

Page 1 of 5	Effective from XX.XX.XXXX	STR No. TI/STR/040 Rev.0 For Silver Bearing Grooved Copper Contact Wire
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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

STR No. TI/STR/040 (Rev.0)

Schedule of Technical Requirements,
for
Vendor Approval for Manufacture & Supply
of

SILVER BEARING GROOVED COPPER CONTACT WIRE FOR 25kV,50 Hz
ELECTRIC TRACTION SYSTEM.

[Specification No. TI/SPC/OHE/CW(Cu-Ag)/0130(02/2020)]

ISSUED BY,
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Prepared by SSE/Conductor	Checked By DTI-II	Approved by EDTI

Page 2 of 5	Effective from XX.XX.XXXX	STR No. TI/STR/040 Rev.0 For Silver Bearing Grooved Copper Contact Wire
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1.0 SCOPE

This Schedule of Technical Requirement(STR) is to assess manufacturing capability of the Vendor for new Registration/Approval to manufacture and supply of Silver Bearing Grooved Copper Contact wire manufactured from Continuous Cast Silver Bearing Copper (CCSBC) wire Rods to the Indian Railways for use in the 25 kV, 50 Hz, AC electric traction.

This STR shall be read in conjunction with RDSO Specification No. TI/SPC/OHE/CW(Cu-Ag)/0130(02/2020) with latest amendments.

The "Make in India" Policy of Government of India shall be applicable.

2.0 GENERAL INFRASTRUCTURE, MANUFACTURING FACILITIES AND TESTING FACILITIES

The manufacturer should have adequate covered accommodation and free space for the storage and transportation of the raw material and finished Silver Bearing Grooved Copper Contact wire awaiting dispatch. Manufacturer should have the system to ensure that the final product conforms to the RDSO specification No. TI/SPC/OHE/CW(Cu-Ag)/0130(02/2020) with latest amendments.

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.

2.1 MANUFACTURING FACILITIES

Following machinery and plant of adequate capacity should be essentially available with the prospective manufacturer :-

2.1.1 Production Stage

- (a) Silver Bearing Grooved Copper Contact wire drawing equipment (Reduction dies of adequate Nos. (Minimum five stages of reduction) to achieve the desired shape and size of contact wire as per RDSO specification referred in Clause 2.0 above.
- (b) Ultrasonic flaw detection equipment with auto cut off and Audio alarm system to stop the driving motor at the time of fault in conductor / rod. Flaw detection should be at two stages i.e. at CCSBC Rod stage and Final contact wire stage.
- (c) Manufacturer identification marking equipment at 40-50 meter length of HDGC contact wire being drawn.
- (d) Rod end cutting/straighting machine.
- (e) Lathe & Shaping machine.
- (f) Grinding machine.

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Page 3 of 5	Effective from XX.XX.XXXX	STR No. TI/STR/040 Rev.0 For Silver Bearing Grooved Copper Contact Wire
-------------	------------------------------	---

- (g) Wooden/Metal drums of standard shape and size to transport Silver Bearing Grooved Copper Contact wire to consignee.
- (h) Weighing Balance (5 M.T.)

2.3 TESTING FACILITIES

The firm should essentially have the following testing and measuring instruments/ equipment. These instruments, wherever applicable, should be calibrated from NABL/NACCB or a similar reputed international/national agency. Each instrument should have a valid calibration certificate.

