Fiber Optic Cable

Whitepaper

Unique solution to last mile installation challenges in FTTH networks

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Abstract

STERLITE developed very innovative design of flexi ribbon cable keeping in view of the on going installation challenges in broadband technology. The cable is suitably designed in order to take care of the requirement of the FTTx network application. The cable has been designed for use as drop/distribution cabling within the building. Cable has ultra high flexibility required for routing through various difficult turns/curves within the building ensuring fast and easy installation. The cable is ideal for riser and plenum type of premise application. Ribbon construction provided one shot quick splicing, thus reducing cost & time for installation.

Keywords

Flexi Ribbon, FTTx, LSZH

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1. Introduction

Keeping in view the challenges encountered during last mile cable installation, Sterlite has developed an innovative, highly flexible flat micro cable containing ribbonized optical fibers, which is expected to bring revolution in the last mile application of broadband/FTTx network. Main features of this cable are:

- Highly flexible, enabling easy routing through various bends/curves in mini-conduits
- Ribbonized optical fiber construction enabling one shot mass fusion splicing and easy identification, thus saves time and cost during installation and maintenance
- Low Smoke Zero Halogen (LSZH) sheath ideal for indoor application
- Very low diameter thus allowing installation of multiple cables in the same duct (install as and when required)
- Very light weight and high strength to weight ratio
- Excellent crush resistance and dimensional stability
- Suitable packing for easy handling during installation

2. Cable Design

Selected numbers of single mode individually coloured fibers are put in the form of ribbon structure. A layer of Aramid yarns is applied over the ribbon for strength. A layer of LSZH jacket is extruded over the preceding structure with a nominal thickness of 0.5mm in flat shape. Figure 1 illustrates the cable design as below.

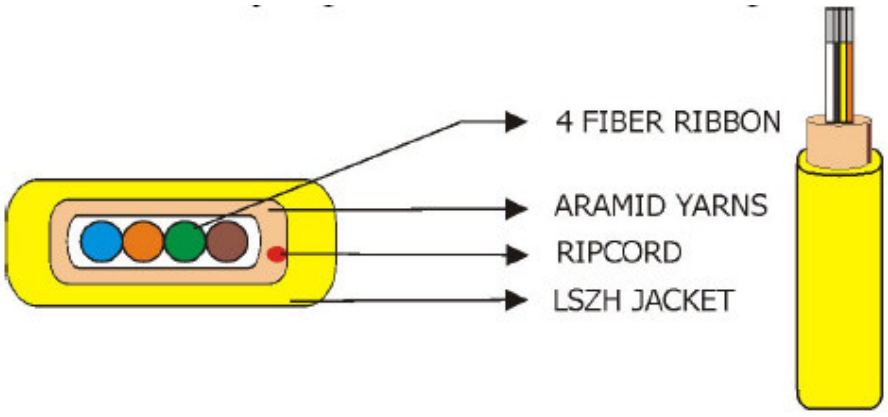

Figure 1. Cable Design & Component

3. Cable Performance

The cable was subjected to rigorous mechanical and environmental performance. The performance has been measured at different manufacturing process.

3.1 Optical Performance

The transmission loss of optical fibers was measured at every stage of manufacturing process like Coloring, Ribbonizing and Sheathing. The graph given in Figure 2 exhibits the behaviour of optical fiber transmission monitored and noted during different manufacturing process. Graphical representation is shown.

