

**SCHEDULE OF TECHNICAL REQUIREMENTS FOR
MANUFACTURE & SUPPLY OF WINDING WIRE FLAT FI Cu Fo 13 CR
BARE SIZE (4.00 X 2.00) MM & (4.23X2.23) MM INSULATED FOR 3-PHASE TM TYPE
6FRA-6068 & 6FXA-7059**

APRIL'2023

**ISSUED BY
TRACTION MOTOR DEPARTMENT
CHITTARANJAN LOCOMOTIVE WORKS
CHITTARANJAN.713331
WEST BENGAL**

Recommended by	Approved by
CEE/TM	PCEE

Prepared & Checked by		Reviewed by	
SSE/TMDO		DY.CEE/TMD	

ALTERATION/REVISION SHEET FOR MANUFACTURE & SUPPLY OF WINDING WIRE FLAT FI Cu Fo 13
CR BARE SIZE (4.00 X 2.00) MM & (4.23X2.23) MM INSULATED FOR 3-PHASE TM TYPE 6FRA-6068 &
6FXA-7059.

Sl. No.	Alteration No.	Authority	Description	Initial	Date

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SSE/TMDO		DY.CEE/TMD	

- 1. Scope:-**The Schedule of Technical Requirements mentioned hereunder is issued to serve as a guideline to the manufacturers and should be read in conjunction with specification No. 4TMS.096.099 Alt.1 (or latest). The firm should satisfy themselves about having complied the requirements of the Specification and the Schedule of Technical Requirements. The Technical Requirements are meant to serve as guideline only and are not exhaustive. The firm should have currently valid ISO certification including the subject item under its range of manufacture.

2. Reference :-

SN	DESCRIPTION & C&D No.	Drg. No./Specification
1.	WINDING WIRE FLAT FI Cu Fo 13 CR BARE SIZE (4.00 X 2.00) MM & (4.23X2.23) MM INSULATED FOR 3-PHASE TM TYPE 6FRA-6068 & 6FXA-7059. C&D No.5712/321,5812/201	4TMS.096.099 Alt.1 (or latest)

- 3. General Requirement :-**The firm should be certified to ISO 9001 by an agency accredited by NABCB.
- 4. Production Capacity:** -Annual production capacity calculation for the full production range must be given on the basis of time required for each process.
- 5. Desired aspect in QAP:** - As per RDSO's QAP Format No.QM-RF-8.1-3 version 1 or latest instruction issued by competent authority.QAP has to be approved by CLW/BLW.
- 6. M&P, Testing and Measuring instrument:** - List of typical M&P required for manufacture, testing and measuring instruments furnished in page 4 of 5 & 5 of 5 is for general guidance only and actual manufacturing operations, specific testing & measuring instruments shall be submitted and get approved by the firm as a part of QAP.
- 7. Internal Quality Control System:-**
- 7.1** The manufacturer shall procure all the raw materials from standard brand preferably from RDSO /CLW approved sources along with test certificates and sources should be available as and when asked for. If RDSO/CLW sources are not available then raw material from reputed firm shall be procured along with proper test certificates.
- 7.2** Quality Assurance Process of incoming materials, manufacturing process used for the subject items including type test, supply criteria covering specn. acceptance norms, agency if tested from outside lab, format of records etc.
- 7.3** Detailed process flow chart indicating process of manufacture and individual product.
- 7.4** The testing and measuring equipments and validity of calibration should be current and Calibration certificate issued by the calibration agency (NABL/GOVT approved) should be maintained.
- 7.5** Relevant Standards like IS/BS/IEC/ASTM etc. shall be available with the firm.

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8. Details of Machinery & Plants**A. Copper conductor manufacturing:**

SN	M&P	Purpose
1	Wire Drawing Machine	For Copper strip making
2	Flattening Machine	
3	Strip Rolling Machine	
4	Drawing cum shaving Machine	For base preparation of copper wire rod.
5	Vacuum Annealing Furnace	For annealing of copper strips.

Note: Continuous extrusion m/c may be used instead of M&P available at SN: 1 to 5

B. On-line insulating film Covering & Testing:

SN	M&P	Purpose
1	Dust Free AC Set up	For covering of polyimide film over copper conductors.
2	Double taping heads with microprocessor based Hysteresis Tension control system	For polyimide film lapping on copper strip with uniform tension.
3	Ultra High Frequency Induction Heating Furnace.	For on line heat sealing of Polyimide film with copper strip.
4	Radiation Furnace	For 2 nd Stage heat sealing of polyimide film.
5	Infrared Temperature Scanner	For monitoring of actual scaling.
6	High frequency sine wave Spark Tester (0-15 kV)	For on line HV testing of insulated copper conductor.
7	Pin Hole Tester	For on line pin hole checking of insulated copper conductor.

C. Material Handling & Miscellaneous Facilities:

SN	Details of Material Handling & Miscellaneous facilities
1	Pickling & Degreasing Plants.
2	Crane to handle raw materials & finished products.
3	Dust free storage facility for keeping polyimide film and other insulation material and finished Polyimide covered copper conductors.

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9. Details of Testing Equipment**A. General Measuring & Testing facilities:**

SN	Details of Measuring & Testing facilities	Range & Capacity
1	Universal tensile testing machine	0-25KN, LC-2KN
2	Hardness tester(Optional)	0-100 HV, LC-0.1HV
3	B.D.V. tester	0-10 KV, LC±1%
4	Profile Projector	20X magnification
5	Kelvin Double Bridge/ Digital Micro Ohm Meter	2micro ohm -2K ohm
6	Electric Oven with Thermostat and Recorder	0-250°C LC-1°C
7	Weighing Machine	0-100 Kgs. LC-1 gm
8	Digital Physical balance	0-5 kgs. LC-1gm
9	Micrometer	0-25mm LC-0.01mm
10	Digital Vernier Caliper	0-600mm LC-0.1mm
11	Spectrometer*	---

*Optional can be tested from NABL accredited lab.

B. Facilities specific for Testing of Polyimide covered copper conductors:-

SN	Details of Measuring & Testing facilities	Range & Capacity
1	Springiness apparatus	0-30°
2	Fixture for twist test	---
3	Edge-wise & Flat wise bending fixture	4mm – 10mm

10. All Machinery and Plant, Testing & Measuring Equipments are to be filled up as per following format:

Sl. No.	IS/STR/Specification para no.	Requirement of M&P/T&P as per IS/STR/Specification		Details of the M&P/T&P available with the firm					
		M&P/T&P name	Range / Capacity of M&P/T&P	Name of M&P/T&P	Model	Make	Machine no.	Year of Built	Range/ Capacity

Note: Vague language like available or will install is not to be considered. CLW reserves the right to cancel capacity assessment without any prior intimation.

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