



FutureFLEX[®]
AIR-BLOWN FIBER[®] SOLUTIONS

SUMITOMO PRODUCT SPECIFICATION

FutureFLEX[®]

**TCxxMSOS DIELECTRIC HIGH PERFORMANCE
OSP TUBE CABLE SERIES**



SUMITOMO ELECTRIC LIGHTWAVE CORP.

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

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1.0 GENERAL

This specification covers the design requirements and performance standards for FutureFLEX® Air-Blown Fiber® (ABF) dielectric, UV resistant low shrink 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® MSOS Dielectric High Performance OSP series tube cables are designed for use as an optical fiber cabling infrastructure in ABF applications that require non-conductive elements. The MSOS, tube cables are ideal for aerial or duct installations and, all OSP applications that require Enhanced Thermal Stability. They may also be used in indoor applications where: 1) the tube cable is installed in rigid steel conduit or 2) no fire ratings apply. The tubes are made of a high performance black HDPE and have a 6mm inside diameter and 8mm outside diameter. Part-Number-TC04MSOS only, the cable construction includes an HDPE Center Member. The tubes are wrapped with a non-conductive water-blocking tape. The outer jackets are made of a high performance black HDPE with four extruded linear yellow stripes set at 90° apart. A ripcord is provided to aid in outer jacket removal. 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 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

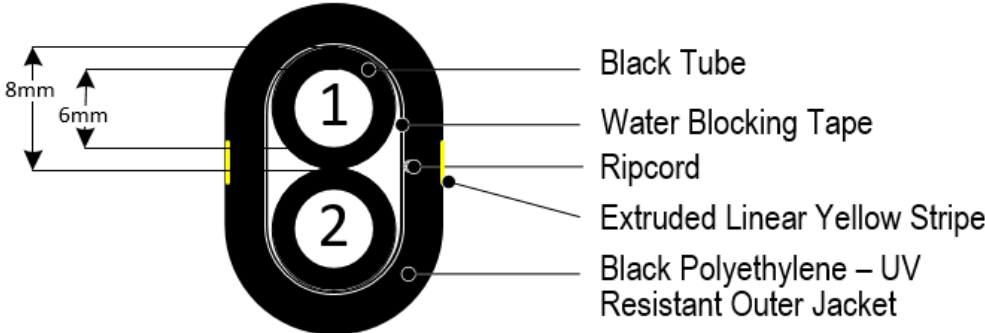
2.1 General

Sumitomo’s FutureFLEX® MSOS series tube cables provide a small diameter, lightweight, outdoor 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-F04-007)