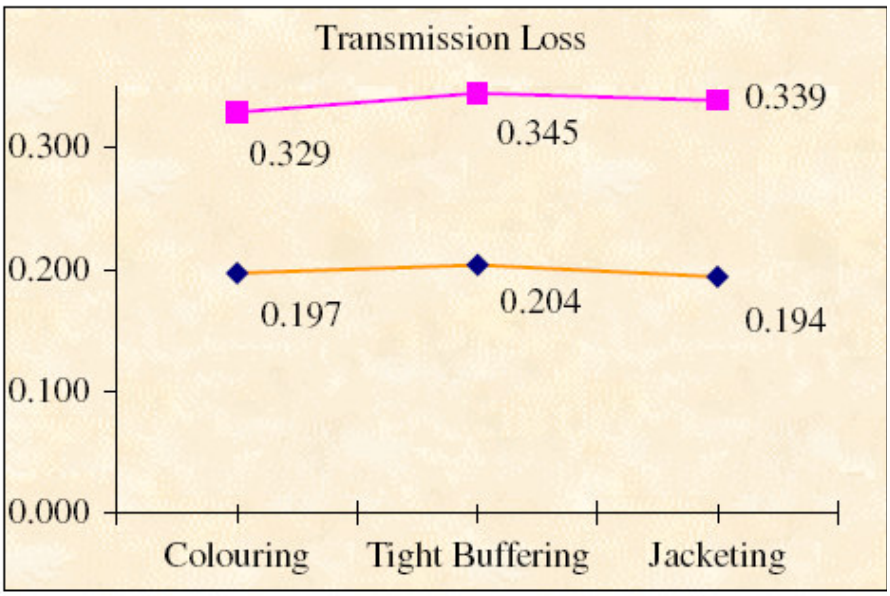

Figure 2

3.2 Tensile Characteristics

The cable was subjected to a load of 200N for 10 minutes and the attenuation changes were monitored. There was the nominal change in the attenuation loss value. The details are given below. Graphical representation is shown in Figure 3.

Table 1. Showing Change in loss after tensile test

Test wavelength	Change in loss - Specification (dB)	Change in loss – dB
1310 nm	≤ 0.2 dB	0.06 dB
1550 nm		0.08 dB

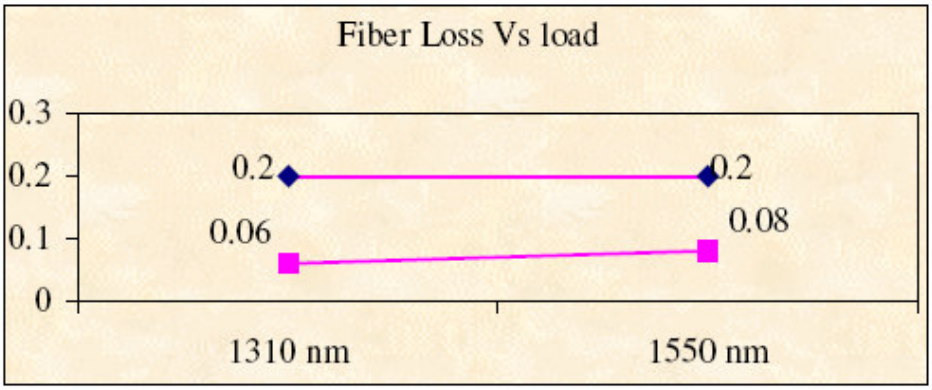

Figure 3.

3.3 Other Mechanical Characteristics

The cable was subjected to various mechanical tests like impact, crush, torsion test etc.., The attenuation was monitored during the test and after the test and change in attenuation loss is given below. Graphical representation is shown in Figure – 4.

Table 2. Change in loss during mechanical tests

Name of the test	Wavelength	Change in loss – Specification (dB)	Change in loss – Observed (dB)
Crush	1310 nm	0.2	0.011
	1550 nm		0.061
Torsion	1310 nm		0.023
	1550 nm		0.041
Impact	1310 nm		0.015
	1550 nm		0.036

