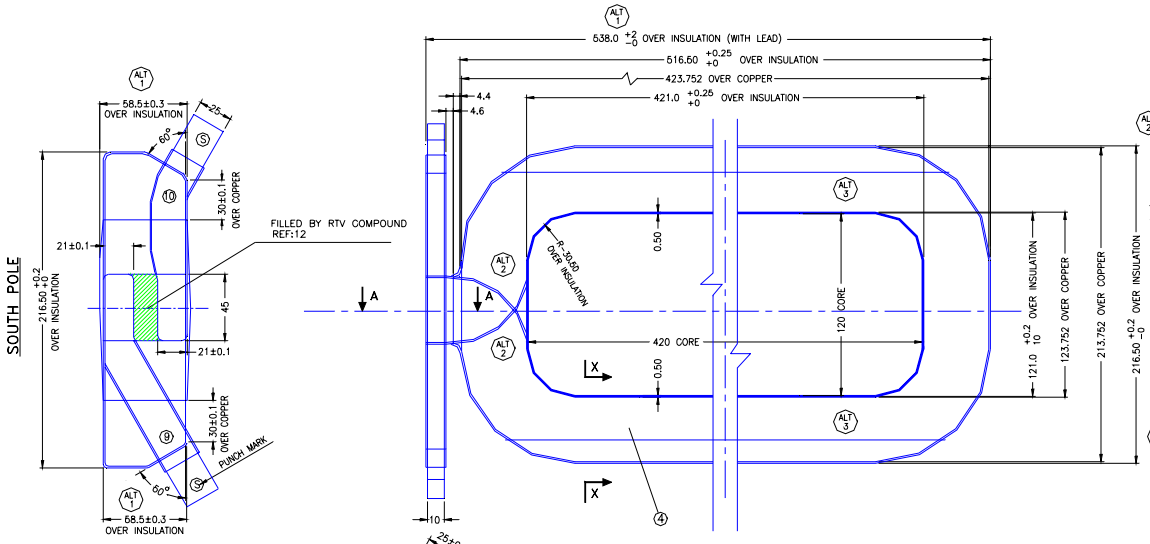
C	
T	

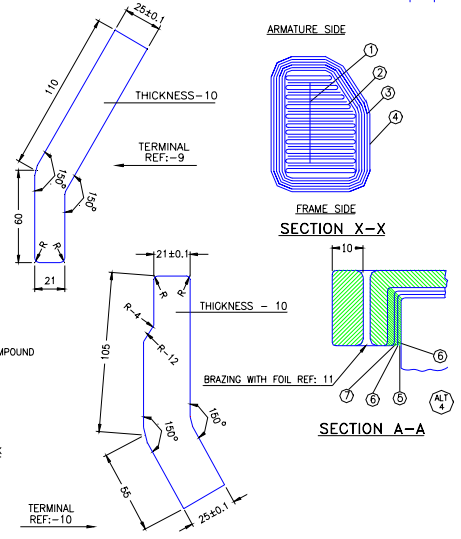
STATUS	ALT.	REF.No.	DESCRIPTION	APPD.BY	DATE
	4		TYPE OF VARNISH AND REF.1 INSULATION CHANGED		25.02.99
	3		RESISTANCE VALUE CHANGED		02.04.98
	2		INSULATION SCHEME ADDED		18.02.98
	1		NOTE ADDED		09.02.98

TRACTION MOTOR TYPE TAO 659
SINGLE SECTION COM.POLE COIL ASSEMBLY

RDSO. ELEC. DTE. | SKEL – 4386

FIRST ISSUED
SUPERSEDES
SUPERSEDED BY





COIL DATA

1. COPPER SIZE _____ 45 $^{+0}_{-0.1}$ x4.8 $^{+0}_{-0.1}$ x R=1.6
2. NO.OF TURNS _____ 11
3. RESISTANCE AT 20°C _____ 0.00114± 5% OHMS (ALT 1)
4. WT. OF COIL WITH TERMINALS _____ 23.66 KG. (APPROXIMATELY)
5. WINDING − i) SOUTH POLE − OPEN
   ii) NORTH POLE − CROOS (ALT 2)

