



सत्यमेव जयते

Government of India  
Ministry of Railways

No.TI/STR/025  
(Revision-2)

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

Specification no. **TI/SPC/OHE/CCC/0871** with latest Amendments.

ISSUED BY,  
Traction Installation Directorate  
Research Designs & Standards Organisation  
Manak Nagar, Lucknow 226 011 (India)

|                       |                       |                         |                     |
|-----------------------|-----------------------|-------------------------|---------------------|
|                       |                       |                         |                     |
| Prepared by<br>SSE/CW | Checked By<br>DDTI-II | Checked By<br>DTI/OHE-D | Approved by<br>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. **TI/SPC/OHE/CW/0971** and **TI/SPC/OHE/CCC/0871** with latest amendments.

## 2.0 GENERAL INFRASTRUCTURE &amp; 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. **TI/SPC/OHE/CCC/0871** with latest amendments and relevant clauses( **Clause no. 1,2,3,4,7,8,10.1,10.2,12**) for CCC Wire Rod in the Specification No. **TI/SPC/OHE/CW/0971** 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) Smelter plant to produce Matte & slag.~~

~~(iii) Piere smith converter for Blister copper for treatment of matte.~~

~~(iv) Process for refinement of blister copper (98-99%) to make anode copper.~~

(i) Raw material : ~~Electrolytic grade Copper cathodes conforming to the requirement of LME Grade 'A' copper as listed in the London Metal Exchange.~~ Copper used, should be Grade `A` copper conforming to the chemical composition of Cu-Cath-1 of IS 191:2007 or latest.

(ii) Facility for verifying chemistry of Raw Material

(iii) Main melting furnace adequate capacity.

(iv) Optical thermal device for continuously monitoring of cast bar.

(v) High pressure casting water

(vi) Rolling mill, crop shear, casting machine, pinch rolls and coiler.

(vii) 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).

(viii) ~~Ultrasonic Eddy current~~ flaw detector.

(ix) Digital Weigh Bridge of adequate capacity with programmable logic controller (PLC).

(x) Pneumatic operated cutting /straightening machines to cut and straightening coil end.

(xi) Lathe, shaping machine and grinding machines.

(xii) Coiler weight setting (generally operable from 1.0 to 4.0 tons per coil)

(xiii) Electronic oven with digital temperature controller.

(xiv) Various types of digital balances capable of determining 1/100<sup>th</sup> of a milligram.

(xv) 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

## 2.1.2 TESTING FACILITIES

| SN | Equipment | Range/accuracy/remarks |
|----|-----------|------------------------|
|----|-----------|------------------------|

|             |            |            |             |
|-------------|------------|------------|-------------|
| Prepared by | Checked By | Checked By | Approved by |
| SSE/CW      | DDTI-II    | DTI/OHE-D  | EDTI        |

|    |   |  |
|----|---|--|
| 1  | Spectrometer for determining the copper and other trace elements of raw material /copper rods     | Suitable for determining all the trace element specified in TI/SPC/OHE/CW/0971 with latest Amendment |
| 2  | Electrolytic analyzer for chemical composition of copper  | Suitable for the purpose.  |
| 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 product should exist.
- 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 metal 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 metal tags shall have the following information.
- Name and trade mark of manufacturer,
  - Size of CCC wire rod and weight of coil,
  - Lot number
  - Date of manufacture
  - Purchase order number and name of consignee;
  - Date of inspection and inspecting authority;

|             |            |            |             |
|-------------|------------|------------|-------------|
|             |            |            |             |
| Prepared by | Checked By | Checked By | Approved by |
| SSE/CW      | DDTI-II    | DTI/OHE-D  | EDTI        |

(vii) Any other information required by the purchaser.  
---

|                       |                       |                         |                     |
|-----------------------|-----------------------|-------------------------|---------------------|
|                       |                       |                         |                     |
| Prepared by<br>SSE/CW | Checked By<br>DDTI-II | Checked By<br>DTI/OHE-D | Approved by<br>EDTI |