



SUMITOMO PRODUCT SPECIFICATION

FutureFLEX®

**TCxxNA4
LOW SMOKE / ZERO HALOGEN (LS/ZH)
TUBE CABLE SERIES**



SUMITOMO ELECTRIC LIGHTWAVE CORP.

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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 4-5

3.0 Tube Cable Characteristics 6

3.1 Performance 6

3.2 Tube Markings 6

3.3 Reel Markings 6

3.4 Tube Cable Ends 6

3.5 Standard Reel Lengths 6

3.6 Maximum Reel Lengths 7

4.0 Blowing Performance / Testing 7

5.0 Installation / Handling Practices 7

6.0 Ordering Information 7

1.0 General

This specification covers the design requirements and performance standards for FutureFLEX[®] Blown Optic Fiber (BOF) NA4 LS/ZH (low smoke / zero halogen) tube cables. These tube cables are designed for shipboard 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[®] NA4 LS/ZH series tube cables are designed for use as an optical fiber cabling infrastructure in naval shipboard BOF applications that may require non-conductive elements, IEEE 383 compliance, and sea water-blocking tape. The tubes are made of a black low-smoke zero-halogen thermoplastic with a natural low-smoke zero-halogen thermoplastic inner liner. Each tube has a 6mm inside diameter and an 8mm outside diameter. In the single tube design, the tube is wrapped with served polyester yarns and has a natural low-smoke zero-halogen thermoplastic outer jacket with a blue color concentrate. In the multi-tube designs, the individual tubes are wrapped with a non-conductive salt water-blocking tape and aramid yarn binder. Black low-smoke zero-halogen thermoplastic rods are installed between the tubes (see Tube Cable Cross-Section Drawing in Section 2.2 for details). An outer layer of non-conductive salt water-blocking tape is wrapped around the tubes and rods. A single aramid yarn ripcord is provided to aid in outer jacket removal. The outer jacket is made of a natural low-smoke zero-halogen thermoplastic with a blue color concentrate. The blue-colored jacket ensures easy identification of the tube cables during the cable installation process aboard ships. These tube cables are pulled or placed in shipboard routes for the purpose of individual tube interconnection to establish pathways for FutureFLEX[®] BOF bundle installation.

1.2 Qualified Products List (QPL) Listing

Sumitomo's FutureFLEX[®] NA4 LS/ZH series tube cables have successfully met the requirements of MIL-PRF-85045; ref. Test Report Number 85045-2943-10. Government Designation M85045/25-01S applies to Sumitomo Part Number TC07NA4. Government Designation M85045/26-01S applies to Sumitomo Part Number TC01NA4.

1.3 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.

1.4 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).

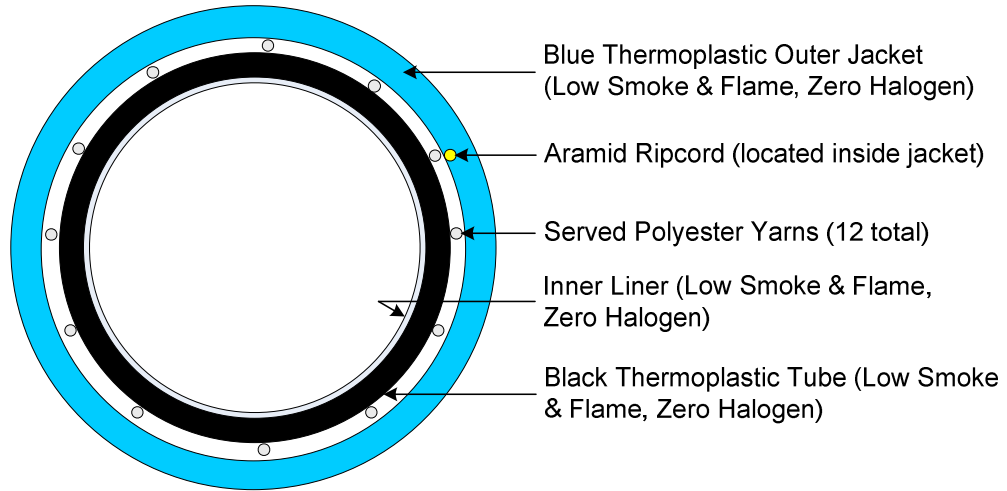
2.0 Tube Cable Design

2.1 General

Sumitomo’s FutureFLEX® NA4 LS/ZH series tube cables provide a small diameter, lightweight, indoor pathway for FutureFLEX® fiber bundle installations. For shipboard applications, FutureFLEX® BOF bundles are available in Radiation Hardened Single-mode and 62.5 / 125 micron Multimode versions with 6- and 18- fiber strand counts. One fiber bundle can be field-installed in each tube.

