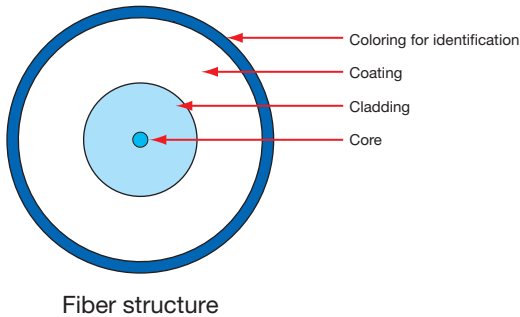


FutureGuide® Optical Fibers

Overview



Fiber structure

FutureGuide® optical fibers are glass fibers with polymer coating for optical signal transmission in optical networks.

Fujikura Ltd. has led optical fiber and cable industries for more than 40 years as a front runner, and also kept on contributing to developments of the industries with various kinds of epoch-making products. These contributions have been realized by Fujikura's integrated technologies, including glass manufacturing technology, coating technology and so on, which are based on Fujikura's R&D effort over the years.

Key Technologies

Advanced Glass Manufacturing Technology

Glass (preform) manufacturing technology is a key technology of optical fiber characteristics. Especially, attenuation, which is one of the most important, strongly depends on quality of glass portion. Fujikura's fiber mass production method — Fujikura's VAD method* — provides leading-edge characteristics of optical fiber at low cost, and it contributes to efficient transmission of light signals.

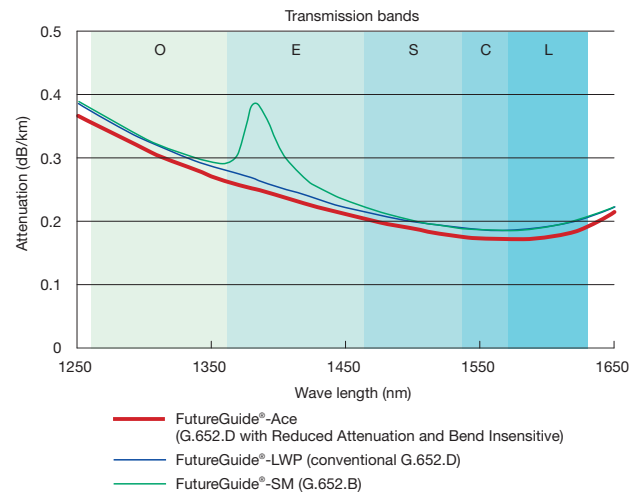
The advanced glass manufacturing technology has resulted in an enhanced ITU-T G.652.D fiber, named FutureGuide®-Ace. The fiber offers not only superior reduced attenuation characteristics but also bend insensitiveness. The reduced attenuation provides longer transmission distance with less number of amplifiers, and the bend insensitiveness offers reliable performance in harsh installation conditions. Furthermore, the fiber maintains backward compatibility with all existing conventional networks based on G.652 fibers. FutureGuide®-Ace is suitable for long-haul, core and access networks using 40Gbps, 100Gbps and beyond.

* Fujikura was awarded a plaque from IEEE in 2015, for significant contribution to VAD (Vapor Axial Deposition) method. The VAD method is presently in the list of IEEE Milestones, for its contribution to construction of worldwide optical fiber networks.

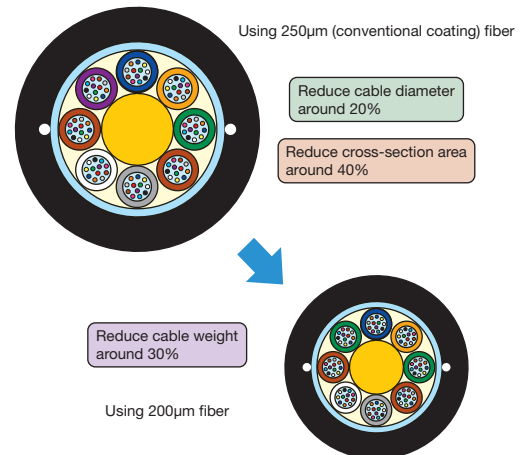
Innovative Coating Technology

Not only optical characteristics, but stability of those in actual networks is also important for quality of optical fibers. It is difficult to eliminate various factors which affect stable signal transmission in installed cables, such as external stress, temperature change, water immersion etc. Robustness against such factors, therefore, is an important characteristic of optical fiber for cable designing as well as fiber characteristics. Fujikura's innovative fiber coating helps such cable designing and manufacturing by its robustness feature.