INSULATION SCHEME

INTER LAYER INSULATION

1. SEMICURED CERAMIC SHEET− 0.15 THK−2 LAYERS REF.1

GROUND INSULATION

2. 4 LAYERS 1/2 LAP GLASS BACKED UNIFORM MICA TAPE 0.13x20mm. REF.2/2LAYERS 1/2 LAP G.B. FLEX.MICA TAPE−.13mm THICK & 2 LAYERS 1/2 LAP 'B' STAGED VARNISHED GLASS TAPE SIZE 0.13mm THICK REF: 14 & 16 RESPECTIVELY.
3. 1 LAYER 1/2 LAP SODIUM TREATED TETRA FLUORO ETHYLENE TAPE SIZE 0.038x19mm (REF:3) (ALT 3)
4. 1 LAYER 1/2 LAP FIBRE GLASS TAPE SIZE−0.13x20mm WIDE (REF.4)

ALTERNATIVELY

1 LAYER 1/2 LAP KAPTON TAPE SIZE 0.05mm THKx20MM WIDE (REF.13) (ALT 4)
3 LAYER 1/2 LAP GLASS BACKED UNIFORM MICA TAPE 0.13x20mm WIDE (REF.2)
1 LAYER 1/2 LAP SODIUM TREATED TETRA FLUORO ETHYLENE TAPE SIZE 0.038x19mm. (REF.3)
1 LAYER 1/2 LAP FIBRE GLASS TAPE SIZE 0.18x20mm WIDE (REF.4)

NOTE:−

(ALT 4) 1. COILS ARE TO BE VPI WITH Dr. BECK'S FT−2005/60DEK OR GE 712 (RE009).
2. THE COILS SHALL BE SUITABLY COVERED WITH PROTECTIVE TAPE TO PREVENT DAMAGE TO INSULATION AND SHALL BE PACKED IN WOODEN CRATE TO PREVENT TRANSIT DAMAGE
3. ONE MOTOR SET OF M.P.COIL CONSISTS OF 3 Nos. (SOUTH POLE) AND 3 Nos. (NORTH POLE)
4. THE COILS MAY BE POTTED WITH THE POLE CORE USING EPOXY COMPOUND TYPE HEW 821 AS PER HITACHI SPECN No. A0116.
(ALT 1) 5. ALTERNATIVELY, COMBIND POTTING & VPI MAY BE DONE WITH GE 712(RE 009)ORa
(ALT 2) 6. DIRECTION OF COIL SEEN FROM TOP SIDE (ARMATURE SIDE) IS CLOCKWISE.

INSULATION TEST −> HIGH FREQUENCY TEST INTERTURN 20V. HF 1000Hz − 5Secs.
PROOF VOLTAGE TEST GROUND 7500V 1−min. a FT 2005/500EK
IMPULSE TEST 1500Vp / COIL.
INSULATION RESISTANCE − 500 MOhms.

REF. No.	PART No.	DESCRIPTION	DETAIL DRG.	No./EMU	MATERIAL SPEC.
15		'B' STAGED VARNISHED GLASS TAPE 0.13 mm THICK			M/S ROTOMAC−765 ROC
14		GLASS BACKED FLEXIBLE (PROCESSED) MICA TAPE−0.13mm THICK			M/S AOTOMAC−779 R5c.
13		KAPTON TAPE.SIZE−0.05x20mm		RQ	M/S DUPONT USA
12		SILICONE RUBBER COMPOUND KE45−RTV−R		−	HITACHI SPECN.NO. A0113
11		BRAZING FOIL−SIZE 0.1x20 Cr. BA−CU− Ag− 16A		RQ	IS: 2927−75
10		TERMINAL SIZE−160L (25x10mm)		6Nos.	IS: 1697−1983
9		TERMINAL SIZE− 170L (25x10)		6Nos.	IS: 1697−1983
8		H.C.E COPPER CONDUCTOR SIZE−45mm x 4.8mm. R=1. 6mm		−	CLW. SPECN. NO. 4TMS.092.004.ALT−6
7		PUTTY − HEW −823 A&B		RQ	HITACHI SPECN NO. A0256
6		C.M.G.S. 0.35mm THK. SIZE−65x60mm		144Nos.	CLW. SPECN. NO. 4TMS 092.039
5		KAPTON FILM SIZE − 0.05THK. x 66x60mm		72Nos.	KAPTON CR−200 OF M/S DUPONT USA
4		F.G TAPE 0.13x20mm/0.18x20mm		15.6m.	BS−3779−1974
3		TETRA FLURD ETHYLENE TAPE SIZE − 0.038x19mm (SODIM TREATED)		20.5m.	HITACHI SPECN NO. A0124
2		GLASS BACKED UNIFORM MICA TAPE 0.13x20mm		40m.	CLW. SPECN. NO. 4TMS.092.114
1		SEMI CURED CERAMIC SHEET 0.15 THK		120	CLW.SPECN.NO. 4TMS. 092.116

REF. CLW DRG. No. ITWD. 092.553 | SCALE:− 1:2 | APPD. BY (FOR DG.)