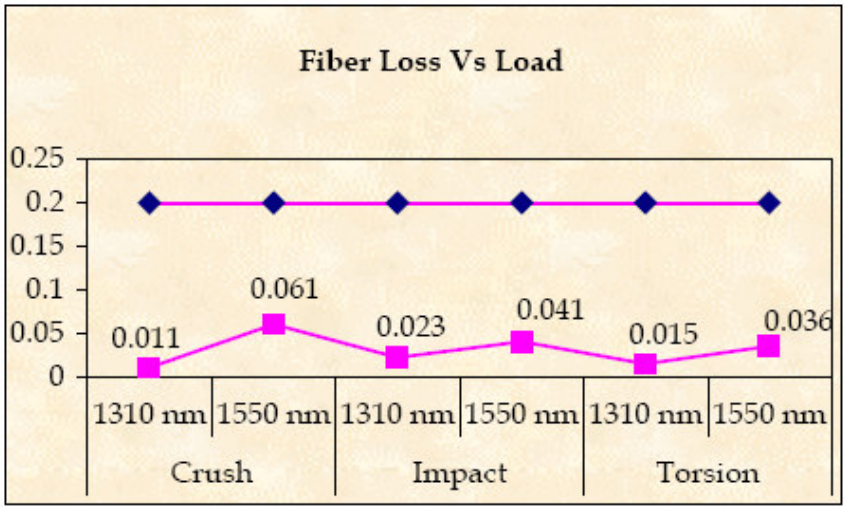

Figure 4. Fiber Loss v/s Load during Mechanical Test

3.4 Temperature Dependence Characteristics

The cable shall be wound onto a reel and placed in an environmental chamber. The reel shall be supported in such a manner as to facilitate handling and free movement of air through it. While cable is in the conditioning chamber the behaviour of transmission loss at extreme temperature range was experimentally investigated. Cable of standard length is kept in the environmental chamber with the temperature. The measurement of transmission loss for the –20° C and + 70 ° C have been carried out and the maximum change in attenuation measured is less than 0.3 dB/Km. Graphical representation is shown in Figure 5.

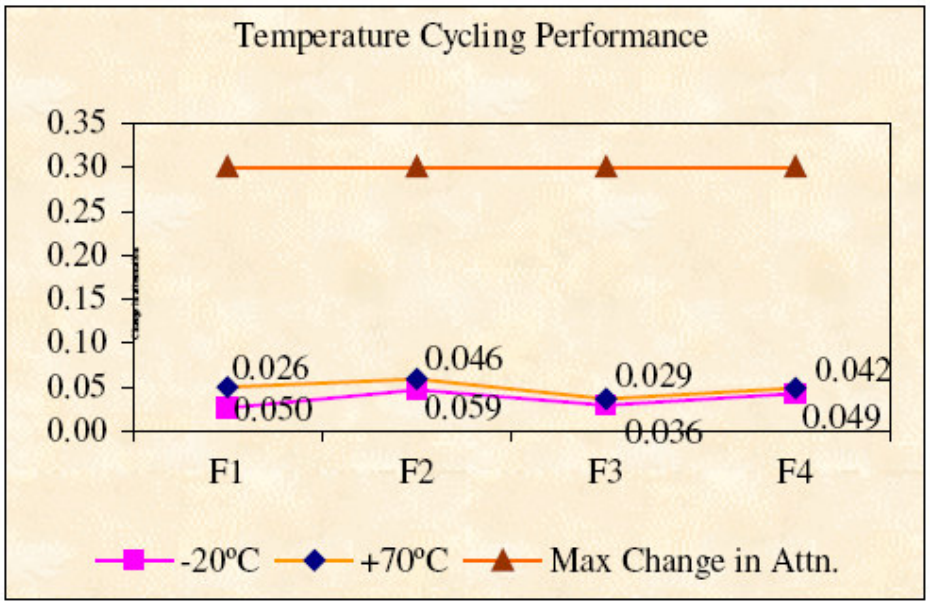

Figure 5. Change in attenuation after temperature cycling

Goes through difficult routes during FTTH installation

Figure 6.

4. Conclusion

In order to cater the need of Access/FTTH network, Sterlite has evaluated the flexi ribbon cable which consists of ribbon surrounded by Aramid yarn strengthening member and LSZH sheath. The above results demonstrate that, cable evaluated exhibits excellent transmission characteristics at each stage of manufacturing and reliability testing thus proves to be a user-friendly suitable option for premises in FTTH networks for broadband application.

5. Reference

[1] Standards: IEC 60794, EIA/TIA-455, GR-409 CORE

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