The coating technology of Fujikura attains a development of innovative ITU-TG.657.A1 and A2 fibers with 200µm coating diameter, named FutureGuide®-SR15E-200 and FutureGuide®-BIS-B-200. The fibers have drastically reduced coating diameter down to 200µm enabled by superior protection performance of new coating materials. The reduced fiber diameter allows more flexible cable designing. Especially downsizing of cables supports the demand in urban areas: more effective utilization of available space by installing high-density and more fiber-count cables underground.



Loss spectrum of FutureGuide®-Ace

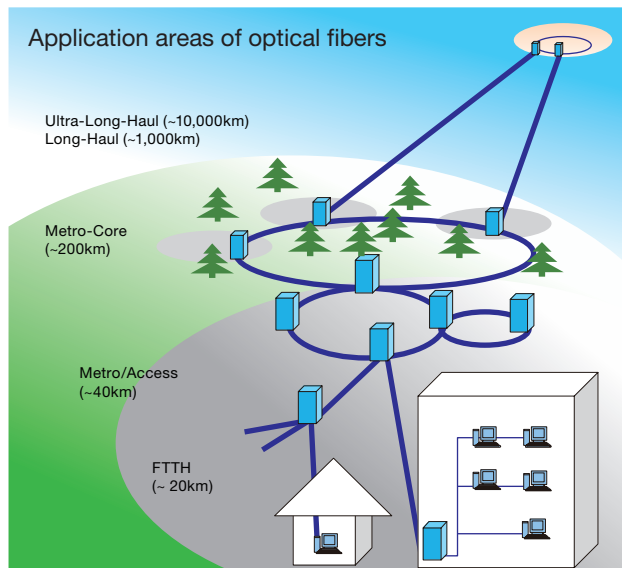
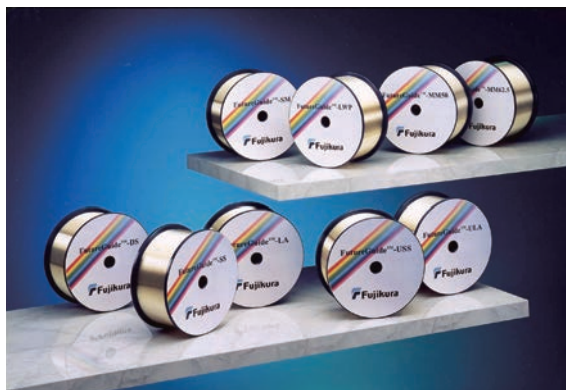


Example of cable downsizing by use of 200µm fibers

FutureGuide® Optical Fibers

Product Lineups

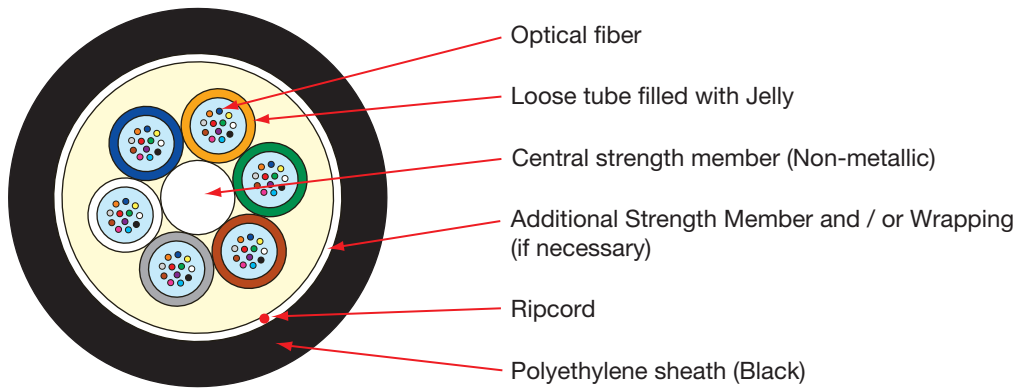
Fujikura has developed various products of optical fibers, selected according to transmission distance, transmission capacity and/or installation environment. All of these fibers meet the industry's latest international standards.