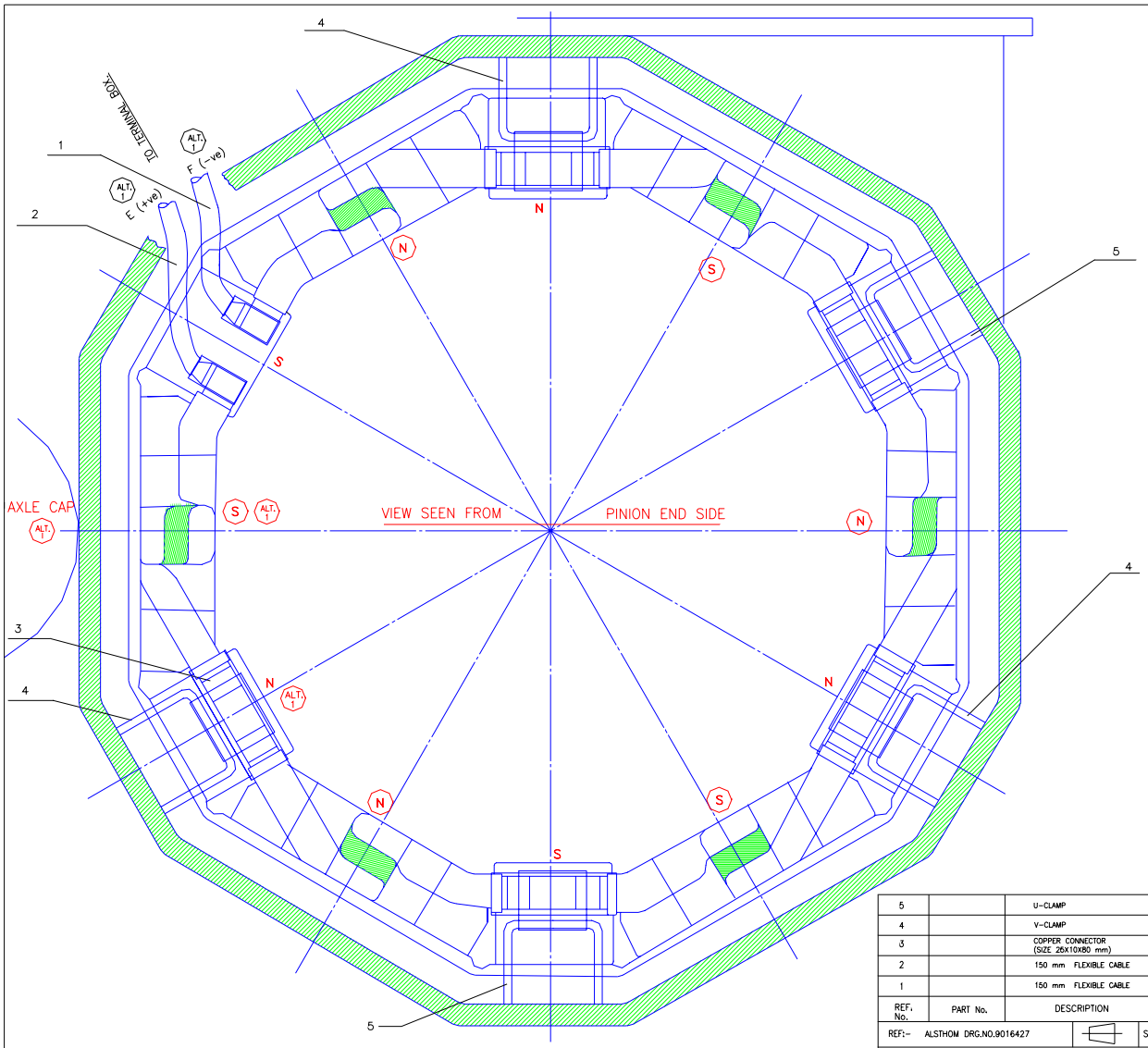
TRACTION MOTOR TAO−659
SINGLE SECTION MAIN POLE COIL ASSEMBLY

RDSO. ELEC. DTE. | SKEL − 4387

FIRST ISSUED
SUPERSEDES
SUPERSEDED BY

STATUS	ALT.	REF.No.	DESCRIPTION	APPD.BY	DATE
	4		TYPE OF VARNISH AND REF.5&13 INSULATION CHANGED		25.02.99
	3		DOTTED LINE MADE FIRM & INSULATION SCHEME ADDED.		12.02.98
	2		DIRECTION OF COIL TURNS SHOWN.		21.01.98
	1		DIMENSIONS & RESISTANCE VALUE CHANGED. NOTE NO. 5		12.11.97

Dt.	16.2.79
D	
C	
T	



NOTE:–

1. MS:RDSO/WAM4/194 FOR THE DETAILS OF INSULATION AND BRAZING OF TERMINAL CONNECTIONS.
2. LOCATION OF AXLE CAP SHOWN
3. FLEXIBLE CABLES MARKED AS E (+Ve) & F (–Ve)
4. VIEW INDICATION ADDED.
5. POLE'S POLARITY INDICATED.

REF. No.	PART No.	DESCRIPTION	DETAIL DRG.	No./EMU	MATERIAL SPEC.
5		U–CLAMP		2	STEEL TO IS 226 ST 42S
4		V–CLAMP		3	–do–
3		COPPER CONNECTOR (SIZE 26X10X80 mm)		6	HIGH CONDUCTIVITY, ELECTROLYTIC COPPER TO IS : 1897–1971
2		150 mm FLEXIBLE CABLE		1	MODIFIED ETFE FLEXIBLE CABLE–1500V (FLUONLEX CABLE)
1		150 mm FLEXIBLE CABLE		1	–do–

REF:– ALSTHOM DRG.NO.9016427 | SCALE:– 1:2 | APPD. BY (FOR DG.)

TRACTION MOTOR TAO–659
MODIFIED ARRANGEMENT OF INTERCONNECTORS FOR SINGLE SECTION MAIN POLE COILS (PINION END SIDE)

