



SUMITOMO PRODUCT SPECIFICATION

FutureFLEX®

**TCxxTOX-2 OSP TUBE CABLE SERIES
WITH GALVANIZED STEEL INTERLOCKING ARMOR**



SUMITOMO ELECTRIC LIGHTWAVE CORP.

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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.

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1.0 General

This specification covers the design requirements and performance standards for FutureFLEX[®] Air-Blown Fiber[®] (ABF) galvanized interlocking steel armored outside plant tube cables. These tube cables are designed for outdoor 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[®] Outside Plant series tube cables with galvanized steel interlocking armor are designed for use in direct buried installations, flooded environments, or applications that require a very high degree of crush resistance. The tubes are made of a black polyethylene and have a 6mm inside diameter and 8mm outside diameter. The tubes are wrapped with a non-conductive water-blocking tape. The inner jackets are made of a black polyethylene. A ripcord is provided to aid in inner jacket removal. A galvanized steel interlocking armor surrounds the inner jacket. The outer jacket is made of a black polyethylene. These tube cables are pulled or placed in 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).

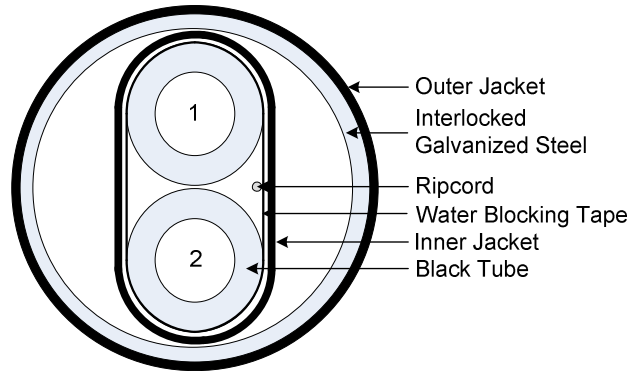
2.0 Tube Cable Design

2.1 General

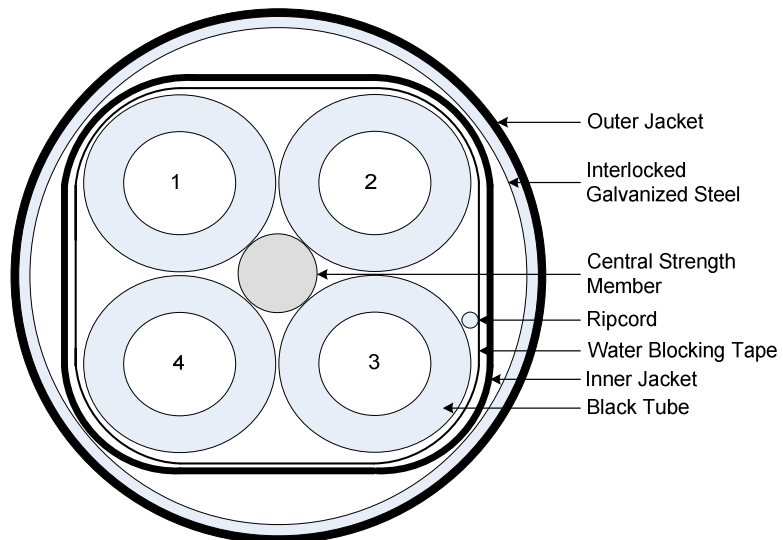
Sumitomo's FutureFLEX® OSP series tube cables with galvanized steel interlocking armor provide a small diameter, outdoor pathway for FutureFLEX® fiber bundle installations. FutureFLEX® ABF fiber bundles are available in Single Mode, 50 micron and 62.5 micron Multimode versions with 2, 4, 6, 12, 18, or 24 fiber strand counts. One fiber bundle can be field-installed in each tube.