	Product	Description
Single-Mode	FutureGuide®-Ace (ITU-T G.652.D + Reduced Attenuation and Bend Insensitive)	G.652.D Fiber with Further Reduced Attenuation and improved Bend Insensitiveness Complying with G.657.A1 Long-Haul, Core and Access Networks for up to 100Gbps and Beyond
	FutureGuide®-LWP-RA (ITU-T G.652.D + Reduced Attenuation)	G.652.D Fiber with Further Reduced Attenuation within All Transmission Windows Long-Haul and High-Speed Transmission Network of 40Gbps, 100Gbps and Beyond
	FutureGuide®-LWP (ITU-T G.652.D)	Low(Zero)-Water-Peak Single-Mode Fiber with High Reliability CWDM and DWDM Optical Transmission for Metropolitan Networks
	FutureGuide®-SM (ITU-T G.652.B)	Conventional Single-Mode Fiber Optical Transmission for Metropolitan Networks
	FutureGuide®-SR15E (ITU-T G.657.A1)	Bend Insensitive down to 15mm Radius Low(Zero)-Water-Peak Single-Mode Fiber with High Reliability Optical Cord and Cable for FTTH / LAN / Premises
	FutureGuide®-SR15E-200 (ITU-T G.657.A1 + 200µm Coating Diameter)	G.657.A1 Fiber with Drastically Reduced Coating Diameter down to 200µm High Fiber-Density Cable for FTTH / LAN / Premises
	FutureGuide®-BIS-B (ITU-T G.657.A2)	Bend Insensitive down to 7.5mm Radius Low(Zero)-Water-Peak Single-Mode Fiber with High Reliability Optical Cord and Cable for FTTH / LAN / Premises
	FutureGuide®-BIS-B-200 (ITU-T G.657.A2 + 200µm Coating Diameter)	G.657.A2 Fiber with Drastically Reduced Coating Diameter down to 200µm High Fiber-Density Cable for FTTH / LAN / Premises
	FutureGuide®-LA (ITU-T G.655.C and D)	Non-Zero Dispersion Shifted Fiber with Large-effective Area of 72µm ² Long-Distance DWDM Optical Transmission in the C- and L-Bands
	FutureGuide®-SS (ITU-T G.655.C and D)	Non-Zero Dispersion Shifted Fiber with Small-dispersion Slope of 0.05ps/nm ² -km at 1550nm Long-Distance DWDM Optical Transmission in the C- and L-Bands
	FutureGuide®-USS (ITU-T G.656)	Non-Zero Dispersion-Shifted Fiber for Wideband Transport with Ultra Small-dispersion Slope of 0.02ps/nm ² -km at 1550nm DWDM Transmission System Effectively Operating at S,C and L Bands
	MultiMode	FutureGuide®-MM50 (ISO/IEC11801 OM1 and OM2)
FutureGuide®-MM62.5 (ISO/IEC11801 OM1 and OM2)		62.5µm Core MultiMode Fiber with Graded-Index LAN / Data Center
FutureGuide®-MM10G/300 (ISO/IEC11801, OM3)		50µm Core Graded Index MultiMode Fiber with 10Gbps Support LAN / Data Center

Loose Tube Optical Fiber Cable

Cable Construction



Features

- Dielectric construction
- Core interstices are filled with water blocking material
- Comply with IEC 60794-3-10 and IEC 60794-1-2

Applications

- Duct and lashed aerial
- Backbone and Access

Mechanical Characteristics

Product code	Fiber count	Nominal diameter (mm)	Weight (kg/km)	Permissible tensile strength (N)		Bending radius (mm)	
				Installation	Service	Installation	Service
L0-24 (t*)	24	9.2	65	1500	450	200	100
L0-48 (t*)	48						
L0-72 (t*)	72						
L0-96 (t*)	96	10.5	85	1500	450	20D	10D
L0-144 (t*)	144	13	125	2000	600		

*F denotes fiber type: FutureGuide®-LWP = LWP, FutureGuide®-SR15E = SR15E, FutureGuide®-LA = LA, FutureGuide®-SS = SS, FutureGuide®-MM50 = MM50, FutureGuide®-MM10G/300 = MM10G/300

D: Cable diameter

Mechanical characteristics can be customized.