S.No.	Equipments	Range/Accuracy/Remarks
1.	Spectrometer for determining the copper and other trace elements of raw material/CCSBC rods/Contact wire	Suitable for determining all the trace elements specified in RDSO Spec.No. TI/SPC/OHE/CW(Cu-Ag)/0130(02/2020) with latest amendments
2.	Electrolytic Analyser for chemical composition of copper.	Suitable for the purpose.
3.	Electronic oven with Digital temperature controller preferably with temperature recorder and time totaliser.	Suitable temperature range.
4.	Digital balance	Suitable capacity/scale.
5.	Kelvin Double Bridge	Suitable range/accuracy.
6.	Tensile Testing machine	Suitable capacity range/accuracy.
7.	Hardness Tester	BHN/Rockwell scale with suitable range/accuracy.
8.	Polishing machine	Suitable finish.
9.	Metallurgical Microscope	Suitable magnification.
10.	Compression Test Machine	Suitable capacity.
11.	Bend Test Machine	Suitable capacity.
12.	Profile Projector	As per RDSO specification No. TI/SPC/OHE/CW(Cu-Ag)/0130(02/2020 with latest amendment
13.	Profile special caliper & shadow graph equipment.	-do-
14.	Dial Micrometer	Suitable accuracy.
15.	Dial vernier caliper	-Do-
16.	Stop watch	Suitable accuracy.
17.	Measuring tape (Steel).	-Do-
18.	Oxygen Analyser	Suitable for the purpose.

Note : For those manufacturers, who have spectrometer which could not determine oxygen content , oxygen analyzer is desirable testing equipment for determining oxygen content.

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Page 4 of 5	Effective from XX.XX.XXXX	STR No. TI/STR/040 Rev.0 For Silver Bearing Grooved Copper Contact Wire
-------------	------------------------------	---

3.0 QUALITY CONTROL REQUIREMENTS :

- 3.1 The firm should have ISO 9000 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 The system of easy traceability of the product from the stage of raw material to finished product should exist.
- 3.4 The firm should possess a 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 of 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.
- 3.7 It should be ensured that a system of documentation in respect of rejection at the customer end, and warranty replacement exists.
- 3.8 It should be ensured that a system of reporting field failures, visit to the site collection of failed samples, proper analysis and corrective action taken in order to arrest failures in future exists.
- 3.9 It should be ensured that raw material (CCSBC Rod) is procured from approved sources and manufacturer's test certificate for the raw material-procured should be obtained. CCSBC rod by Job work is not permitted.
- 3.10 It should be ensured that properly calibrated instruments are used and calibration is done within time through authorised agencies.
- 3.11 It should be ensured that identification details like maker's name, year and month of manufacture are embossed on the finished product.
- 3.11.1 The emblem/identification mark of the Contact Wire manufacturer and CCC Rod manufacturer with year of manufacture in 3mm letter size shall be provided on the top lobe of the contact wire on regular intervals-not less than 40m and not exceeding 50m so as to facilitate identification. The marking shall be provided in the format mentioned in Clause 3.11.2 below and shall be such that it is not detrimental to the strength of the contact wire.
- 3.11.2 The identification mark in format 'CCC/MMM/YY' shall be provided as mentioned in Clause 3.11.1 above.

Prepared by SSE/Conductor	Checked By DTI-II	Approved by EDTI

Page 5 of 5	Effective from XX.XX.XXXX	STR No. TI/STR/040 Rev.0 For Silver Bearing Grooved Copper Contact Wire
-------------	------------------------------	---

Where, First abbreviation i.e. 'CCC' shall indicate identification for manufacture of CCC rod. Followed by slash.

Second abbreviation i.e. 'MMM' shall indicate identification for manufacture of Contact Wire. Followed by slash

Third abbreviation i.e. 'YY' shall indicate, year of manufacture for example 80 for 1980 and 10 for 2010.

The abbreviation for manufacturers of CCC rod and Contact wire manufacturer should be first three alphabets of vendor name as indicated in vendor directory against each firm.

- 3.12 It should be ensured that the employees engaged in the manufacture/testing of the said product are technically competent enough and are headed by qualified engineer.
- 3.13 It should be ensured that the manufacturer maintains adequate fire fighting equipment for employees safety and takes measures for keeping pollution under control.
- 3.14 Packing of the final product should be done in metal/wooden containers conforming to NEMA WC 26/ IS 1778-1980 or latest. A layer of glazed paper should be provided between layers of Contact wire conductor.

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