FIRST ISSUED

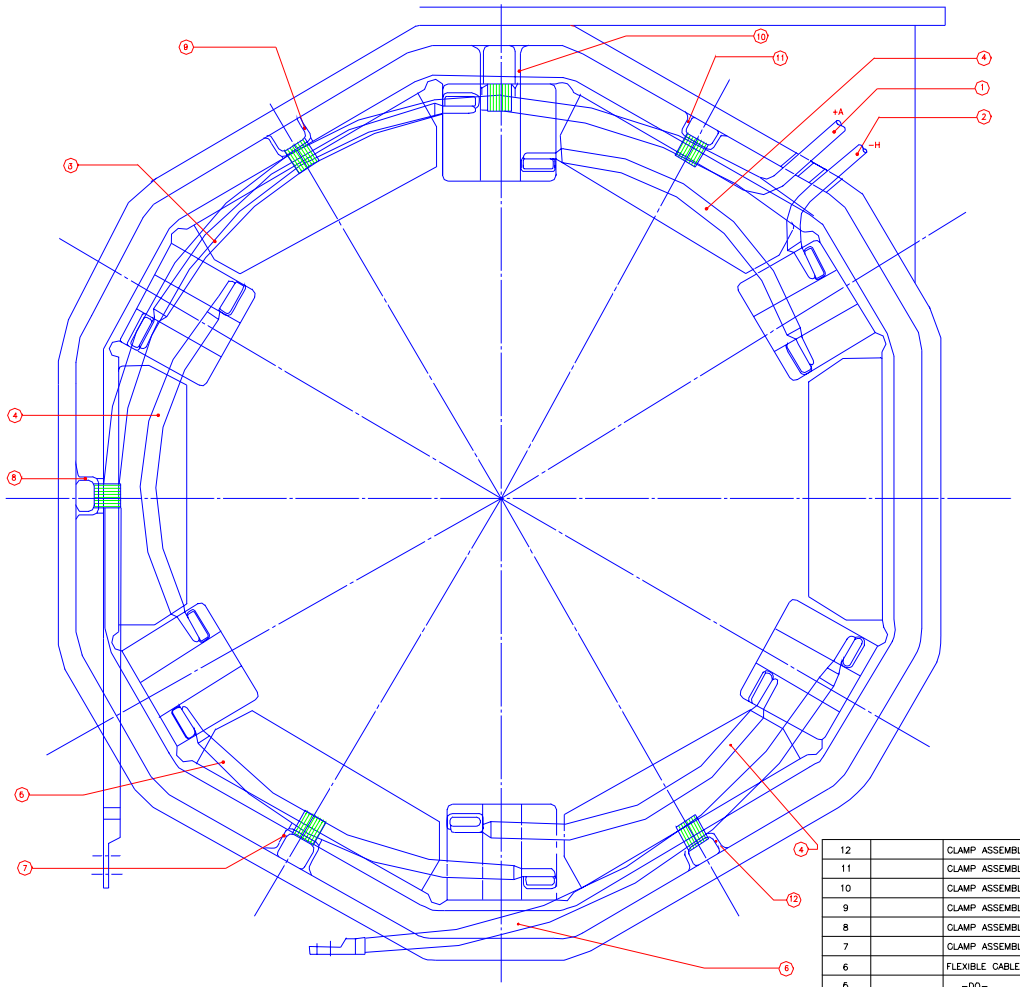
SUPERSEDES

SUPERSEDED BY

RDSO.ELEC.DTE. SKEL–4388

STATUS	ALT.	REF.No.	DESCRIPTION	APPD.BY	DATE
	1		NOTE 2,3,4 & 5 ADDED		13.2.98

Dt.	16.2.79
D	
T	
C	



NOTE :-

MS,RDSO/WAM4/194-FOR THE DETAILS OF INSULATION AND BRAZING OF TERMINAL CONNECTIONS

REF. No.	PART No.	DESCRIPTION	DETAIL DRG.	No./EMU	MATERIAL SPEC.
12		CLAMP ASSEMBLY		1	STEEL TO IS 226 ST 42S
11		CLAMP ASSEMBLY		1	STEEL TO IS 226 ST 42S
10		CLAMP ASSEMBLY		1	STEEL TO IS 226 ST 42S
9		CLAMP ASSEMBLY		1	STEEL TO IS 226 ST 42S
8		CLAMP ASSEMBLY		1	STEEL TO IS 226 ST 42S
7		CLAMP ASSEMBLY		1	STEEL TO IS 226 ST 42S
6		FLEXIBLE CABLE SIZE 150 mm2		1	HITACHI FLUONLEX CABLE-1600V-E0026
6		-DO-		1	-DO-
4		-DO-		3	-DO-
3		-DO-		1	-DO-
2		-DO-		1	-DO-
1		-DO-		1	-DO-

REF. | SCALE:- 1:1 | APPD. BY (FOR DG.)

