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Functional Requirement Specification (FRS) for Fibre Distribution Management System for Indian Railways			

**GOVERNMENT OF INDIA, MINISTRY OF RAILWAYS**



सत्यमेव जयते

**FUNCTIONAL REQUIREMENT SPECIFICATION (FRS)  
FOR  
FIBRE DISTRIBUTION MANAGEMENT SYSTEM  
SPECIFICATION FOR  
INDIAN RAILWAYS**

**RDSO/SPN/TC/-----**

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## I. DOCUMENT DATA SHEET

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<b>Abstract:</b> This document specifies the functional requirement specification (FRS) for Fibre Distribution Management System Specification for Indian Railways	

## II. DOCUMENT CONTROL SHEET

Designation	Organisation	Function	Level
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## 1.0 FOREWORD:

In Indian Railway, Optical Fibre communication system is provided for following types of communication needs: -

- (a) Control Communication with emergency communication
- (b) Administrative voice and data communication.
- (c) Both for control and long haul communication backbone for mobile train radio communication.
- (d) Short haul communication for block channels signaling.

**1.1** Indian Railways uses 48 Fibre Optical Fibre Cable for Short haul and long haul communication. A Fibre Distribution Management System for accommodating 48 Fibre for Optical Fibre termination, interconnection, expansion and for reconfiguration is required.

**1.2** This Functional Requirement Specification (FRS) is prepared for framing RDSO specification for Fibre Distribution Management System Specification for Indian Railways. (Reference Railway Board letter No. 2020/Tele/9(2)/1 dated 04.01.2025)

**2.0 SCOPE:** This document outlines the functional requirements for the Fibre Distribution Management System (OFC Termination Box and patching shelf) suitable for mounting on a 19" rack in Indian Railways.

**3.0 OBJECTIVE:** Indian Railways are using 48 Fibre Optical Fibre Cable for Short haul and long haul communication. A Fibre Distribution Management System for accommodating 48 Fibre for Optical Fibre termination, interconnection, expansion and for reconfiguration will be used.

## 4.0 Functional Requirements

- 4.1** This (FDMS) shall be manufactured as per the latest technology. It shall provide management of 48 numbers of fibres of armoured optical fibre cable. It shall also provide facilities for reconfiguration and testing.
- 4.2** This (FDMS) shall be of compact design, easy in handling and its constructed structure shall be inherently robust and rigid for all conditions of operation, replacement, storage and transport. It should be made of fire retarding material.
- 4.3** The FDMS should be suitable for all kind of cable construction with proper arrangements for holding the sheath, FRP, loose tubes etc.
- 4.4** The system shall be modular in design and shall be easily expandable.
- 4.5** Painting and plating shall be of good quality with the thickness not less than 50 microns.
- 4.6** This (FDMS) shall be accessible for operation, testing easy handling from the front side.

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4.7 Bend radius of Pig tails, patch cords and optical fibres in installed condition should be better than 70 mm dia.

#### 4.8 Capacity :-

- (a) Line side shall have maximum capacity to terminate 2 nos. optical fibre cable each of < 20 mm nominal dia. Each Splice tray shall have capacity to hold at least Twelve Splices and each FDMS should have capacity to hold up to Four such splice Trays and thus making the maximum capacity of FDMS to 48 Fibres.
  - (b) Accordingly, the Equipment side shall have maximum capacity to take out and terminate 48 pig tails/patch cords.
- 4.9 The FDMS modules are sheet metal boxes suitable for mounting on a standard 19" rack. The box is a metal chassis with pull out drawers type of splicing and patching shelves mounted on telescopic slides.
- 4.10 Each splicing shelf shall accommodate 4 nos. of cassettes/splice trays each capable to house minimum 12 nos. of fusion type spliced joints. The loose tubes coming into splicing shelves are stored in the storage space provided before entering into the cassettes.
- 4.11 Each Patching shelf can house max. 48 nos. of specified adaptors mounted on a adaptor fixing plate. The pigtails and patch cords are connected to these adaptors. The recording sheet provided in the label holder can store the routing information.
- 4.12 Splicing tray shall be used with variable loop sliding type in front direction.
- 4.13 The FDMS shall have sufficient storage space for storing extra length of loose tubes and patch cords which shall not experience the bend below critical bend radius of 35mm.
- 4.14 The FDMS shall have sufficient storage space for storing extra length of loose tubes and patch cords which shall not experience the bend below critical bend radius of 35mm.
- 4.15 Identification mechanism of incoming & outgoing cables/loose tubes/pigtails/patch cords fibres and connector adopter shall be provided.
- 4.16 Type of organizer / cassette
- 4.16.1 Fibre organizer shall be non-metallic made of ABS material with following properties.

