Document: SF-F02-012
Issue Date: 04/2020
Revision: 5

Sumitomo Cable Specification

SE-*RU

Ribbon Indoor Plenum Cable

OFNP Rated Central Tube Cable with 12 - 432 Optical Fibers

Issued: April 2020

SUMITOMO ELECTRIC LIGHTWAVE

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CONTENTS

1. General

This specification covers the design requirements and performance standards for the supply of optical fiber cables as described below. The features described in this document are intended to provide information on the performance of Sumitomo Electric Lightwave's optical cable and aid in handling and installation. Please refer to the separate fiber specification for details regarding the optical fiber.

1.1 Cable Description

Sumitomo's Ribbon cables contain 12 to 432 optical fibers. The fibers are grouped in the form of 12 & 24 fiber flat ribbon matrices. The ribbon fibers are stacked within a single flame retardant central buffer tube. Stranded dielectric strength elements are wrapped around the central tube for tensile and compression strength. A flame retardant polyvinyl chloride (PVC) sheath is extruded over the strength elements with highly visible ripcords underneath for rapid sheath entry.

The Ribbon Plenum cable is designed for the indoor plenum environment and is ideal for high density requirements where conduit space is limited. This cable passes the FT-6/NFPA 262 burn test as required by the National Electrical Code (NEC) Section 770, and thus carries the Optical Fiber Non-Conductive Plenum (OFNP UL) rating. This cable also meets or exceeds the plenum cable requirements of ICEA 596.

1.2 Quality

Sumitomo ensures a high level of quality through ISO / TL 9000 registered Quality Management Systems and our commitment to continuous improvement. Guaranteed, high quality products have been manufactured at Sumitomo's facility in Raleigh, North Carolina.

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 cable's performance and durability in the field environment.

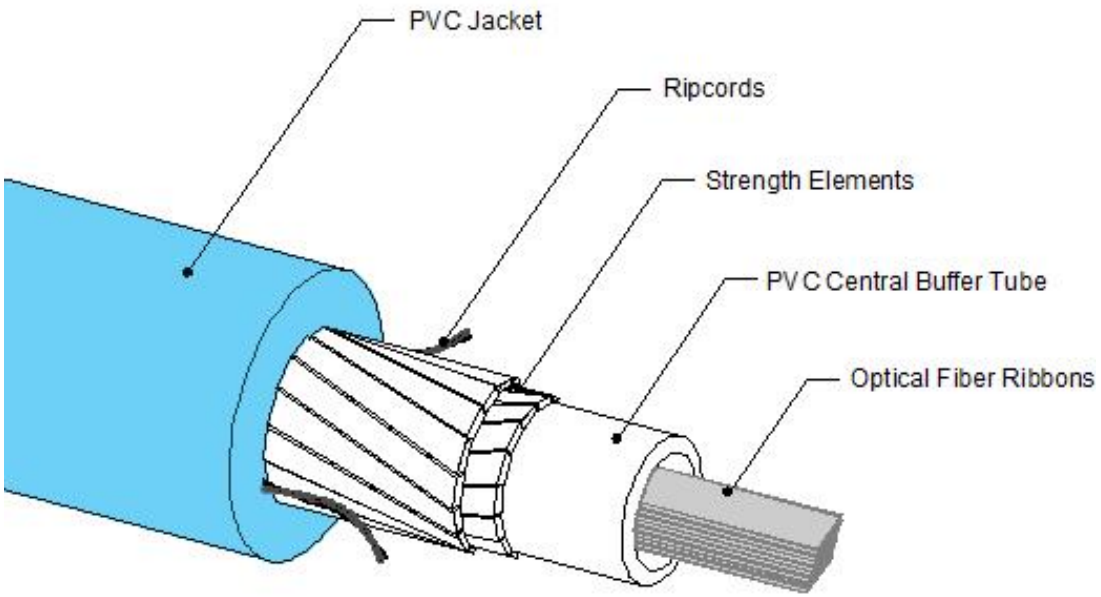
Sumitomo supports industry standards organizations such as Bell Communications Research (Bellcore), Telecommunications Industry Association (TIA), International Telecommunications Union (ITU), International Electrotechnical Commission (IEC), American Society for Testing and Materials (ASTM), Rural Utilities Service (RUS), The Institute of Electrical and Electronics Engineers (IEEE), and Insulated Cable Engineers Association (ICEA).

2. Cable Design

2.1 General

Sumitomo's Ribbon Indoor Plenum optical cables utilize ribbons in a central tube construction to provide a high fiber density packed cable. The flame retardant PVC sheath construction produces a rugged yet flexible cable for indoor plenum applications.

RIBBON PLENUM CABLE



2.2 Fiber Types

The following fiber types are available in this cable design. Please refer to the appropriate fiber specification document for details on fiber design and performance.