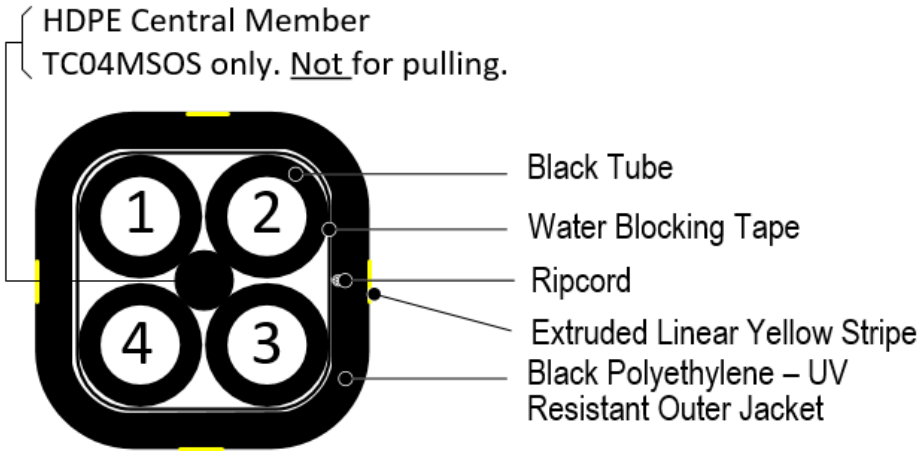
2.2 Construction

SEL Part Number	Product Description	Outside Diameter (in.)	Max. Weight (lbs./kft.)	Max. Tensile Load (lbs.)
TC02MSOS	2- high performance tubes, wrapped with water-blocking tape, ripcord, and black high performance polyethylene outer jacket with 4 yellow stripes	0.81	90	200
TC04MSOS	4- high performance tubes, around a HDPE central member, wrapped with water-blocking tape, ripcord, and black high performance polyethylene outer jacket with 4 yellow stripes	0.94	146	200
TC07MSOS	7- high performance tubes, wrapped with water-blocking tape, ripcord, and black high performance polyethylene outer jacket with 4 yellow stripes	1.14	203	400
TC12MSOS	12- high performance tubes, wrapped with water-blocking tape, ripcord, and black high performance polyethylene outer jacket with 4 yellow stripes	1.51	300	400
TC19MSOS	19- high performance tubes, wrapped with water-blocking tape, ripcord, and black high performance polyethylene outer jacket with 4 yellow stripes	1.77	444	600

