



SUMITOMO PRODUCT SPECIFICATION

FutureFLEX®

**TCxxTRX-1 RISER RATED TUBE CABLE SERIES
WITH GALVANIZED INTERLOCKING STEEL ARMOR**



SUMITOMO ELECTRIC LIGHTWAVE CORP.

78 TW Alexander Drive, Research Triangle Park, NC 27709

(919) 541-8100 or 1-800-358-7378

www.futureflex.com

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1.0 GENERAL

This specification covers the design requirements and performance standards for FutureFLEX® Air-Blown Fiber® (ABF) riser rated tube cables encased in an interlocked galvanized steel armor. These tube cables are designed for indoor tube cable infrastructures. The features described in this document are intended to provide information on the performance of Sumitomo Electric's FutureFLEX® tubes and aid in handling and use.

1.1 Tube Cable Description

Sumitomo's FutureFLEX® TRX-1 series tube cables are designed for use as an optical fiber cabling infrastructure in ABF applications that require Optical Fiber Conductive Riser (OFCR) fire rating and optimum protection against damage by contact. The riser rated tube cables are UL/cUL UL 1666 and CSA OFN FT4 listed. They may also be used in indoor applications where: 1) lesser fire ratings, such as Optical Fiber Conductive General Purpose (OFCG) apply or 2) no fire ratings apply. The individual tubes have a 6mm inside diameter and 8mm outside diameter. A polyester tape wrap surrounds the inner tubes. The inner jackets are made of black fire-retardant PVC. A fire-blocking tape surrounds the inner jackets. The outer jackets are made of orange fire-retardant PVC. Ripcords are provided to aid in inner and outer jacket removal. An interlocked galvanized steel armor wrap surrounds the outer jacket. These tube cables are pulled or placed in indoor routes for the purpose of individual tube connections to establish pathways for FutureFLEX® fiber bundle installation.

1.2 Quality

Sumitomo ensures a continuing high level of quality through ISO / TL9000 registered Quality Management Systems and our commitment to continuous improvement. Guaranteed, high quality products have been manufactured at Sumitomo's facility in Research Triangle Park, North Carolina since 1984.

1.3 Reliability

Sumitomo ensures product reliability through rigorous qualification testing of each product family to meet or exceed industry standards. Both initial and periodic qualification testing are performed to assure the tube cables' performance and durability in a field environment.

Sumitomo supports industry standards organizations such as Bell Communications Research (Bellcore), Telecommunications Industry Association (TIA), International Telecommunications Union (ITU), International Electrotechnical Commission (IEC), American Society for Testing and Materials (ASTM), Rural Utilities Service (RUS), The Institute of Electrical and Electronics Engineers (IEEE), and Insulated Cable Engineers Association (ICEA).

2.0 TUBE CABLE DESIGN

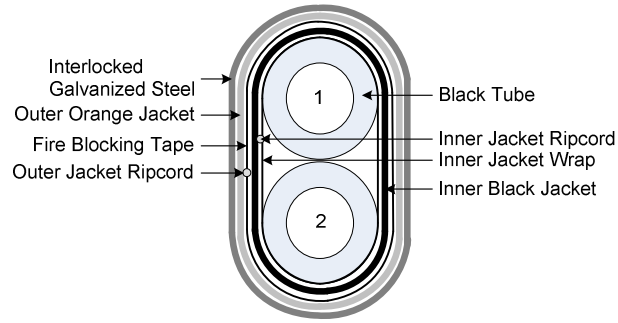
2.1 General

Sumitomo's FutureFLEX® TRX-1 series tube cables provide a small diameter, lightweight, indoor pathway for FutureFLEX® fiber bundle installations with armored protection against damage. FutureFLEX® ABF fiber bundles are available in Single Mode, 50 micron and 62.5 micron Multimode versions with 2, 4, 6, 12, 18, or 24 fiber strand counts. One fiber bundle can be field-installed in each tube.