APPLICABLE FIBER TYPES

FIBER TYPE	TIA CLASS	SUMITOMO SPEC. #
Multimode 50 µm	Type Ia	SE-1**
Multimode 62.5 µm	Type Ia	SE-2**
PureBand-Plus – Low Water Peak Attenuation	Type IVa	SE-5**
PureAccess – Bend Insensitive (single mode)	Type IVa	SE-8**

2. Optical Fiber Color Code

The UV acrylate coated fibers are color coded with highly distinguishable, vibrant colors according to the following table. All colors meet Munsell standards as specified in TIA-359 and TIA-598.

FIBER COLOR CODE	
FIBER #	COLOR
1	Blue
2	Orange
3	Green
4	Brown
5	Slate
6	White
7	Red
8	Black
9	Yellow
10	Violet
11	Rose
12	Aqua

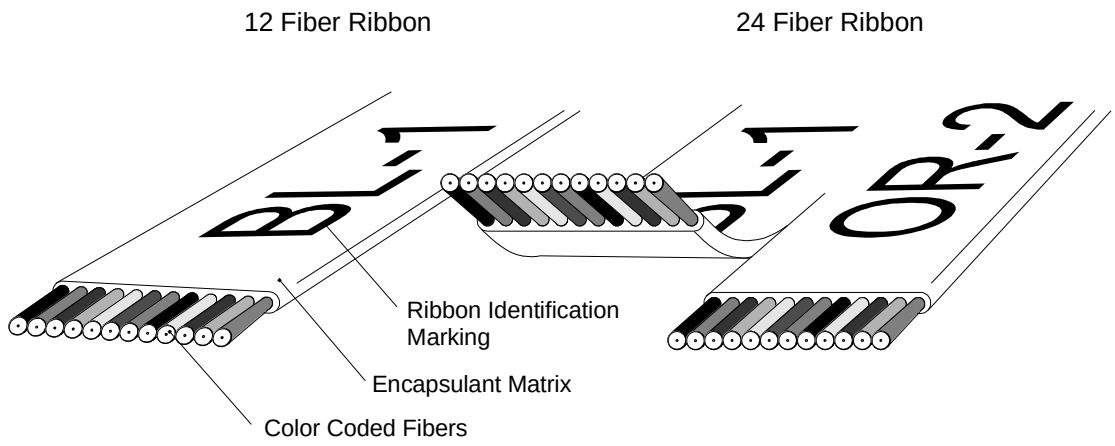
RIBBON MARKING CODES			
RIBBON #	CODE	RIBBON #	CODE
1	BL 1	19	D-RD 19
2	OR 2	20	D-BK 20
3	GR 3	21	D-YL 21
4	BR 4	22	D-VI 22
5	SL 5	23	D-RS 23
6	WH 6	24	D-AQ 24
7	RD 7	25	DD-BL 25
8	BK 8	26	DD-OR 26
9	YL 9	27	DD-GR 27
10	VI 10	28	DD-BR 28
11	RS 11	29	DD-SL 29
12	AQ 12	30	DD-WH 30
13	D-BL 13	31	DD-RD 31
14	D-OR 14	32	DD-BK 32
15	D-GR 15	33	DD-YL 33
16	D-BR 16	34	DD-VI 34
17	D-SL 17	35	DD-RS 35
18	D-WH 18	36	DD-AQ 36

2.4 Ribbon Matrices

Twelve (12) individually color coded fibers are held together in the form of a flat ribbon by an UV cured acrylate matrix. Fibers within the ribbon are arranged in the order shown in the table above. Each ribbon within the cable is marked with “SUMITOMO” and a unique identification number and code as shown above. For cables with greater than 216 fibers, the 12 fiber ribbons are formed together into 24 fiber ribbons. These 24 fiber ribbons are easily split apart into two 12-fiber ribbons for ease of handling and splicing.

The optical fiber ribbons are fully compatible with Sumitomo's mass fusion splicing equipment and other commercially available splicing techniques. The matrix and coatings are easily stripped with thermal strippers. The matrix material can also be easily and cleanly pulled away from the individual 250 μm colored fibers if single fiber access is needed from the ribbon end or in midspan using Sumitomo's ribbon midspan access kit.

SUMTOMO OPTICAL FIBER RIBBON



2.5 Central Buffer Tube

The ribbons are placed in a single, non-filled, flame retardant buffer tube.

2.6 Cable Sheath

The cable sheath consists of a two layers of fiberglass yarns stranded around a central buffer tube. These elements provide the necessary tensile strength for installation and service loads.

The cable core and strength elements are covered with a flame-retardant PVC jacket. The PVC is colored in accordance with TIA-598-B. Two highly visible ripcords are placed 180° apart underneath the jacket for quick and easy sheath entry.