S.No.	Parameter	Specified Values	Test Method	Raw material/finished product Test
(a)	Specific gravity	1.01-1.21gm/cc	ASTM-D-792	To be tested on finished product.
(b)	Vicat Softening Point	100-108 °c	ASTM-D-1525	----do---
(c)	Tensile strength	2.79 kg/mm <sup>2</sup> – 5.58 kg/mm <sup>2</sup>	ASTM-D-638	To be tested on raw material
(d)	Elongation	≤ 50%	ASTM-D-638	----do---
(e)	Water absorption	≤0.4%	ASTM-D-57-59	----do---
(f)	Rockwell hardness	R81-R111	ASTM-D-785A	----do---

Note: A certificate from recognized laboratory is acceptable. if the manufacturer do not have the test facility.

**4.16.2** Splice trays shall allow for coiling of fibres with primary (0.250 mm) and secondary (0.9 mm) coating. Following type of splices shall be accommodated in each tray:

- Splicing of primary coated fibres (0.250 mm)
- Splicing of secondary –coated fibres (0.9 mm) to primary coated fibres (0.250 mm).
- Splicing of secondary coated fibres (0.9 mm) to secondary coated fibres (0.9 mm)

**4.17 Dimensions:**

Height = 180 mm  $\pm$  10 mm

Width = 450 mm (max.)

Length or depth = 275 mm  $\pm$  10 mm

Thickness of the sheet : 1.6 mm  $\pm$  0.20 mm (IS 1852 – 1885)

Should be suitable for mounting on standard 19" Instrument rack as per IS:9606/IEC 297

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4.17.1 Suitable mounting holes along with nut bolt & locking arrangement shall be provided for mounting on a standard 19" rack.( IS 9606:1980/ IEC:297)

4.17.2 The adopter mounting plate should be designed to accept either of the following type of Optical connectors.

SC/APC, SC/UPC, FC/PC,LC/APC, EURO 2000 or as per requirement. The inside sleeves of connector should be zirconia type.

4.11 Clamping arrangement for strength member shall be of stainless steel material.

4.12 Type of connector adaptor must be SC/APC unless otherwise specified . The optical coupling loss must be < 0.5 dB.

## 5.0 QUALITY MANAGEMENT :

5.1 It shall be manufactured as per International Quality Standards and manufacturer shall be duly accredited for ISO 9000 series of standards.

## 6.0 MARKING :

The marking on the system shall carry the following minimum information on the front panel of the system.

- Manufacture's name , date & year of production.
- Model no.
- Type of system.
- Capacity for number of fibres.
- Identification details / cable/ fibre / labeling facility.

## 7.0 Following items are required for each Fibre Distribution Management system

	Item to be provided by Supplier	specified by Purchaser.
1.	Connectors/adaptors (48 fibre OFC)	Type of connectors
2.	Patch cords – 2 No., Pig tails-2 No.	
3.	Protection sleeves (60 nos for 48 fibre)	
4.	Iso Propyl Alcohol: 200 ml	
5.	Cable ties, 3 dozen	
6.	1 meter scale, 1 No.	
7.	Adhesive pads	

8.	Numbering Ferrules	
9.	Cotton Buds	
10.	Velcro strap 2 nos	