Drawings Not to Scale

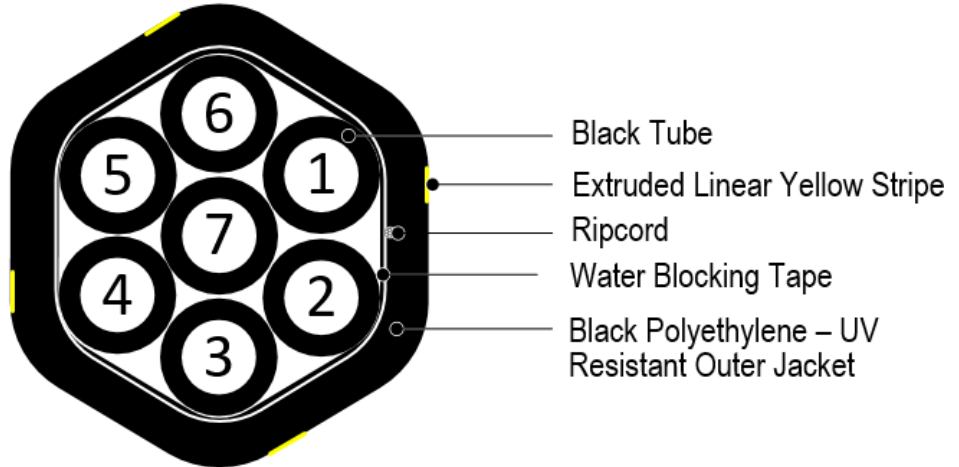


TC02MSOS

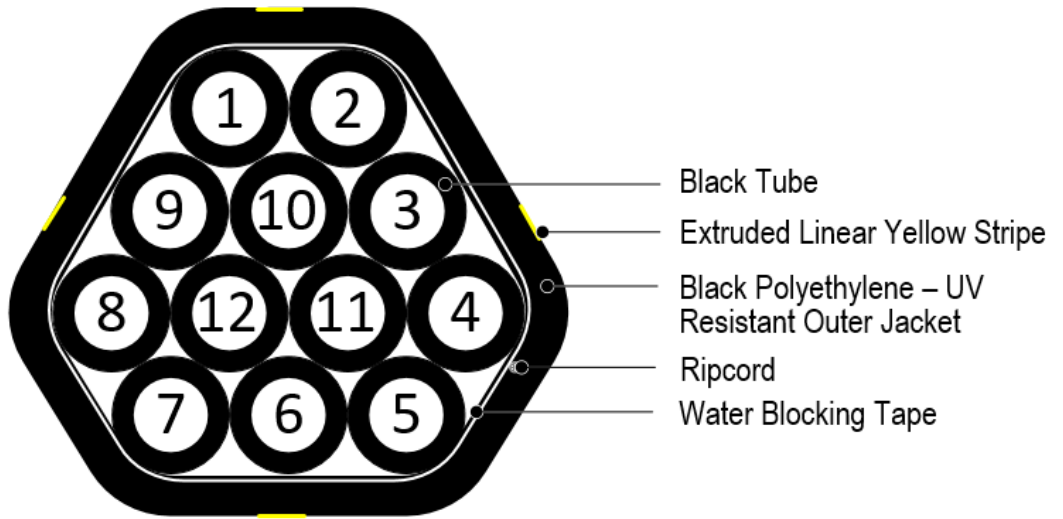


TC04MSOS

Drawings Not to Scale

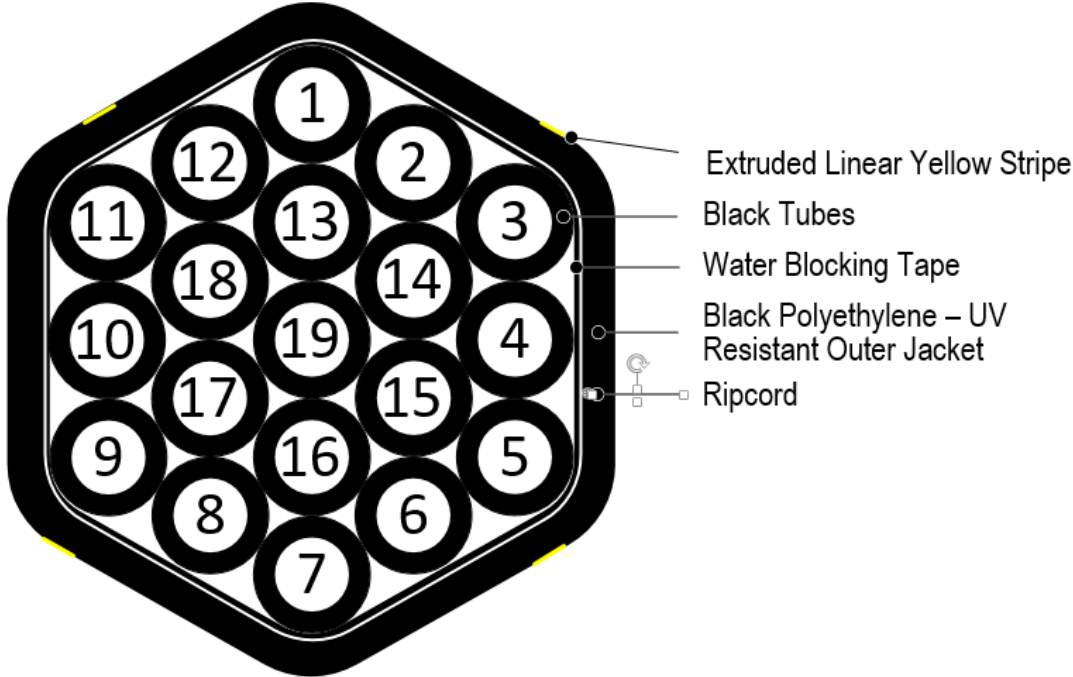


TC07MSOS



TC12MSOS

Drawing Not to Scale



TC19MSOS

3.0 TUBE CABLE CHARACTERISTICS

3.1 Performance

Property	Specification
Operation Temperature Range	-40° F to +158° F (-40° C to +70° C) (ICEA 640)
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:

 **SEL FutureFLEX® (SEL Part No.) (#)-Tube Dielectric OSP Optical Fiber Cable, A-(Lot #-1, -2, -3, etc.) (Seq. Ftg.) 1-877-356-FLEX WWW.SUMITOMO ELECTRICAL LIGHTWAVE.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.

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
TC02MSOS	1000	54 x 16	40	116	205
TC02MSOS	3000	60 x 42	40	420	686
TC04MSOS	1000	54 x 16	40	116	257
TC04MSOS	3000	60 x 42	40	420	842
TC07MSOS	1000	54 x 32	40	137	333
TC07MSOS	3000	60 x 42	40	420	1008
TC12MSOS	1000	60 X42	40	420	699
TC12MSOS	3000	72 X45	36	543	1380
TC19MSOS	1000	60 x 42	40	420	819
TC19MSOS	2500	72 x 42	40	523	1521
TC19MSOS	3000	72 x 45	36	543	1740

Notes:

- Standard Reel Lengths are 1,000-feet and Maximum Reel Lengths are 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.

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