



FutureFLEX®
AIR-BLOWN FIBER® SOLUTIONS

SUMITOMO PRODUCT SPECIFICATION

FutureFLEX®

**TCxxTP2-1 PLENUM RATED TUBE CABLE SERIES (NFPA 262)
WITH GALVANIZED STEEL INTERLOCKED ARMORING**



**SUMITOMO ELECTRIC
LIGHTWAVE**

SUMITOMO ELECTRIC LIGHTWAVE CORP.

201 South Rogers Lane, Suite 100, Raleigh, NC 27610

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

www.sumitomoelectriclightwave.com

SEL is a Member of the Sumitomo Electric Industries, Ltd. Group

Sumitomo Electric Lightwave reserves the right to improve or modify these specifications without notice.

CONTENTS

| | | |
|------------|--|----------|
| 1.0 | General | 3 |
| 1.1 | Tube Cable Description | 3 |
| 1.2 | Quality | 3 |
| 1.3 | Reliability | 3 |
| 2.0 | Tube Cable Design | 4 |
| 2.1 | General | 4 |
| 2.2 | Construction | 4-7 |
| 3.0 | Tube Cable Characteristics | 8 |
| 3.1 | Performance | 8 |
| 3.2 | Tube and Jacket Markings | 8 |
| 3.3 | Reel Markings | 8 |
| 3.4 | Tube Cable Ends | 8 |
| 3.5 | Tube Cable Reel Data | 8 |
| 4.0 | Testing | 9 |
| 5.0 | Installation / handling Practices | 9 |
| 6.0 | Ordering Information | 9 |

1.0 GENERAL

This specification covers the design requirements and performance standards for FutureFLEX® Air-Blown Fiber® (ABF) interlocking galvanized steel armored, plenum rated, jacketed tube cables. 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® TP2-1 series tube cables are designed for use as an optical fiber cabling infrastructure in ABF applications that require an OFNP fire rating plus armored protection. TP2-1 series tube cables are NFPA 262 listed. TP2-1 series tube cables may also be used in indoor applications where: 1) lesser fire ratings such as Optical Fiber Conductive Riser (OFCR) or Optical Fiber Conductive General Purpose (OFCG) apply or 2) no fire ratings apply but extremely rugged, high crush resistant armoring is required. The outer jacket of the core is grey. The individual tubes have a 5.5 mm inside diameter and an 8 mm outside diameter, where the tubes and jacket are comprised of plenum rated PVC material. The inner tube-liner material is comprised of White PVC infused with Silicone to reduce friction and provide strength/firmness preventing unnecessary flexibility of the inner-tubes. The tube cable core is encased in a galvanized steel interlocked armor with no outer jacket. These tube cables are pulled or placed in indoor routes for the purpose of individual tube interconnection to establish pathways for FutureFLEX® fiber bundle installation. All TP2-1 Series tube cables require grounding and bonding in accordance with EIA/TIA 607 Standards. A ripcord is provided to aid in outer jacket removal.

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 Telcordia, 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

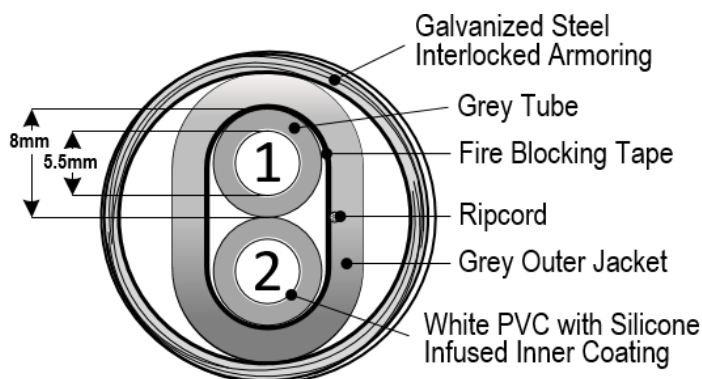
2.1 General

Sumitomo's FutureFLEX® TP2-1 series tube cables provide a small diameter, lightweight, 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. (Ref SEL Drawing SD-F04-004)