2.2 Construction

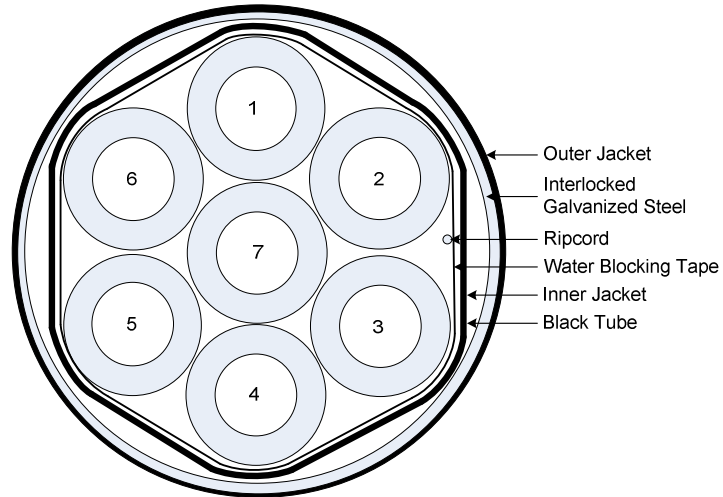
SEL Part Number	Product Description	Outside Diameter (in.)	Max. Weight (lbs./kft.)	Max. Tensile Load (lbs.)
TC02TOX-2	2-tubes, black, wrapped with water-blocking tape, ripcord, black inner polyethylene jacket, galvanized steel interlocking armor, and black outer polyethylene jacket	1.2	589	500
TC04TOD-2	4-tubes, black, wrapped with water-blocking tape, ripcord, black inner polyethylene jacket, galvanized steel interlocking armor, and black outer polyethylene jacket	1.3	734	500
TC07TOX-2	7-tubes, black, wrapped with water-blocking tape, ripcord, black inner polyethylene jacket, galvanized steel interlocking armor, and black outer polyethylene jacket	1.50	825	600
TC19TOX-2	19-tubes, black, wrapped with water-blocking tape, ripcord, black inner polyethylene jacket, galvanized steel interlocking armor, and black outer polyethylene jacket	2.10	1152	600



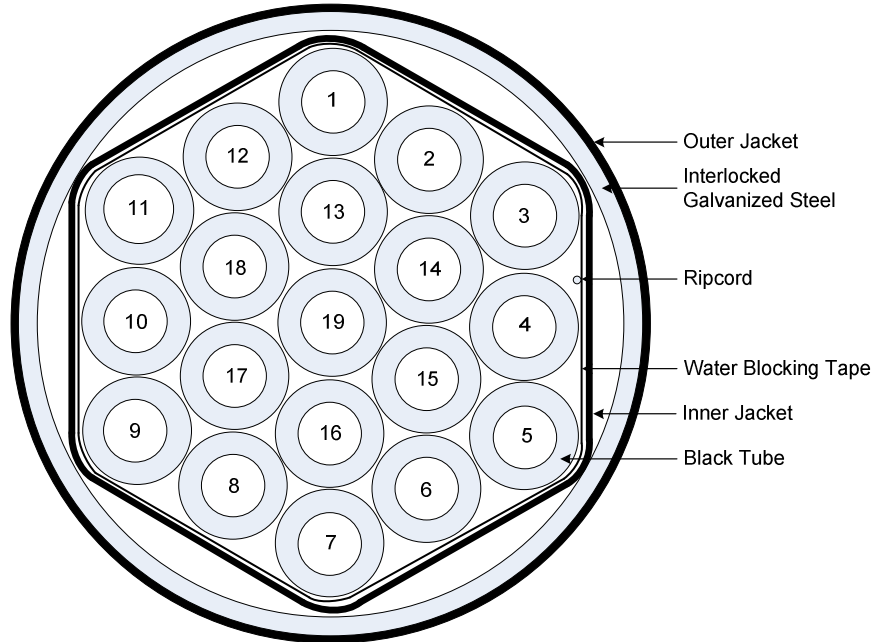
2-Tube
Interlocked Armor /
Dielectric OSP Cable
TC02TOX-2



4-Tube
Interlocked Armor /
Dielectric OSP Cable
TC04TOD-2



7-Tube
Interlocked Armor /
Dielectric OSP Cable
TC07TOX-2



19-Tube
Interlocked Armor /
Dielectric OSP Cable
TC19TOX-2

3.0 Tube Cable Characteristics

3.1 Performance

Property	Specification
Operation Temperature Range	-65° to +158°F
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 is marked every two (2) inches with the tube designation number (1 through 19).

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

'Phone Receiver' SEL FutureFLEX® TCxxTOX-2 (#)-Tube Armored OSP Optical Fiber Cable, A-(Lot #-1, -2, -3, etc.) (Seq. Ftg.) 1-877-356-FLEX WWW.FUTUREFLEX.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."

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.

Standard 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
TC02TOX-2	1000	50 x 39	40	308	897
TC04TOD-2	1000	50 x 39	40	308	1041
TC07TOX-2	1000	60 x 49	40	420	1245
TC19TOX-2	1000	60 x 49	40	420	1572

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

3.5 Maximum Reel Lengths

Sumitomo Part No.	Max Reel Length (ft)	Max Reel H x W (in)	Minimum Drum Diameter (in)	Std Reel Weight (lbs) Empty	Std Reel Weight (lbs) Full
TC02TOX-2	3000	72 x 49	40	523	2557
TC04TOD-2	3000	72 x 49	40	523	2725
TC07TOX-2	3000	72 x 49	40	523	2998
TC19TOX-2	2300	72 x 49	40	523	3173

Notes:

- Maximum 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.