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Sumitomo Cable Specification

**SE-\*RP**

**Litepipe™ Ribbon Indoor RoHS Riser Cable**

*OFNR Rated Central Tube Cable with 432 Optical Fibers*

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# 1. GENERAL

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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 Litepipe Ribbon RoHS Riser cables contain 432 optical fibers. The fibers are grouped in the form of 12 or 24 fiber flat ribbon matrices. The optical fiber ribbons are stacked within a single, flame-retardant, PVC central buffer tube. Dual layers of stranded dielectric strength elements are wrapped around the central tube for tensile and compression strength. A yellow polyvinyl chloride (PVC) sheath is pressure extruded over the strength elements with highly visible ripcords underneath for rapid sheath entry.

The Litepipe Ribbon / PVC Sheath cable is designed for the indoor riser environment and is ideal for high density requirements where conduit space is limited. This cable passes the UL 1666 burn test as required by the National Electrical Code (NEC) Section 770, and thus carries the Optical Fiber Non-Conductive Riser (OFNR) rating. This cable also meets or exceeds the riser cable requirements of Bellcore's GR-409-CORE, Issue 1.

## 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 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 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).

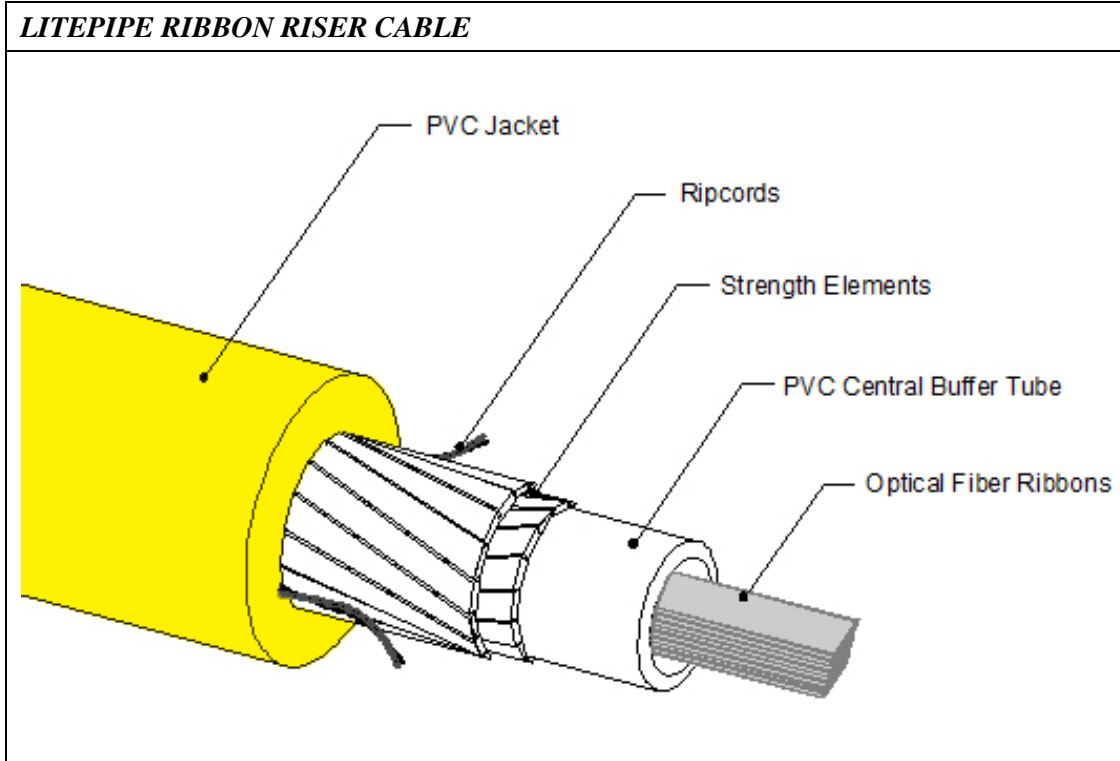
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## 2. CABLE DESIGN

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### 2.1 General

Sumitomo's Litepipe Ribbon RoHS Indoor Riser sheath 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 riser applications.



### 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.

<b><i>APPLICABLE FIBER TYPES</i></b>		
<b>FIBER TYPE</b>	<b>TIA CLASS</b>	<b>SUMITOMO SPEC. #</b>
Multimode 50 $\mu\text{m}$	Type Ia	SE-1**
Multimode 62.5 $\mu\text{m}$	Type Ia	SE-2**
PureBand – Low Water Peak Attenuation	Type IVa	SE-5**

### 2.3 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.

<b>FIBER COLOR CODE</b>	
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

<b>RIBBON MARKING CODES</b>			
RIBBON	CODE	RIBBON	CODE
1	BL 1	1	BL 1
2	OR 2	2	OR 2
3	GR 3	3	GR 3
4	BR 4	4	BR 4
5	SL 5	5	SL 5
6	WH 6	6	WH 6
7	RD 7	7	RD 7
8	BK 8	8	BK 8
9	YL 9	9	YL 9
10	VI 10	10	VI 10
11	RS 11	11	RS 11
12	AQ 12	12	AQ 12
13	D-BL 13	13	D-BL 13
14	D-OR 14	14	D-OR 14
15	D-GR 15	15	D-GR 15
16	D-BR 16	16	D-BR 16
17	D-SL 17	17	D-SL 17
18	D-WH 18	18	D-WH 18