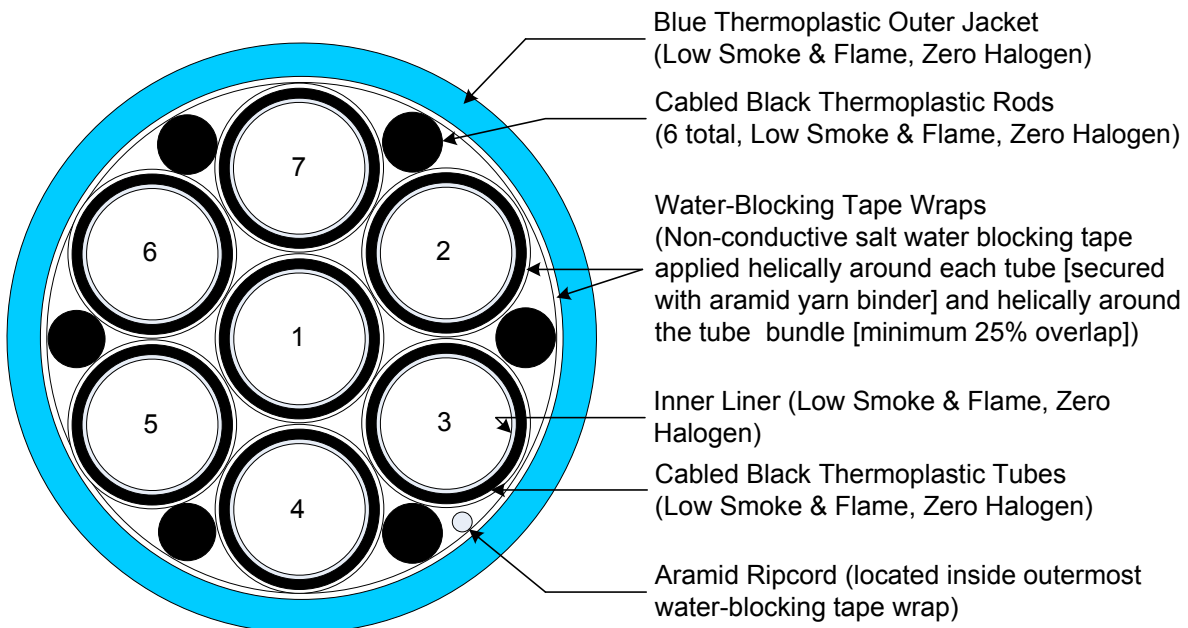
2.2 Construction

SEL Part Number	Product Description	Outside Dia. (in.)	Max. Weight (lbs./kft.)	Max. Tensile Load (lbs.)
TC01NA4	Single tube, black low-smoke zero-halogen thermoplastic with natural low-smoke zero-halogen thermoplastic inner liner, wrapped with polyester yarns, ripcord, and a blue low-smoke zero-halogen thermoplastic outer jacket	0.455	65	60
TC07NA4	7-tubes, black low-smoke zero-halogen thermoplastic with natural low-smoke zero-halogen thermoplastic inner liner, each tube wrapped with sea water-blocking tape and aramid yarn binder, black low-smoke zero-halogen thermoplastic rods between tubes, all tubes wrapped with outer layer of sea water-blocking tape, and a blue low-smoke zero-halogen thermoplastic outer jacket	1.2	438	400



Single Tube
Low Smoke / Zero Halogen Tube
TC01NA4

Drawing not to scale



7-Tube
Low Smoke / Zero Halogen Tube
TC07NA4

Drawing not to scale

3.0 Tube Cable Characteristics

3.1 Performance

Property	Specification
Operation Temperature Range	-20° to +130°F
Minimum Bend Radius (During / After Installation) (TC01NA4)	9 inches
Minimum Bend Radius (During / After Installation) (TC07NA4)	20x / 10x tube cable outside diameter

3.2 Tube Markings

The outside surface of each jacketed cable is marked every meter with the following information:

SEL FutureFLEX TCxxNA4 Air Blown Fiber Optic Cable JAN M85045/2#-01 (WW-YY) A-(Lot #-1, -2, -3, etc.) (Seq. Meters) →

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

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, and the text “Do Not Lay Flat” and “Forklift by 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 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
TC01NA4	1000	28 x 18	20	18	83
TC07NA4	1000	54 x 32	40	308	746

Notes:

- Standard Reel Length tolerances are ±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)	Std Reel Weight (lbs) Empty	Std Reel Weight (lbs) Full
TC01NA4	3000	36 x 13	18	55	250
TC07NA4	3000	72 x 42	40	523	1837

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-spooled, 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 TW Alexander Drive
Research Triangle Park, NC 27709
Attn: Customer Service Department
E-mail: info@sumitomoelectric.com

Phone: 800-358-7378
919-541-8100
Fax: 919-541-8265

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.