2.2 Construction

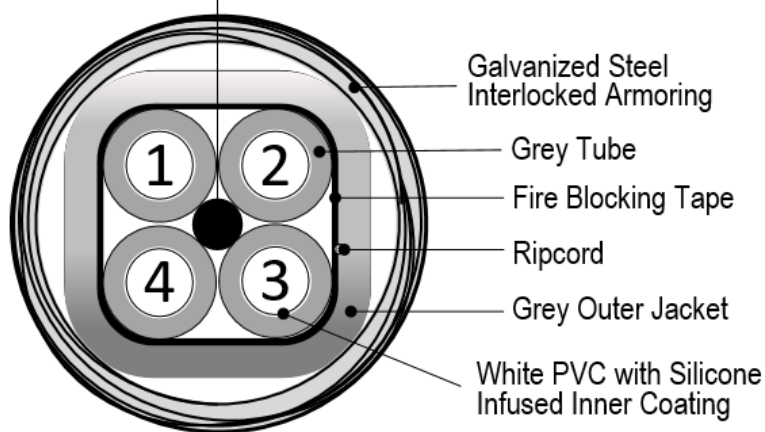
| SEL Part Number | Product Description | Outside Diameter (in.) | Max. Weight (lbs. / kft.) | Max. Tensile Load (lbs.) |
|-----------------|--|------------------------|---------------------------|--------------------------|
| TC02TP2-1 | 2- Plenum rated tubes, fire blocking tape, ripcord, jacketed, galvanized steel interlocking armor | 1.31 | 559 | 500 |
| TC04TP2-1 | 4- Plenum rated tubes, polyethylene center member, fire blocking tape, ripcord, jacketed, galvanized steel interlocking armor. | 1.31 | 608 | 500 |
| TC07TP2-1 | 7- Plenum rated tubes, fire blocking tape, ripcord, jacketed, with a galvanized steel interlocking armor. | 1.50 | 887 | 600 |
| TC12TP2-1 | 7- Plenum rated tubes, fire blocking tape, ripcord, jacketed, with a galvanized steel interlocking armor. | 1.69 | 1100 | 600 |
| TC19TP2-1 | 19- Plenum rated tubes, fire blocking tape, ripcord, jacketed, with a galvanized steel interlocking armor. | 2.15 | 1696 | 600 |