Jacket Colors

Fiber Type	Jacket Color
Multimode 50/125	Orange
Multimode 62.5/125	Orange
Multimode 50/125 OM2	Orange
Multimode 50/125 OM3 & OM4	Aqua
Singlemode	Yellow

Other colors can be substituted upon request

2.7 Cable Dimensions

RIBBON / INDOOR PLENUM CABLE		
FIBER COUNT	NOMINAL DIAMETER	NOMINAL WEIGHT
12 - 48	10.3 mm (0.44 in)	187 Kg/km (126 lbs/kft)
60 - 96	14.0 mm (0.55 in)	192 Kg/km (129 lbs/kft)
108 - 216	16.6 mm (0.65 in)	257 Kg/km (173 lbs/kft)
288 - 432	21.6 mm (0.85 in)	392 Kg/km (263 lbs/kft)

2.8 Sheath Marking

The entire length of each cable is marked, at a minimum, with the following items:

- "SUMITOMO OPTICAL CABLE"
- Month and Year of Manufacture
- Telcordia SOC Code per SR-2014
- Number of Optical Fibers
- Sequential Length Markings in feet (optional meters)
- UL Listing - Type OFNP

All length markings are placed at two foot intervals (one meter intervals if metric length markings are specified). The actual cable length will be within +1%, -0% of the marked length. All markings are printed on the jacket in permanent black characters.

3. Cable Performance

The finished cables can be subjected to the following mechanical and environmental conditions without a permanent increase in attenuation or damage to the cable.

3.1 Mechanical Performance

MECHANICAL PERFORMANCE PROPERTY		TEST PROCEDURE	SPECIFICATION
Low and High Temperature Cable Bend		EIA/TIA-455-37	20 x cable O.D. @ -0°C and 60°C
Impact Resistance		EIA/TIA-455-25	20 impact cycles 2.94 N·m (2.17 lbf·ft)
Cold Impact Resistance		EIA/TIA-455-25	2 impact cycles 2.94 N·m (2.17 lbf·ft)@ 0°C
Compressive Strength		EIA/TIA-455-41	220 N/cm (124 lbs/in.)
Maximum Tensile Load:	During Installation During Service	EIA/TIA-455-33	1340 N (300 lbs) 450 N (100 lbs)
Cable Twist		EIA/TIA-455-85	1 meter length ± 180°
Cable Cyclic Flexing		EIA/TIA-455-104	20 x cable OD 100 cycles
Minimum Bend Radius:	During Installation During Service	EIA/TIA-455-37	20 x cable O.D. 10 x cable O.D.

3.2 Environmental Performance

ENVIRONMENTAL PERFORMANCE PROPERTY		TEST PROCEDURE	SPECIFICATION
Temperature:	Operation Storage / Shipping Installation	EIA/TIA-455-3	0 to +70 ^{O}C (32 to +158 ^{O}F) -40 to +70 ^{O}C (-40 to +158 ^{O}F) 0 to +60 ^{O}C (32 to +140 ^{O}F)
Fire Resistance		FT-6/NFPA 262	Pass

4. Testing and Inspection

The optical properties of all fibers are measured prior to cable manufacturing and remain traceable throughout the manufacturing process and the lifetime of the cable.

After cabling, we use statistical process control techniques along with periodic verification to insure 100% compliance to attenuation requirements in each length of cable with bi-directional OTDR at the operating wavelengths. Cable dimensional measurements are also made at final inspection and recorded.

5. Packaging and Shipping

Cable is supplied in lengths specified at the time of purchase. Each length will be shipped on a separate non-returnable wooden reel or if specified, a returnable steel reel. The minimum barrel diameter of the reel will not be less than 24 inches.

The cable on each reel will be completely covered with a thermal wrap which is fastened to the cable by packaging straps. This wrap is reusable and provides excellent thermal and UV protection to cables sitting in reel yards.

The cable ends will be sealed with plastic protection caps to prevent water penetration. The ends will be easily accessible for testing. Optional pulling grips may be factory installed if specified at the time of purchase.

Each reel is marked with the manufacturer's name and address, cable type, fiber count, attenuation specs, and cable length. A final inspection test report with attenuation performance data for each fiber is attached to the reel flange along with shipping labels.

Wood Reels

Reel Name	Flange (mm)	Barrel (mm)	Traverse (mm)	Overall Width (mm)	Reel Weight (kg)
L-11	1,250	508	609	709	93
L-15	1,350	508	762	860	109
L-18	1,500	508	762	862	133
L-21	1,600	610	850	1,000	217
L-47	1,219	610	787	915	107
L-48	1,550	1,066	1,025	1,177	246
L-50	2,133	1,066	1,066	1,218	408
L-52	1,524	762	736	787	158
L-53	1,829	914	863	914	318
C-L (cardboard)	1,066	762	508	508	20

NOTE: Actual reel size used will depend on production capacity, net weight, and reel availability. Check with your sales representative for more details.

6. Installation / Handling Practices

Sumitomo has incorporated a wide range of technical support and training services for our fiber optic 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, as well as demonstration video tapes. Please contact Sumitomo's Customer Service department for more information.

7. 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.	*Phone:*	*800-358-7378*
201 S. Rogers Lane, Suite 100		*919-541-8100*
Raleigh, NC 27610	*Fax:*	*919-541-8265*
Attn: Customer Service Department	*E-mail:*	info@sumitomoelectric.com

Sumitomo Electric Lightwave Corp. 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.

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