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सत्यमेव जयते

Government of India Ministry of Railways

Telecom Directorate

Schedule of Technical Requirement (STR)
For

24/48 FIBRE ARMOURED OPTICAL FIBRE CABLE

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Research Designs and Standards Organisation

Manak Nagar, Lucknow - 226011

24/48 FIBRE ARMOURED OPTICAL FIBRE CABLE RDSO/SPN/TC/110/2020 Revision - 0

I. SCOPE:

The Schedule of Technical Requirement covers machinery & plants, testing equipment's and quality assurance plan required for manufacturing of 24/48 Fibre Armoured Optical Fibre Cable as per specification No. RDSO/SPN/TC/110/2020 Revision-0 .

Vendor shall also comply norms issued by RDSO time to time in this connection and other relevant laws of the country.

This STR shall be applicable to all vendors applying for registration.

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II. ESSENTIAL MACHINERY AND PLANTS REQUIRED FOR PRODUCTION:

Sr. No.	Requirement of Machinery & Plants		Details of Machinery & Plants Available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year Of Installation	Range/ Capacity	Due date of calibration
1.	Fully Computer controlled UV curable Fibre Colorings Line with automatic control of UV intensity, Static Charge removal. Machine to be installed and operated in Temperature controlled and dust free environment.	01							
2.	Fully Computer controlled Tubing Secondary coating line comprising of: • Driven Tension Controlled Pay-off • Jelly Filling System Fully synchronized with Line Speed • Compound De-humidifier • Cooling Trough(25 Meters long) with hot water section, over length capstan and cold water section. • On-line Dual Axis Diameter Measuring Unit Lump & Neck-down Detector • Exit Capstan/caterpillar Dual Take-up with automatic Changeover.	01							

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Sr. No.	Requirement of Machinery & Plants		Details of Machinery & Plants Available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year Of Installation	Range/ Capacity	Due date of calibration
3.	Fully Computer controlled SZ stranding line comprising of: • Strength member Payoff • Double wheel entry Capstan • Strength Member tension monitoring and Control • Loose tube Driven pay off with tension Control system • SZ stranding unit with Lay control and synchronization with line speed • Dual counter rotating • cross binder head • Torsion Blocker • Pressurized Jelly • Filling arrangement • Dual Wheel Capstan / Caterpillar • Motorized Take up	01							
4.	HDPE sheathing sequential marking comp arising of: • Pay –off Compound Pre-heater • Extruder complete with HDPE screw, nylon	01							

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Sr. No.	Requirement of Machinery & Plants		Details of Machinery & Plants Available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year Of Installation	Range/ Capacity	Due date of calibration
	screw, & crosshead with tooling, loading and PID Temperature Controllers - Cooling trough of length of 25 meters(minimum) and made up of stainless steel body. - On line spark tester (0-15KV AC) with numeric fault counter - Caterpillar with Pneumatic belt tension control - Take-up unit.								
5.	Steel tape armouring machine consisting of: - Pay-off Double Tangential Taping Heads - Butt Welding Machine - Caterpillar with Pneumatic belt tension control - Corrugation unit	01							
6.	Rewinding machine consisting of: - Pay-off Sequential Meter Marking Unit - Spark tester (0- 15 KVAC) with numeric fault counter - Motorized Take up	01							
7.	Work Shop consisting of following Machines - Lathe - Drilling - Grinding - Welding machine	01 01 01 01							

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Sr. No.	Requirement of Machinery & Plants		Details of Machinery & Plants Available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year Of Installation	Range/ Capacity	Due date of calibration
8.	D.G. set (heavy duty) of 100 KVA minimum capacity.	01							
9.	UPS for critical machines 100 KVA minimum capacity.	01							

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III ESSENTIAL TESTING AND EQUIPMENTS REQUIRED FOR QUALITY ASSURANCE:

Sr. No	Requirement of Essential Testing Equipment's		Details of Testing & Measuring Equipment's available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year of installation	Range/ Capacity	Due date of calibration
1.	Tensile testing machines with ranges as given below, (each with 3 sub ranges) to test copper wire, rods, steel tapes, laminates & Al wires etc.:- i)Tensile testing machine 0 to 500 N ii) Tensile testing machine 0 to 5000 N	01							
2.	Vernier calipers, least count 0.01mm with digital display.	01							
3.	Micrometer, least count 0.001mm with digital display.	01							
4.	Measuring Tape	01							
5.	Apparatus for determining melt flow index (extrusion plasto meter) with digital temp indication, thermostatic control, accuracy 0.1deg.c.	01							
6.	Digital balance to weigh to an accuracy of 0.1 mg	01							
7.	Apparatus for environmental stress cracking test to ASTM-1693 (Blanking die, Jig, specimen, holders, test tubes, corks, aluminum foil, test tube rack,	01							