TRACTION MOTOR TAO-659
MODIFIED ARRANGEMENT OF INTER CONNECTORS FOR SINGLE SECTION CP COILS COMMUTATOR END SIDE

FIRST ISSUED

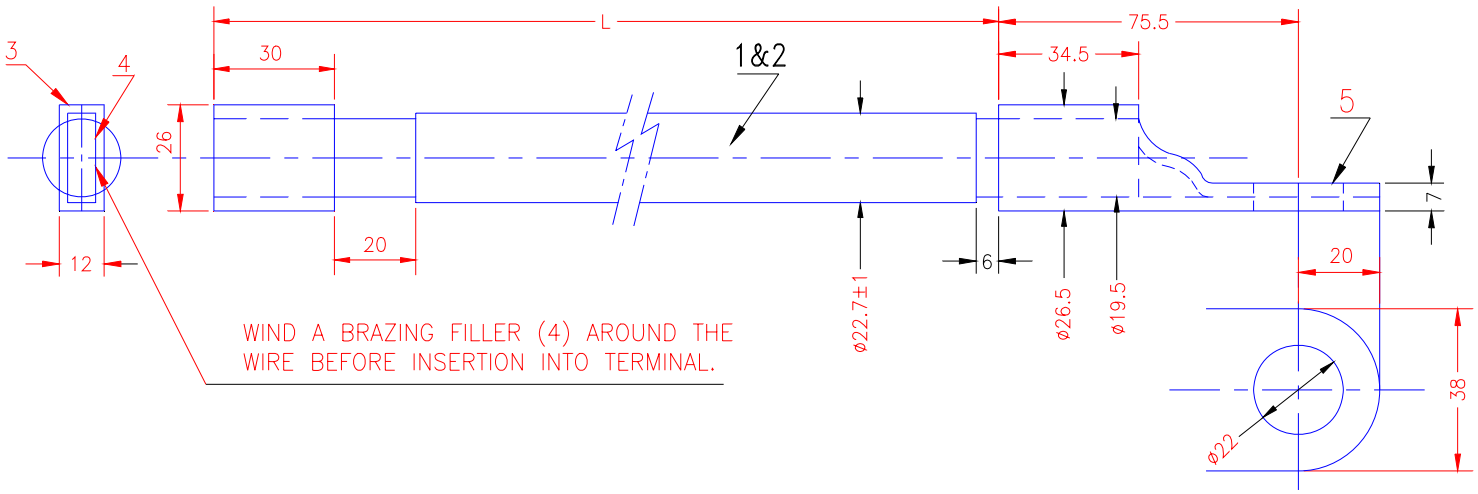
SUPERSEDES

SUPERESDED BY

RDSO. ELECT. DTE. SKEL - 4389

STATUS	ALT.	REF.No.	DESCRIPTION	APPD.BY	DATE

Dt.	6.10.06
T	
D	S.KUMAR
C	KAUL SHARMA



NOTE:–

1. GRIND THE CORNERS OF TERMINAL LUGS REF. 3&5 BEFORE INSERTION OF WIRE INTO TERMINAL LUGS.
2. THE SOLDERLESS TERMINAL LUG SHALL BE CRIMPPED FLAT TO REF. 1/2 UNDER HIGH PRESSURE TO OBTAIN REQUIRED DIMENSION.
3. SOLDERLESS TERMINAL REF. 5 LUG SHALL BE TINNED.
4. TERMINAL REF. 3, MANUFACTURED OUT OF ELECTROLYTIC COPPER TUBE SHALL BE CRIMPPED FLAT TO REF. 1/2 UNDER HIGH PRESSURE TO OBTAIN REQUIRED DIMENSION. TERMINAL SHALL BE BRAZED WITH SUITABLE BRAZING FOIL.

REF. No.	DESCRIPTION	QTY./ MOTOR	MATL. SPECCN.
5	SOLDERLESS TERMINAL LUG	1	JIS H3100 / EQUIVALENT IS
4	BRAZING FILLER	RQ.	JIS Z3264 BCUP5-0.2 / EQUIVALENT IS
3	TERMINAL LUG	1	JIS H3300 / EQUIVALENT IS
2	1500 V FLEXIBLE CABLE SIZE 150mm^{2}x 870mm L	1	HITACHI SPECN. NO. E 0028
1	1500V FLEXIBLE CABLE SIZE 150mm^{2}x 676mm L	1	HITACHI SPECN. NO. E 0028

REF:– SCALE:– NTS APPROVED BY:– Rajiv Kumar FOR D.G.

