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Government of India  
Ministry of Railways



STR No.TI/STR/020

(Revision-01)

Schedule of Technical Requirements,  
for  
Vendor Approval for Manufacture & Supply  
of  
STRANDED CADMIUM COPPER CONDUTORS

[Ref: Specification No.ETI/OHE/50 (6/97) with Latest Amendments]

ISSUED BY

Traction Installation Directorate  
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Prepared By : SSE/Conductor	Checked By : DTI-4	Approved By : EDTI

1.0 **SCOPE:** This Schedule of Technical Requirements (STR) is to assess manufacturing capability of the Vendor for new Registration /Approval to manufacture and supply of stranded Cadmium Copper Catenary wire to Railways for use on overhead traction equipment.

This STR shall be read in conjunction with RDSO's Specification No.ETI/OHE/50 (6/97) with latest amendments.

2.0 **GENERAL INFRASTRUCTURE, MANUFACTURING AND TESTING FACILITIES**

Manufacturer should have adequate covered accommodation and free space for storage and transportation of raw material, finished conductor awaiting dispatch and arranging inspection. Manufacturer should have system right from inward raw material to inspection of the final product to ensure that the product conforms to the requirements of RDSO's Specification No.ETI/OHE/50 (6/97) with latest Amendments or the one prevailing thereof.

2.1 The relations with the workers should be harmonious and regular employee training programs should be scheduled by the management for regular up-gradation of the knowledge and skills of the employees.

2.2 **MANUFACTURING FACILITIES :** Following Machinery and Plant of suitable capacity should be essentially available with the prospective manufacturer.

2.2.1 **PRODUCTION STAGE**

- a) One electric/ PNG/oil fired furnace of 500 kg capacity Min., manually/pneumatically tilting type with temperature control & measuring device with other facilities of casting the billet.
- b) Pickling tank with heater of adequate capacity, washing tank & neutralizing tank for 8 - 10 mm diameter wire Rods - one number.
- c) One complete wire drawing set for wire size up to 2.10 mm.
- d) Electric butt welding machine or facility or soldering the wire.
- e) Facility for spooling the wire.
- f) One stranding machine, as per the requirement of number of strands 7, 19 or 37 in the conductor for 3200 m length Min., equipped with other facilities up to winding of conductor on the drum.
- g) Platform weighing machine upto 3 T Min.
- h) Powered hacksaw.
- i) Powered grinder.
- j) Other tools and tackles required for the purpose.
- k) One powered drilling machine.

2.2.2 **DESIRABLE FACILITY:-** Facility for rolling of cadmium copper billets to 8-10 mm diameter wire Rod with the manufacturer shall be preferable. In case the rolling facility is not available the manufacturer shall furnish the name & address of Rolling Mill with telephone/fax numbers and contact person along with agreement with the Rolling Mill for providing the rolling facility at any time.

2.2.3 **INSPECTION AND TESTING FACILITIES :** The firm should essentially have the following testing and measuring instruments/ equipment. These instruments, wherever applicable, should be calibrated with standard master instruments

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accountable to National Physical Laboratory or a similar reputed international/national agency. Each instrument should have a valid calibration certificate.

S.N.	Equipment/measuring instruments	Range/Accuracy/Remarks
1.	Spectrometer for determining the copper and other trace elements of copper wire bar, cadmium copper billets and Copper cadmium wires.	Suitable for determining all the trace elements specified in RDSO's Spec. No. ETI/OHE/50(6/97) with latest amendment
2.	Electrolytic Analyser for determination of chemical composition of Copper.	Suitable for the purpose.
3.	Well-equipped chemical lab for determination of Cd & Cu content and Cu + Ag content.	-
4.	Digital/Analytical balances	Suitable capacity/scale.
5.	Kelvin's Double Bridge for measurement of resistance.	Suitable range/accuracy.
6.	Tensile Testing Machine	500kgf-capacity.
7.	Muffle Furnace	-
8.	Precision Digital Electronic weighing balance.	-
9.	Micrometers and calipers & thermometers.	Suitable range & accuracy.
10.	Facility for measurement of lay & lay length of stranded Conductor.	-
11.	Facility for Wrapping Test of Wire.	-

### 3.0 QUALITY CONTROL REQUIREMENTS

- 3.1 The firm should have ISO-9000 certification for the product broadly for which approval is being sought.
- 3.2 The system of easy traceability of the product from the raw-material stage to the finished product stage should be available.
- 3.3 The manufacturer should have a system of monitoring the supplied products. The complaints made by the customer should be identifiable to the various manufacturing stages of the product and linking the complaint for corrective and preventive action of the product.

~~3.4 Quality assurance plan for the product detailing following aspect should be available:-~~

- ~~● Organisation Chart.~~
- ~~● Flow process chart.~~
- ~~● Stage inspection details.~~
- ~~● Various parameters to maintain the control over the manufacturing.~~
- ~~● Policy of disposal of rejected material and its record for Documentary Evidence.~~

3.4 Quality Assurance Plan (QAP) : Quality Assurance Plan (QAP) for the product in accordance with RDSO's ISO guidelines should be available with the firm. The Quality Assurance Plan (QAP) shall be approved by RDSO.

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- 3.5 Quality manual of the firm indicating the extent of control over production and testing should be available.
- 3.6 At least a diploma holder must be the head of the inspection/testing/quality control section with 5 years' experience in the relevant field.
- 3.7 System of documentation in respect of rejection at the customer end and its warranty replacement, if any, should be available.
- 3.8 System should exist for documentation of the following.
  - Incoming raw material with the reference of suppliers as well as internal test results.
  - Details regarding stage inspection and test results.
  - Details regarding the final testing and dispatch to the customer in proper packed condition.
  - System for timely calibration of testing and measuring instruments.

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