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Sr. No	Requirement of Essential Testing Equipment's		Details of Testing & Measuring Equipment's available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year of installation	Range/ Capacity	Due date of calibration
	bending clamps and transfer tools constant temperature, bath range 0 to 1000 °C with thermostatic controlled heating system, inbuilt digital temperature. Meter, hour meter and sealing arrangement.								
8.	Two nos. of Air circulating ovens with controls to maintain the setting within $\pm 2^{\circ}\text{C}$. Temp range 0 to 200 °C with PID control digital display. Hour meter with sealing arrangement to monitor tests timings .	02							
9.	Environmental Test chamber Range -20°C to +70°C, relative humidity 20% to 95% along with data logging/ recording facility with suitable print out mechanism	01							
10.	Apparatus for stability test of filling compound (water bath range, for monitoring temperature, hour meter for recording test duration. Sealing arrangement may also be made for sealing.	01							
11.	Flash Point Apparatus	01							
12.	Drop Point Apparatus	01							
13.	Cone penetrometer	01							
14.	Set up for water penetration test (separate room required for conducting	01							

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Sr. No	Requirement of Essential Testing Equipment's		Details of Testing & Measuring Equipment's available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year of installation	Range/ Capacity	Due date of calibration
	tests)								
15.	Multi meter analog/Digital	01							
16.	Stamping die (for cutting dumbbell and other type of samples)	01							
17.	Digital / Analog Thermometer (duly calibrated)	01							
18.	Digital / Analog stop watch	01							
19.	Traveling Microscope/Profile Projector for checking eccentricity / circularity_of core	01							
20.	Ageing oven range 0 to 200 deg C with Digital temperature controller & pressure monitoring facility. Hour meter (with sealing arrangement)	01							
21.	Standard to check calibration of Test equipment.	01							
22.	DSC Instruments	01							
23.	Carbon black content test set up for black Sheathing/Jacketing Compound	01							
24.	Carbon black dispersion test set up for black Sheathing/Jacketing Compound	01							
25.	Fibre Optic Analyzer suitable for measuring spectral attenuation from 1200 nm to 1625 nm, MFD at 1310 & 1550 nm, and	01							

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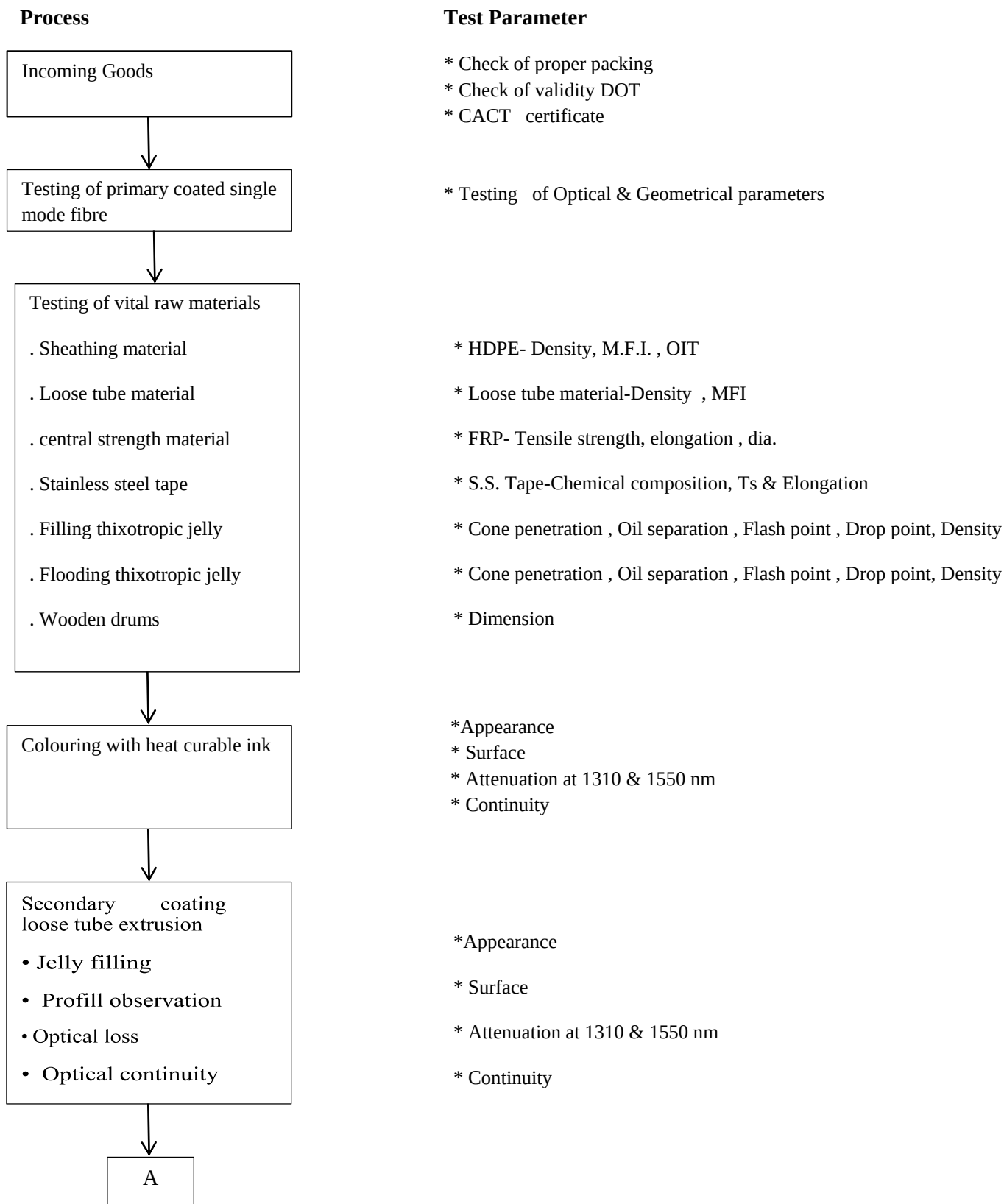
Sr. No	Requirement of Essential Testing Equipment's		Details of Testing & Measuring Equipment's available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year of installation	Range/ Capacity	Due date of calibration
	Fibre Cut-off Wavelength								
26.	Fibre Geometry Analyzer -Suitable for measuring diameter of core, clad and primary coating, Non-circularity and concentricity error	01							
27.	Optical Time Domain Reflectometer (OTDR) - Suitable for measuring Attenuation at 1310,1490, 1550 &1625 wavelength	02							
28.	Chromatic Dispersion Test Setup suitable for measuring CD from 1200 nm to 1625 nm, zero dispersion dispersion slope	01							
29.	Fiber Strain Measurement System	01							
30.	Fusion Splicer, suitable for splicing single mode Fibre	01							
31.	Polarization Mode Test Setup suitable for measuring PMD at 1310, 1550 nm wavelength.	01							
32.	Crush Test Setup	01							
33.	Torsion Test Setup	01							
34.	Repeated Bend Test Setup	01							
35.	Cable Bend Test Setup	01							
36.	Impact Test Setup	01							

