



FutureFLEX[®]

AIR-BLOWN FIBER[®] SOLUTIONS

SUMITOMO PRODUCT SPECIFICATION

FutureFLEX[®]

TCxxTRC-1 SINGLE-JACKETED RISER RATED (OFNR) TUBE CABLE SERIES WITH GALVANIZED STEEL INTERLOCKED ARMORING



SUMITOMO ELECTRIC LIGHTWAVE

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1.0 GENERAL

This specification covers the design requirements and performance standards for FutureFLEX® Air-Blown Fiber (ABF) single-jacketed Riser-rated tube cables with galvanized steel interlocked armoring. 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® TRC-1 single-jacketed Riser-rated tube cables are designed for use as an optical fiber cabling infrastructure in ABF applications that require OFNR fire rating plus armored protection. The TR3-1 riser rated tube cables are UL 1666 and CSA OFN FT4 listed. They may also be used in indoor applications where: 1) lesser fire ratings, such as Optical Fiber Nonconductive – General Purpose (OFN) apply or 2) no fire ratings apply but armored protection is required. The individual tubes have a 6mm inside diameter and 8mm outside diameter. A non-woven glass fiber tape wrap surrounds the tubes. The outer jacket of the core is made of orange fire-retardant PVC. Ripcords are provided to aid in jacket removal. The tube cable core is encased in an interlocked galvanized steel armor. 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

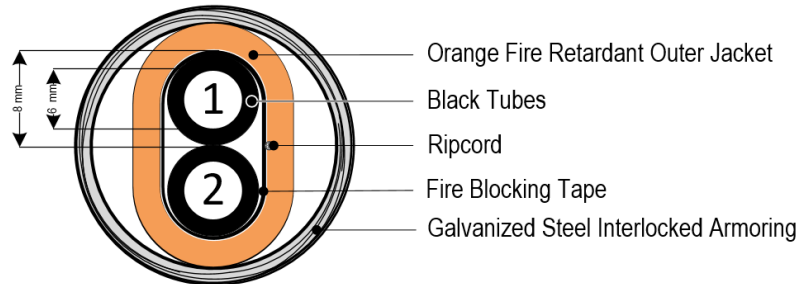
2.1 General

Sumitomo's FutureFLEX® TRC-1 single-jacketed Riser-rated series tube cables provide a small diameter indoor pathway for FutureFLEX® fiber bundle installations. FutureFLEX® ABF fiber bundles are available in Single-mode OS2, 62.5 micron Multimode OM1, 1-Gigabit 50 micron Multimode OM2, Laser Optimized 10-Gigabit 50 micron Multimode OM3, and Laser Optimized 10-Gigabit 50 micron Multimode OM4 versions with 6, 12, 24, 48 fiber strand counts. 72 fiber strand bundles are available in single-mode only. One fiber bundle can be field-installed in each tube. (Refer SEL Drawing: SD-F04-002)

