



**Government of India
Ministry of Railways**

**No.TI/STR/025
(Revision-1)**

**Schedule of Technical Requirements
for
Approval of Vendor for Manufacture & Supply
of
Continuous Cast Copper (CCC) Wire Rods**

Specification no.ETI/OHE/65(8/87) with latest Amendments.

**ISSUED BY,
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Prepared By SSE/CW	Checked By DDTI-II	Approved By EDTI

1.0 SCOPE

This Schedule of Technical Requirements (STR) is to assess manufacturing capability of the Vendor for new Registration /Approval in RDSO to manufacture and supply of Continuous Cast Copper Wire Rods of size 19.1 to 26.5 mm diameter manufactured by South Wire Process.

This STR shall be read in conjunction with RDSO Specification No.ETI/OHE/76 (6/97) and ETI/OHE/65(8/87) with latest amendments.

2.0 GENERAL INFRASTRUCTURE & MANUFACTURING FACILITIES

The manufacturer should have adequate covered area and free space for storage and transportation of Raw Material and finished CCC Wire Rod awaiting dispatch. Manufacturer should have the system to ensure that the final product conforms to the RDSO Specification No. ETI/OHE/65(8/87) with latest amendments and relevant clauses for CCC Wire Rod in the Specification No. ETI/OHE/76(6/97) with latest amendments.

2.1 MANUFACTURING FACILITIES

Following manufacturing and transportation facilities of copper concentrate (Raw Material) machinery and plant of adequate capacity should be essentially available with the prospective manufacturer:-

2.1.1 PRODUCTION STAGE

- (i) Facilities for sourcing in India or importing copper concentrate (Raw Material) from leading copper mines in the world. In case of later factory should preferably be located nearby port.
- (ii) Facility for verifying chemistry of Raw Material
- (iii) Smelter plant to produce Matte & slag.
- (iv) Piere smith converter for Blister copper for treatment of matte.
- (v) Process for refinement of blister copper (98-99%) to make anode copper.
- (vi) Utilities like casting water, processor water, soluble oil for hot Rolling Mill and Iso-propel alcohol for use of rod pickling and cooling. Wax for rod coating (water soluble type).
- (vii) Strapping material – Standard polyester based of minimum 15 mm width such as Tenax 15 mm or Cordlash 25 mm or equivalent suitable for the customized automatic strapping heads
- (viii) Electrolytic grade Copper cathodes conforming to the requirement of LME Grade 'A' copper as listed in the London Metal Exchange.
- (ix) Main melting furnace adequate capacity.
- (x) Optical thermal device for continuously monitoring of cast bar.
- (xi) High pressure casting water
- (xii) Rolling mill, crop shear, casting machine, pinch rolls and coiler.
- (xiii) Eddy current flaw detector.
- (xiv) Digital Weigh Bridge of adequate capacity with programmable logic controller (PLC).
- (xv) Pneumatic operated cutting /straightening machines to cut and straightening coil end.
- (xvi) Lathe, shaping machine and grinding machines.
- (xvii) Coiler weight setting (generally operable from 1.0 to 4.0 tons per coil)
- (xviii) Electronic oven with digital temperature controller.
- (xix) Various types of digital balances capable of determining 1/100th of a milligram.

2.1.2 TESTING FACILITIES

SN	Equipment	Range/accuracy/remarks
1	Spectrometer for determining the copper and other trace elements of raw material /copper rods	Suitable for determining all the trace element specified in ETI/OHE/76(6/97) with latest Amendment
2	Electrolytic analyzer for chemical composition of copper	Suitable for the purpose.

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3	Oxygen analyzer	Suitable for the purpose
4	Electronic oven with digital temperature controller preferably with temperature recorder and time	Suitable temperature range
5	Digital balance	Suitable capacity/range
6	Ultimate tensile testing machine	Suitable capacity range/ accuracy
7	Kelvin double bridge	Suitable range /accuracy
8	Hardness tester	BHN/Rockwell scale machine with suitable range /accuracy
9	Polishing machine	Suitable finish
10	Metallurgical Microscope	Suitable magnification
11	Compression Test Machine	Suitable capacity
12	Digital micrometer	Suitable accuracy and range
13	Digital Vernier Caliper	Suitable accuracy and range
14	Stop watch	Suitable accuracy
15	Measuring Tape (Steel)	Suitable accuracy

3.0 QUALITY CONTROL REQUIREMENTS

- 3.1 The firm should have ISO: 9001 of (latest version) certification.
- 3.2 The quality manual of the firm should clearly indicate the control over manufacturing and testing of the said product at various stages of production and testing.
- 3.3 System of easy traceability of the product from the stage of raw material to finished
- 3.4 The firm should have quality assurance plan (QAP) indicating the checks to be carried out at Raw Material stage, in process stage and testing and inspection stage.
- 3.5 Details about type test, quantum of checks and record of all the parameters checked should be kept systematically in respective record books.
- 3.6 The approval of QAP mentioned in para 3.4 above is to be obtained by the firm from RDSO before prototype test is undertaken by RDSO.
- 3.7 It should be ensured that system of documentation in respect of rejection at the customer end and warranty replacement exists.
- 3.8 It should be ensured that in case of failures reporting from purchaser a system of reporting recording, visit to the site, and collection of failed samples, proper analysis and corrective action taken in order to arrest failures.
- 3.9 It should be ensured that properly calibrated instruments are used and calibration is done within time through authorized agencies.
- 3.10 It should be ensured that suitable tag for identification having details mentioned in para 3.13 shall be provided on each coil.
- 3.11 It should be ensured that employees engaged in the manufacture/ testing of the said product are technically competent enough and are headed by qualified engineer.
- 3.12 It should be ensured that manufacturer maintain adequate fire fighting equipment for employees safety and takes measures for keeping pollution under control.
- 3.13 Packing of the material shall be supplied in coils strapped with loops or as required by the purchaser. The suitable tags with marking made on the coil and shall have the following information.
- (i) Name and trade mark of manufacturer,
 - (ii) Size of CCC wire rod and weight of coil,
 - (iii) Lot number
 - (iv) Date of manufacture
 - (v) Purchase order number and name of consignee;
 - (vi) Date of inspection and inspecting authority;
 - (vii) Any other information required by the purchaser.

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