Drawings Are Not To Scale



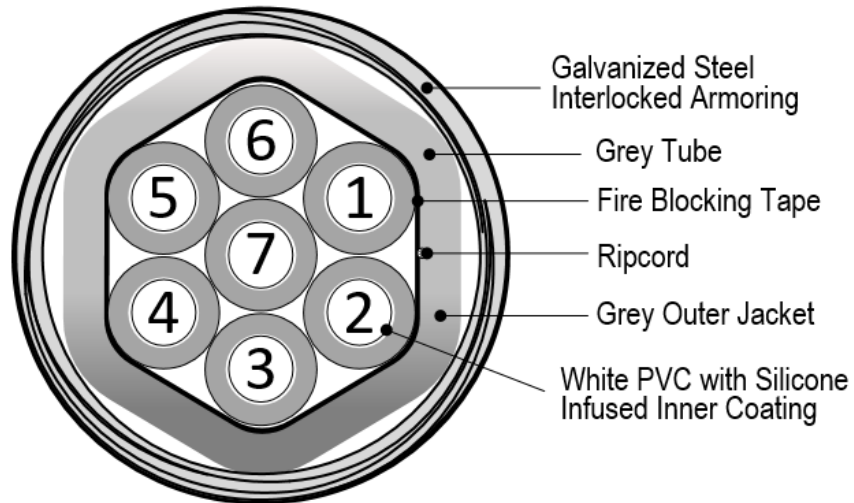
TC02TP2-1

Black Fire Retardant Polyethylene
Center Member: Not for Pulling

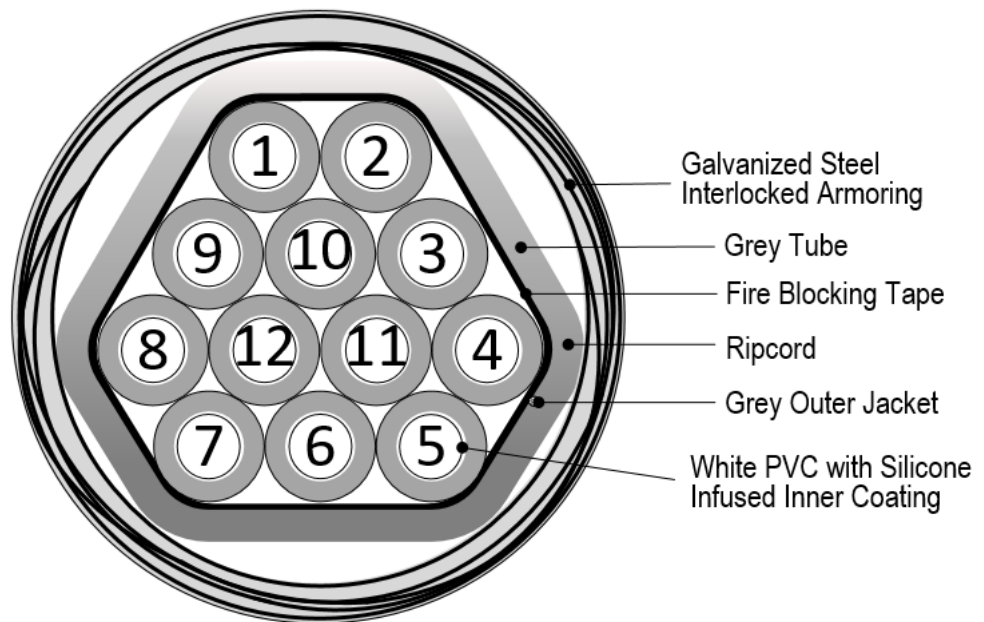


TC04TP2-1

Drawings Are Not To Scale

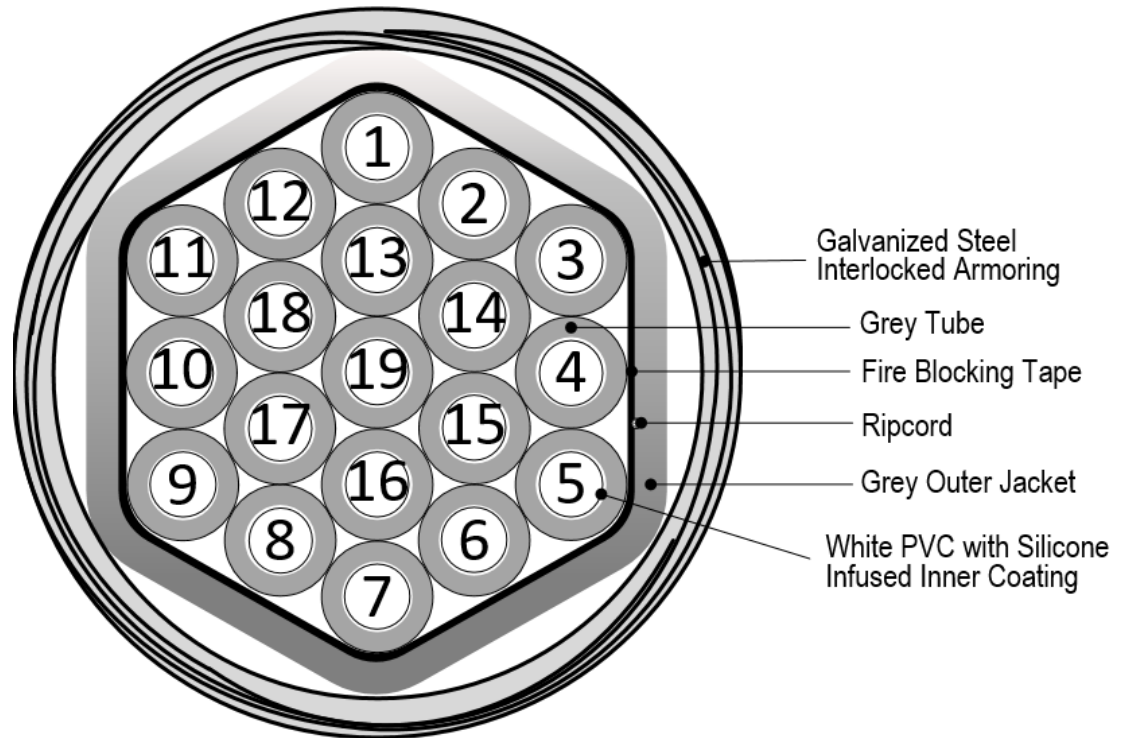


TC07TP2-1



TC12TP2-1

Drawing Are Not To Scale



TC19TP2-1

3.0 TUBE CABLE CHARACTERISTICS

3.1 Performance

| Property | Specification |
|---|--|
| Operation Temperature Range | +32° to +158° F (0° C to +70° (per ICEA 596) |
| Minimum Bend Radius (During / After Installation) | 20 / 10 x tube cable outside diameter |

3.2 Tube and Jacket Markings

The outside surface of each tube in multi-tube configurations is marked every two inches with a tube 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 OFNP (UL) c(UL) E146200 Field Assembled Optical Fiber Cable CSA 238147 OFN FT6-(Manufacturing Lot #-) (Sequential Footage)**
1-877-356-FLEX WWW.SUMITOMOELECTRICLIGHTWAVE.COM ←

3.3 Reel Markings

The outside of each reel 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 Tube Cable Reel Data

| Sumitomo Part No. | Reel Length (ft) | Reel F x W (in) | Minimum Drum Diameter (in) | Reel Weight (lbs) Empty | Reel Weight (lbs) Full |
|-------------------|------------------|-----------------|----------------------------|-------------------------|------------------------|
| TC02TP2-1 | 1000 | 60 x 32 | 30 | 410 | 912 |
| TC04TP2-1 | 1000 | 60 x 32 | 30 | 410 | 1090 |
| TC07TP2-1 | 1000 | 72 x 42 | 36 | 652 | 1506 |
| TC12TP2-1 | 1000 | 84 x 54 | 36 | 930 | 2096 |
| TC19TP2-1 | 1000 | 84 x 54 | 36 | 930 | 2475 |

Notes:

- TCxxTP2-1 Armored Plenum Tube Cable Designs are only available in 1,000-foot Reel Lengths.
- Reel Length tolerances are $\pm 5\%$.
- Cut Lengths are available. Contact FutureFLEX® Distributor for additional information.
- If tube cable is re-spoiled, 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.
- Refer to SEL SRP “SP-F04-039” for special TP2-1 armored tube cable installation procedures.

4.0 TESTING

Each finished tube cable is required to pass a 4.5mm 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 S 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.