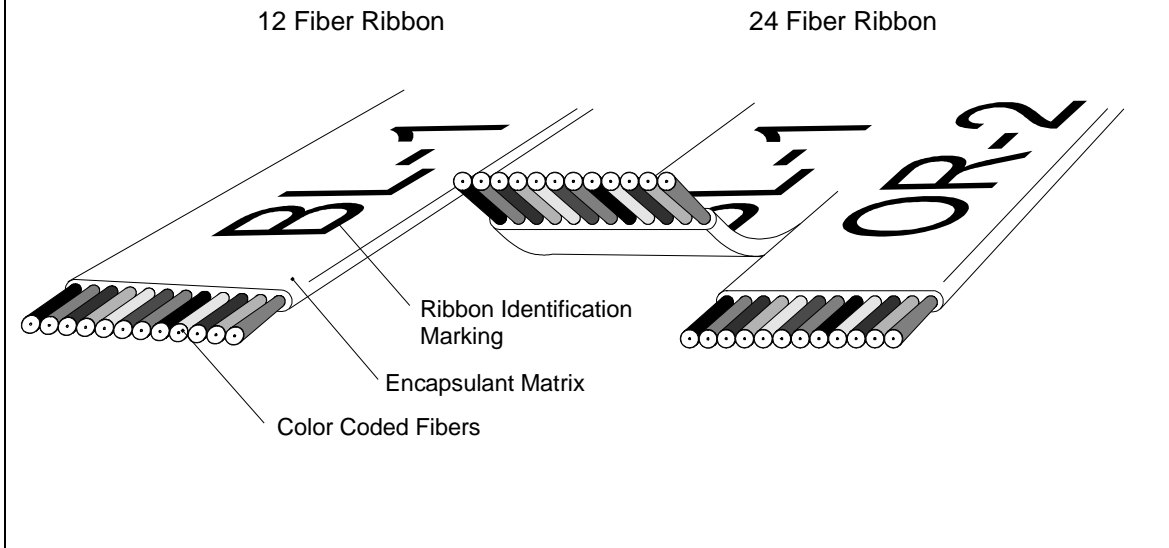
<b>FIBER TYPE MARKING (on ribbons)</b>	
TYPE	CODE
Single Mode	SM
50um Multi-mode	MM50
62.5um Multi-mode	MM62

### 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 240 to 432 fibers, the 12 fiber ribbons are formed together into 24 fiber ribbons. These 24 fiber ribbons can be 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 RIBBONS



### 2.5 Central Buffer Tube

The ribbons are placed in a single, non-filled, flame retardant PVC buffer tube. The PVC is not colored and retains its natural color.

### 2.6 Cable Sheath

The cable sheath consists of a layer of fiberglass yarns stranded around the central buffer tube over which a second layer of rigid Fiber Reinforced Plastic (FRP) strength elements is stranded in the opposite direction. 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 yellow to denote the use of Single-Mode optical fibers. 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

<b>LITEPIPE RIBBON / INDOOR RISER CABLE</b>		
FIBER COUNT	NOMINAL DIAMETER	NOMINAL WEIGHT
12 - 96	13.2 mm (0.52 in)	160 Kg/km (108 lbs/kft)
108 - 216	15.7 mm (0.62 in)	212 Kg/km (143 lbs/kft)
240 - 432	20.5 mm (0.81 in)	313 Kg/km (210 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
- Number of Optical Fibers
- Sequential Length Markings in feet (optional meters)
- UL Listing - Type OFNR

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.

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## 3. CABLE PERFORMANCE

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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

<b>MECHANICAL PERFORMANCE PROPERTY</b>		<b>TEST PROCEDURE</b>	<b>SPECIFICATION</b>
Low and High Temperature Cable Bend		EIA/TIA-455-37	254 mm (10 in.) mandrel @ -20°C and 50°C
Impact Resistance		EIA/TIA-455-25	20 impact cycles
Compressive Strength		EIA/TIA-455-41	220 N/cm (124 lbs/in.)
Maximum Tensile Load:	During Installation During Service	EIA/TIA-455-33	2700 N (600 lbs) 890 N (200 lbs)
Cable Twist		EIA/TIA-455-85	2 meter length ± 180°
Cable Cyclic Flexing		EIA/TIA-455-104	254 mm (10 in.) mandrel 25 cycles
Minimum Bend Radius:	During Installation During Service	EIA/TIA-455-37	254 mm (10 in.) 127 mm (5 in.)