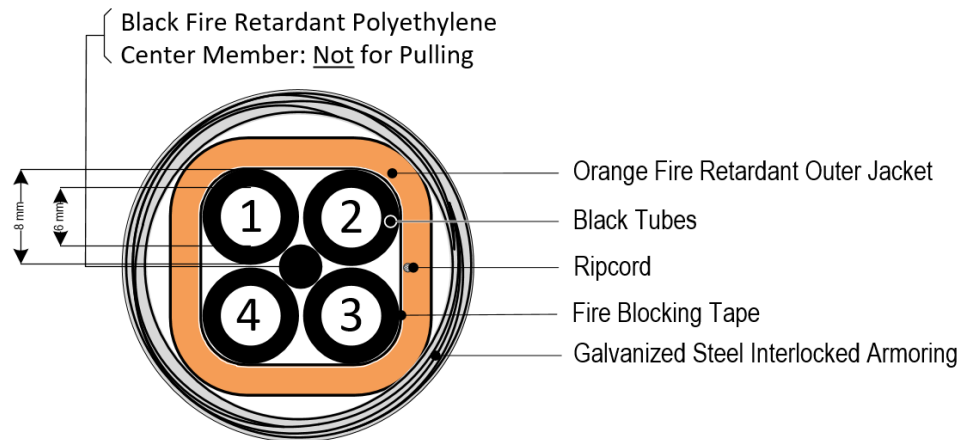
2.2 Construction

| SEL Part Number | Product Description | Outside Diameter (in.) | Max. Weight (lbs. /kft.) | Max. Tensile Load (lbs.) |
|-----------------|--|------------------------|--------------------------|--------------------------|
| TC02TRC-1 | 2- tubes, fire blocking tape wrap, ripcord, orange fire retardant outer jacket, encased in a galvanized steel interlocked armor | 1.08 | 543 | 500 |
| TC04TRC-1 | 4- tubes, fire blocking tape wrap, black fire retardant polyethylene center member, ripcord, orange fire retardant outer jacket, encased in a galvanized steel interlocked armor | 1.20 | 748 | 500 |
| TC07TRC-1 | 7- tubes, fire blocking tape wrap, ripcord, and orange fire retardant outer jacket, encased in a galvanized steel interlocked armor | 1.39 | 982 | 600 |
| TC12TRC-1 | 12- tubes, fire blocking tape wrap, ripcord, and orange fire retardant outer jacket, encased in a galvanized steel interlocked armor | 1.73 | 1101 | 600 |
| TC19TRC-1 | 19- tubes, fire blocking tape wrap, ripcord, and orange fire retardant outer jacket, encased in a galvanized steel interlocked armor | 2.03 | 1783 | 600 |