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Sr. No	Requirement of Essential Testing Equipment's		Details of Testing & Measuring Equipment's available with the vendor						Calibration Details
	Description	Qty. Required	Qty. Available	Model	Make	Machine No.	Year of installation	Range/ Capacity	Due date of calibration
37.	Kink Test Setup	01							
38.	Abrasion Test Setup	01							
39.	Walk-in Type Climatic Chamber (-40°C to 85°C)	01							

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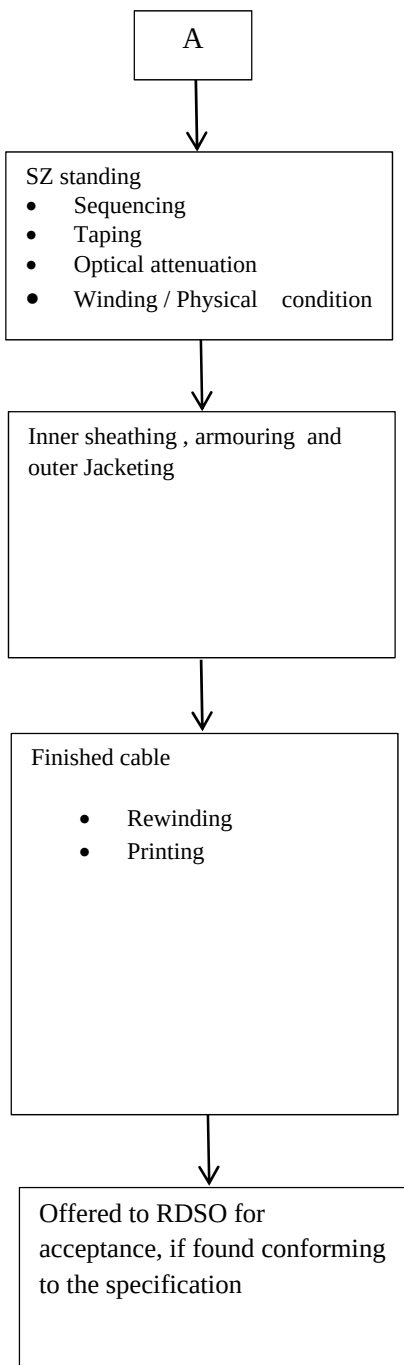
QUALITY ASSURANCE FLOW - CHART
ARMOURED OPTICAL FIBRE CABLE (IRS:TC 55-2019 Revision-2)



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Process

Test Parameter



*S-Z stranding & Ley length measurement
 *Attenuation at 1310 & 1550 nm, 1625nm
 *Diameter , placing of dummy & polyester yarn binding

* Inner jacket thickness
 * Over lap of S.S Tape
 * Height & pitch of corrugation
 * Application of glue
 *Outer jacket thickness
 * Over all dia
 * Attenuation at 1310 & 1550 nm

* Ts & Elongation on sheath & jacket
 * Mechanical Test
 * Water penetration test
 *Drip test
 * Spark test
 * Abrasion test
 * Physical length
 * Marking on cable
 * Attenuation
 * Rip cord

* Acceptance test