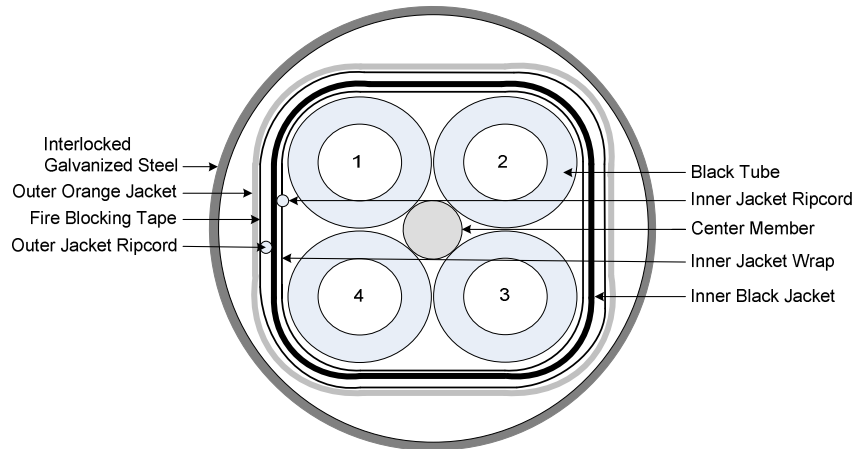
2.2 Construction

| SEL Part Number | Product Description | Outside Diameter (in.) | Max. Weight (lbs./ft.) | Max. Tensile Load (lbs.) |
|-----------------|--|------------------------|------------------------|--------------------------|
| TC02TRX-1 | 2- tubes, black, inner jacket wrap, black inner fire retardant jacket, inner ripcord, fire blocking tape, outer ripcord, orange fire retardant outer jacket with an interlocked galvanized steel armor wrap | 1.3 | .727 | 500 |
| TC04TRX-1 | 4- tubes, black, inner jacket wrap, black inner fire retardant jacket, inner ripcord, fire blocking tape, outer ripcord, orange fire retardant outer jacket with an interlocked galvanized steel armor wrap | 1.3 | .822 | 500 |
| TC07TRX-1 | 7- tubes, black, inner jacket wrap, black inner fire retardant jacket, inner ripcord, fire blocking tape, outer ripcord, orange fire retardant outer jacket with an interlocked galvanized steel armor wrap | 1.55 | 1.1 | 600 |
| TC19TRX-1 | 19- tubes, black, inner jacket wrap, black inner fire retardant jacket, inner ripcord, fire blocking tape, outer ripcord, orange fire retardant outer jacket with an interlocked galvanized steel armor wrap | 2.14 | 1.72 | 600 |

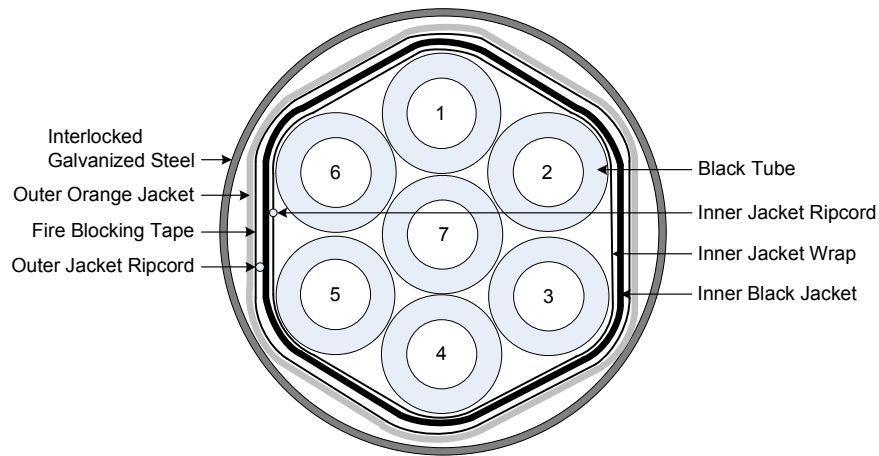
Drawings Are Not To Scale



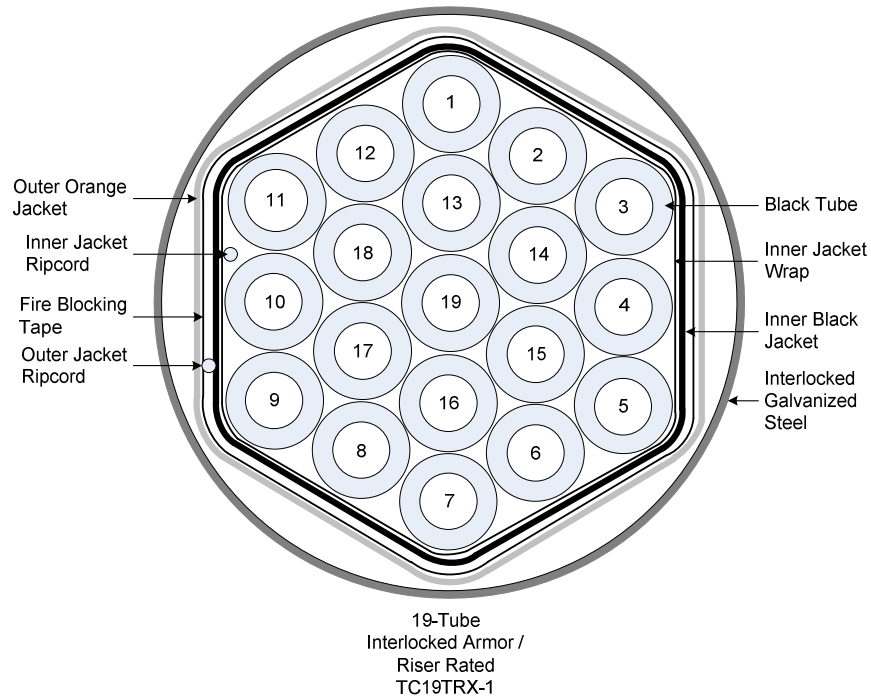
2-Tube
Interlocked Armor /
Riser Rated
TC02TRX-1