Drawings Not to Scale

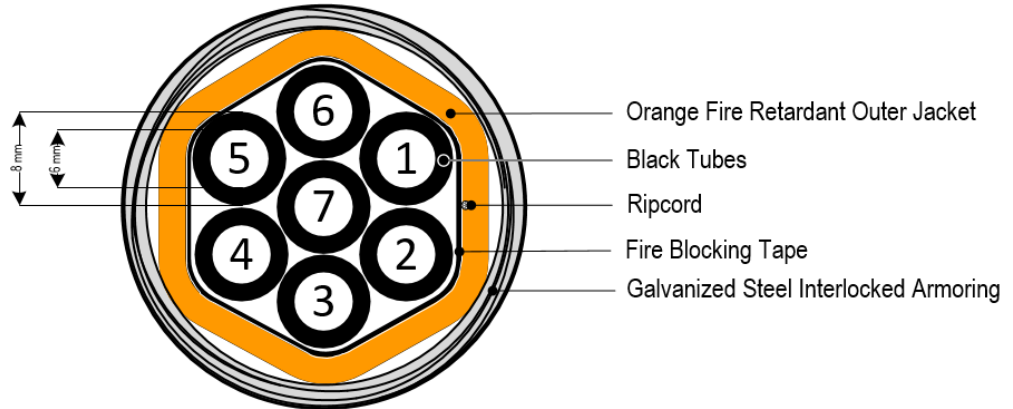


TC02TRC-1

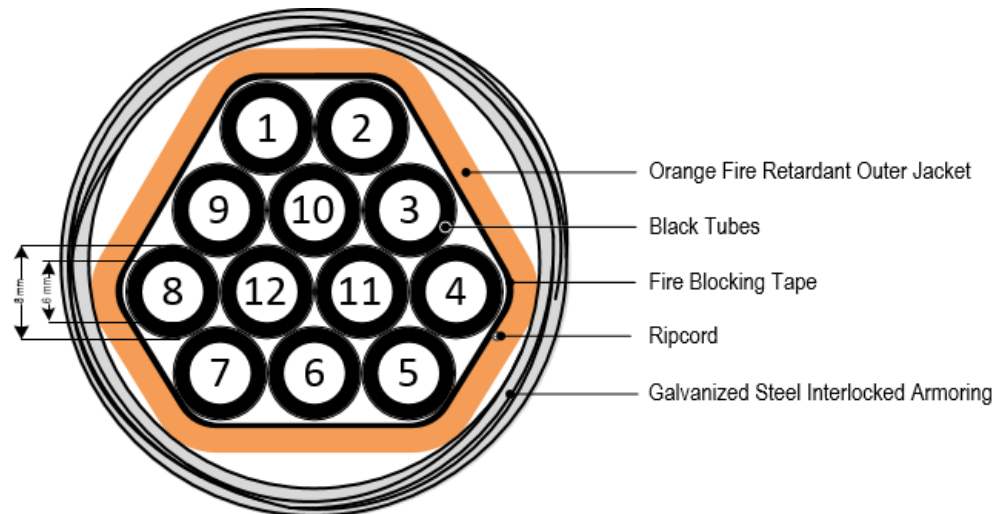


TC04TRC-1

Drawings Not To Scale

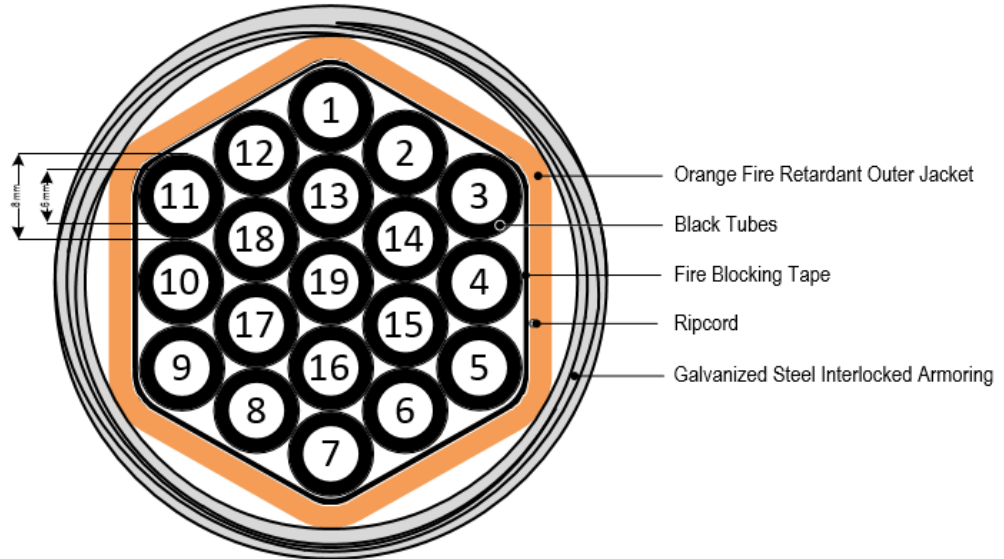


TC07TRC-1



TC12TRC-1

Drawing Not To Scale



TC19TRC-1

3.0 TUBE CABLE CHARACTERISTICS

3.1 Performance

| Property | Specification |
|---|---------------------------------------|
| Operation Temperature Range | -4° F to +158° F (-20° C to +70° C) |
| Minimum Bend Radius (During / After Installation) | 20 / 10 x tube cable outside diameter |

3.2 Tube Markings

The outside surface of each tube in multi-tube configurations is marked every two (2) inches with a tube number designation number (1 through 19).

In accordance with UL requirements, the outside surface of each cable jacket, under the armoring, is marked every two (2) feet with the following product identification information:

SEL FutureFLEX® (SEL Part No.) Type OFNR (UL) c(UL) E146200 Armored Field Assembled Optical Fiber Cable (Manufacturing Lot #) (Seq. Ftg.)
1-877-356-FLEX WWW.SUMITOMOELECTRICLIGHTWAVE.COM ←

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” and “Forklift from Flanges Only.”