### 3.2 Environmental Performance

<i>ENVIRONMENTAL PERFORMANCE</i>		TEST	SPECIFICATION
PROPERTY		PROCEDURE	
Temperature:	Operation	EIA/TIA-455-3	-20 to +50 °C (-4 to +122 °F)
	Installation		-20 to +50 °C (-4 to +122 °F)
	Storage / Shipping		-40 to +65 °C (-40 to +149 °F)
Fire Resistance		UL 1666	Passes

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## 4. TESTING AND INSPECTION

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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 all operating wavelengths. Cable dimensional measurements are also made at final inspection and recorded.

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## 5. PACKAGING AND SHIPPING

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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 and the escape of water blocking gel. The ends will be easily accessible for testing. Optional pulling grips may be factory installed if specified at the time of purchase.



<b>REEL DIMENSIONS</b>						
REEL TYPE	REEL CODE	FLANGE DIAMETER		REEL WIDTH		REEL WEIGHT
Wood	L-3	850 mm	(34 in.)	580 mm	(23 in.)	32 Kg (70 lbs)
	L-8	1050 mm	(41 in.)	760 mm	(30 in.)	61 Kg (134 lbs)
	L-11	1250 mm	(49 in.)	760 mm	(30 in.)	91 Kg (200 lbs)
	L-15	1350 mm	(53 in.)	910 mm	(36 in.)	106 Kg (233 lbs)
	L-18	1500 mm	(59 in.)	910 mm	(36 in.)	133 Kg (293 lbs)
	L-21	1600 mm	(63 in.)	1050 mm	(42 in.)	214 Kg (471 lbs)
	L-25	1800 mm	(71 in.)	1050 mm	(42 in.)	246 Kg (541 lbs)
	L-27	1850 mm	(73 in.)	1120 mm	(44 in.)	294 Kg (647 lbs)
	L-29	1950 mm	(77 in.)	1120 mm	(44 in.)	307 Kg (676 lbs)
	L-37	2210 mm	(87 in.)	1240 mm	(49 in.)	421 Kg (927 lbs)
	L-46	2440 mm	(96 in.)	1240 mm	(49 in.)	504 Kg (1108 lbs)
Steel	414	1270 mm	(50 in.)	810 mm	(32 in.)	109 Kg (240 lbs)
	415	1420 mm	(56 in.)	810 mm	(32 in.)	130 Kg (285 lbs)
	416	1680 mm	(66 in.)	810 mm	(32 in.)	155 Kg (340 lbs)
	417	1980 mm	(78 in.)	840 mm	(33 in.)	241 Kg (530 lbs)
	420	2130 mm	(84 in.)	1220 mm	(48 in.)	350 Kg (770 lbs)
	421	2290 mm	(90 in.)	1220 mm	(48 in.)	405 Kg (890 lbs)
	422	2440 mm	(96 in.)	1220 mm	(48 in.)	539 Kg (1185 lbs)

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.

**REEL USAGE**

WOOD STEEL	REEL CODES							[ft.]	[m]	CABLE LENGTH
	<b>L-18</b> 417	<b>L-25</b> 420	<b>L-29</b> 420	<b>L-37</b> 421	<b>L-46</b> NA	<b>NA</b> NA	<b>NA</b> NA	30,000	9,140	
<b>L-15</b> 416	<b>L-21</b> 417	<b>L-25</b> 420	<b>L-37</b> 420	<b>L-46</b> 422	<b>L-46</b> NA	<b>NA</b> NA	25,000	7,620		
<b>L-15</b> 416	<b>L-18</b> 417	<b>L-25</b> 420	<b>L-29</b> 420	<b>L-37</b> 421	<b>L-46</b> 422	<b>L-46</b> NA	20,000	6,100		
<b>L-11</b> 415	<b>L-15</b> 416	<b>L-21</b> 417	<b>L-25</b> 420	<b>L-27</b> 420	<b>L-37</b> 420	<b>L-37</b> 421	15,000	4,570		
<b>L-8</b> 414	<b>L-11</b> 415	<b>L-15</b> 416	<b>L-21</b> 417	<b>L-21</b> 417	<b>L-27</b> 420	<b>L-37</b> 420	10,000	3,050		
<b>L-8</b> 414	<b>L-11</b> 414	<b>L-15</b> 415	<b>L-21</b> 416	<b>L-21</b> 417	<b>L-27</b> 417	<b>L-37</b> 420	7,500	2,290		
<b>L-8</b> 414	<b>L-8</b> 414	<b>L-11</b> 414	<b>L-21</b> 415	<b>L-21</b> 416	<b>L-27</b> 416	<b>L-37</b> 417	5,000	1,520		
<b>L-3</b> 414	<b>L-3</b> 414	<b>L-11</b> 414	<b>L-21</b> 414	<b>L-21</b> 414	<b>L-27</b> 414	<b>L-37</b> 415	2,500	760		
[in.]	0.4	0.5	0.6	0.7	0.8	0.9	1.0			
[mm]	10.2	12.7	15.2	17.8	20.3	22.9	25.4			
CABLE DIAMETER										

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 videotapes. Please contact Sumitomo's Customer Service department for more information.

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## 7. ORDERING INFORMATION

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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](mailto: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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