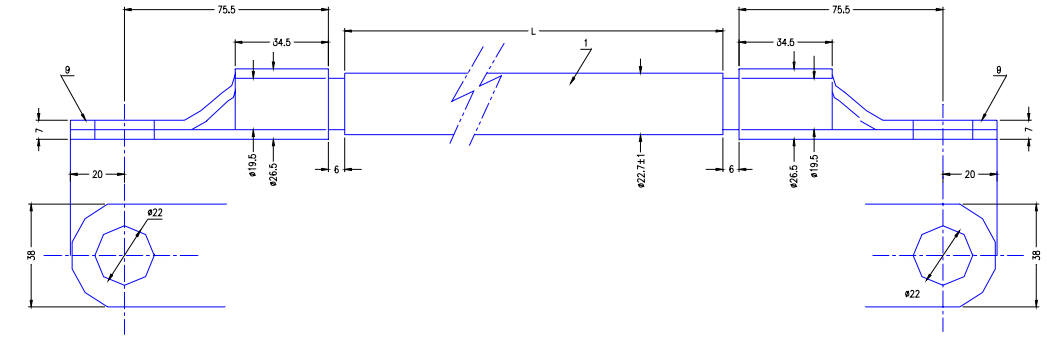
TRACTION MOTOR TAO–659
INTER CONNECTORS FOR MAIN POLE COILS

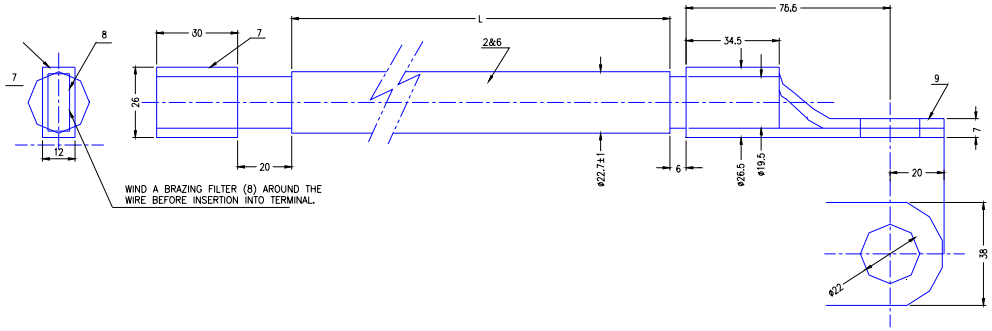
RDSO.ELEC.DTE. SK.EL–4394

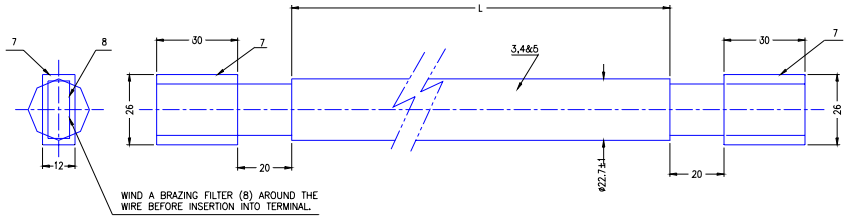
Dt.	16.2.79
D	S.CHANDRA
C	H.N.S. DHILLON

NOTE:–

1. GRIND THE CORNERS OF TERMINAL LUGAS REF.' 7&9 BEFORE INSERTION OF WIRE INTO TERMINAL LUGS.
2. THE SOLDERLESS TERMINAL LUG SHALL BE CRIMPPED FLAT TO REF, 1,2&6 UNDER HIGH PRESSURE TO OBTAIN REQUIRED DIMENSION.
3. SOLDERLESS TERMINAL LUG REF. 9 SHALL BE TINNED.
4. TERMINAL REF.7 MANUFACTURED OUT OF ELECTROLYTIC COPPER TUBE SHALL BE CRIMPPED FLAT TO REF.2,3,4. 5&6 UNDER HIGH PRESSURE TO OBTAIN REQUIRED DIMENSION TERMINAL SHALL BE BRAZED WITH SUITABLE BRAZUNG FOIL.







REF. No.	PART No.	DESCRIPTION	DETAIL DRG.	No./EMU	MATL. SPEC.
9		SOLDERLESS TERMINAL LUG		4	JIS H3100 /EQUIVALENT IS
8		BRAZING FILTER		RQ.	JIS Z3264 BCUP 5–0.2/ EQUIVALENT IS
7		TERMINAL PLUG		8	JIS H3300 /EQUIVALENT IS
6	SKEL–4389 REF. 6	1500 V FLEXIBLE CABLE SIZE 150mm2 x 620mm L		1	HITACHI SPECN. NO. E0028
5	SKEL–4389 REF. 5	1500 V FLEXIBLE CABLE SIZE 150mm2 x 410mm L		1	HITACHI SPECN. NO. E0028
4	SKEL–4389 REF. 4	1500 V FLEXIBLE CABLE SIZE 150mm2 x 290mm L		3	HITACHI SPECN. NO. E0028
3	SKEL–4389 REF. 3	1500 V FLEXIBLE CABLE SIZE 150mm2 x 410mm L		1	HITACHI SPECN. NO. E0028
2	SKEL–4389 REF. 2	1500 V FLEXIBLE CABLE SIZE 150mm2 x 470mm L		1	HITACHI SPECN. NO. E0028
1	SKEL–4389 REF. 1	1500 V FLEXIBLE CABLE SIZE 150mm2 x 1450mm L		1	HITACHI SPECN. NO. E0028

REF.	HBB/SWT 5007	SCALE	NTS	APPD. BY	(FOR DG.)

TRACTION MOTOR TAO–659 INTER CONNECTORS FOR COMM. POLE COILS

FIRST ISSUED

SUPERSEDES

SUPERSEDED BY

RDSO.ELEC.DTE. SKEL–4395

Dt.	
D	
C	
T	

STATUS	ALT.	REF.No.	DESCRIPTION	APPD.BY	DATE