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 Tube Cable Reel Data

| Sumitomo Part No. | Reel Length (feet) | Reel F x W (inches) | Minimum Drum Diameter (inches) | Empty Reel Weight (lbs) | Full Reel Weight (lbs) |
|-------------------|--------------------|---------------------|--------------------------------|-------------------------|------------------------|
| TC02TRC-1 | 1000 | 60 x 32 | 30 | 410 | 963 |
| TC02TRC-1 | 1500 | 60 x 32 | 30 | 410 | 1240 |
| TC02TRC-1 | 2000 | 60 x 32 | 30 | 410 | 1516 |
| TC02TRC-1 | 2500 | 60 x 32 | 30 | 410 | 1793 |
| TC02TRC-1 | 3000 | 60 x 32 | 30 | 410 | 2069 |
| TC04TRC-1 | 1000 | 60 x 32 | 30 | 410 | 1090 |
| TC04TRC-1 | 1500 | 60 x 32 | 30 | 410 | 1430 |
| TC04TRC-1 | 2000 | 60 x 32 | 30 | 410 | 1770 |
| TC04TRC-1 | 2500 | 60 x 32 | 30 | 410 | 2110 |
| TC04TRC-1 | 3000 | 60 x 32 | 30 | 410 | 2450 |
| TC07TRC-1 | 1000 | 60 x 32 | 30 | 410 | 1214 |
| TC07TRC-1 | 1500 | 60 x 32 | 30 | 410 | 1616 |
| TC07TRC-1 | 2000 | 60 x 32 | 30 | 410 | 2018 |
| TC07TRC-1 | 2500 | 60 x 32 | 30 | 410 | 2420 |
| TC07TRC-1 | 3000 | 60 x 32 | 30 | 410 | 2822 |
| TC12TRC-1 | 1000 | 60 x 32 | 30 | 410 | 1385 |
| TC12TRC-1 | 1500 | 60 x 32 | 30 | 410 | 1873 |
| TC12TRC-1 | 2000 | 72 x 42 | 36 | 652 | 2602 |
| TC12TRC-1 | 2500 | 72 x 42 | 36 | 652 | 3090 |
| TC12TRC-1 | 3000 | 72 x 42 | 36 | 652 | 3577 |
| TC19TRC-1 | 1000 | 72 x 42 | 36 | 652 | 1996 |
| TC19TRC-1 | 1500 | 72 x 42 | 36 | 652 | 2668 |
| TC19TRC-1 | 2000 | 72 x 42 | 36 | 652 | 3340 |
| TC19TRC-1 | 2500 | 72 x 42 | 36 | 652 | 4012 |
| TC19TRC-1 | 3000 | 72 x 42 | 36 | 652 | 4684 |

Notes:

- TCxxTRC-1 Armored Riser Tube Cable Designs are available in Reel Lengths of 1,000-, 1,500-, 2,000-, 2,500-, and 3,000-feet unless otherwise noted.
- All Reel Length tolerances are $\pm 5\%$.
- Cut Lengths are available. Contact FutureFLEX[®] Distributor for additional information.
- If tube cable is re-spooled, the minimum Drum Diameter of the new reel SHALL be no less than that specified herein to avoid damaging tube cable product.
- All Reel Widths shown are approximate values only and measured from outside-of-flange to outside-of-flange plus an allowance for fastener hardware protrusions.
- All Empty and Full Reel Weights shown are approximate values only.
- TC24TRC-1 Not Available.

4.0 TESTING

Each finished tube cable is required to pass a 5mm diameter 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
201 South Rogers Lane
Suite 100, Raleigh, NC 27610
Attn: Customer Service Department
Phone: 800-358-7378
919-541-8100
Fax: 919-541-8265
E-mail: info@sumitomoelectric.com
URL: www.sumitomoelectriclightwave.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.