4-Tube
Interlocked Armor /
Riser Rated
TC04TRX-1



7-Tube
Interlocked Armor /
Riser Rated
TC07TRX-1



3.0 TUBE CABLE CHARACTERISTICS

3.1 Performance

| Property | Specification |
|---|---------------------------------------|
| Operation Temperature Range | -4° to +158°F |
| Minimum Bend Radius (During / After Installation) | 20 / 10 x tube cable outside diameter |

3.2 Tube Markings

The outside surface of each jacketed cable under the armoring is marked every two (2) feet with the following information:

”Phone Receiver” SEL FutureFLEX® (SEL Part No.) Type OFNR (UL) c (UL) E146200 Field Assembled Optical Fiber Cable CSA 238147 OFN FT4 (Manufacturing Lot #) (Seq. Ftg.) 1-877-356-FLEX WWW.FUTUREFLEX.COM ←

The outside surface of each tube is marked every two (2) inches with the tube designation number (1 through 19).

3.3 Reel Markings

The outside of each flange is marked with the Sumitomo Electric Lightwave Corp. product part number, the tube cable manufactured length in feet, and the text “Do Not Lay Flat.”

3.4 Tube Cable Ends

Both ends of the tube cable are accessible on the reel. Each tube is sealed with a plastic cap or plug. Tube cable ends are sealed with a heat shrink end cap.

3.5 Reel Lengths

| Sumitomo Part No. | Std Reel Length (ft) | Std Reel H x W (in) | Minimum Drum Diameter (in) | Std Reel Weight (lbs) Empty | Std Reel Weight (lbs) Full |
|-------------------|----------------------|---------------------|----------------------------|-----------------------------|----------------------------|
| TC02TRX-1 | 1000 | 60 x 42 | 40 | 420 | 1147 |
| TC04TRX-1 | 1000 | 60x 42 | 40 | 420 | 1242 |
| TC07TRX-1 | 1000 | 60 x 42 | 40 | 420 | 1530 |
| TC19TRX-1 | 1000 | 60 x 42 | 40 | 420 | 2140 |

Notes:

- Standard Reel Length tolerances are $\pm 5\%$
- All Reel Widths shown are approximate values only and measured across outside-of-flanges
- If tube cable is re-spoiled, the Minimum Drum Diameter of the new reel shall be as shown to avoid damaging tube cable product
- All Empty and Full Reel Weights shown are approximate values only

3.6 Maximum Reel Lengths

| Sumitomo Part No. | Max Reel Length (ft) | Max Reel H x W (in) | Minimum Drum Diameter (in) | Max Reel Weight (lbs) Empty | Max Reel Weight (lbs) Full |
|-------------------|----------------------|---------------------|----------------------------|-----------------------------|----------------------------|
| TC02TRX-1 | 3000 | 72 x 42 | 40 | 523 | 2704 |
| TC04TRX-1 | 3000 | 72 x 42 | 40 | 523 | 2878 |
| TC07TRX-1 | 3000 | 72 x 42 | 40 | 523 | 3853 |
| TC19TRX-1 | 2000 | 72 x 42 | 40 | 523 | 3963 |

Notes:

- Standard Reel Length tolerances are $\pm 5\%$
- All Reel Widths shown are approximate values only and measured across outside-of-flanges
- If tube cable is re-spoiled, the Minimum Drum Diameter of the new reel shall be as shown to avoid damaging tube cable product
- All Empty and Full Reel Weights shown are approximate values only

4.0 BLOWING PERFORMANCE / TESTING

Each finished tube cable on its reel is required to pass a 5mm diameter steel ball from end to end using 70 psi (+/-10 psi) gas pressure

5.0 INSTALLATION / HANDLING PRACTICES

Sumitomo has incorporated a wide range of technical support and training services for our tube cable products into our Technical Support Services (TSS) program. TSS offers training in the areas of cable installation, sheath entry, splicing, testing, and system troubleshooting. The services are available in a variety of media formats and can be customized to better accommodate individual training needs. The TSS program consists of an extensive series of recommended procedure documents, training courses with classroom and hands-on instruction. Please contact Sumitomo's Customer Service department for more information.

6.0 ORDERING INFORMATION

To learn more about Sumitomo's cables or to place an order, call, fax, e-mail, or write us at:

Sumitomo Electric Lightwave Corp.
78 Alexander Drive
Research Triangle Park, NC 27709
Attn: Customer Service Department

Phone: 800-358-7378
919-541-8100
Fax: 919-541-8265
E-mail: info@sumitomoelectric.com

Sumitomo Electric Lightwave reserves the right to improve, enhance, or modify the cable's features and specifications. For special requirements different than those shown above, please contact our Inside Sales Department. Each Sumitomo Electric Lightwave Corp. optic cable and/or its manufacture may be covered by one or more of the following US Patents: 4,715,677 4,729,629 4,763,983 4,770,489 4,828,349 4,953,945 5,043,037 5,082,347 5,165,003 D331,567 5,247,599 5,410,901 5,471,555 5,642,452.