Identification

Fiber & tube identification							
1	Blue	2	Orange	3	Green	4	Brown
5	Grey	6	White	7	Red	8	Black
9	Yellow	10	Violet	11	Pink	12	Turquoise

*Fiber and tube colors can be customized as per requirement.

Environmental Characteristics

Criteria	Temperature
Transportation & Storage	-30°C - +70°C
Installation	-10°C - +50°C
Operation	-30°C - +70°C
Water Penetration	No water at the unsealed end

*Environmental characteristics can be customized subject to limitations.

Fiber Characteristics

Characteristics	Unit	Fiber type	
		FutureGuide®-LWP (ITU-T G.652.D)	FutureGuide®-SR15E (ITU-T G.657.A1)
Geometrical Characteristics,			
Mode field diameter at 1310nm	µm	9,2 ± 0,4	8,6 ± 0,4
Cladding diameter	µm	125 ± 1	125 ± 0,7
Core concentricity error	µm	≤ 0,6	≤ 0,5
Cladding non-circularity	%	≤ 1,0	≤ 1,0
Primary coating diameter (including color layer)	µm	250 ± 15	250 ± 15
Coating-cladding concentricity error	µm	≤ 12,5	≤ 12,5
Fiber curl radius	m	≥ 4	≥ 4
Transmission Characteristics			
Attenuation at 1310nm	dB/km	≤ 0,36	≤ 0,36
Attenuation at 1383nm*	dB/km	≤ 0,35	≤ 0,35
Attenuation at 1550nm	dB/km	≤ 0,22	≤ 0,22
Macro bending loss** φ 60mm, 100 turns, 1625nm	dB	≤ 0,1	-
Macro bending loss** φ 30mm, 10 turns, 1550nm	dB	-	≤ 0,25
Macro bending loss** φ 30mm, 10 turns, 1625nm	dB	-	≤ 1,0
Macro bending loss** φ 20mm, 1 turns, 1550nm	dB	-	≤ 0,75
Macro bending loss** φ 20mm, 1 turns, 1625nm	dB	-	≤ 1,5
Cut-off wavelength (λ _{cc})	nm	1260	1260
Chromatic dispersion at 1310nm	ps/nm.km	≤ 3,5	≤ 3,5
Chromatic dispersion at 1550nm	ps/nm.km	≤ 18	≤ 18
Zero dispersion wavelength	nm	1300-1324	1300-1324
Zero dispersion slope	ps/nm ² .km	≤ 0,092	≤ 0,092
PMD (Link design value)	ps/√km	≤ 0,2	≤ 0,2
Mechanical Characteristics			
Proof stress level	%	1	1,5

*Attenuation increase due to hydrogen aging at this wavelength in bare optical fiber is tested in accordance with IEC60793-2-50 test procedure.

** This characteristics is measured before coloring process.

Packing

Cables are packed in standard durable and export quality wooden drums and suitable protection means are applied to prevent damage of cables during shipment and storage. Drums are non-returnable. Cable ends sealed by suitable method are fastened so as not to protrude beyond any portion of the drum and to prevent the cable from becoming loose during transportation.

Ordering Information

Product code	Fujikura product name
L0-24 (F*)	OGNMLWBE F × 24C
L0-48 (F*)	OGNMLWBE F × 48C
L0-72 (F*)	OGNMLWBE F × 72C
L0-96 (F*)	OGNMLWBE F × 96C
L0-144 (F*)	OGNMLWBE F × 144C

* F denotes fiber type : FutureGuide®-LWP = LWP, FutureGuide®-SR15E = SR15E, FutureGuide®-LA = LA, FutureGuide®-SS = SS, FutureGuide®-MM50 = MM50, FutureGuide®-MM10G/300 = MM10G/300

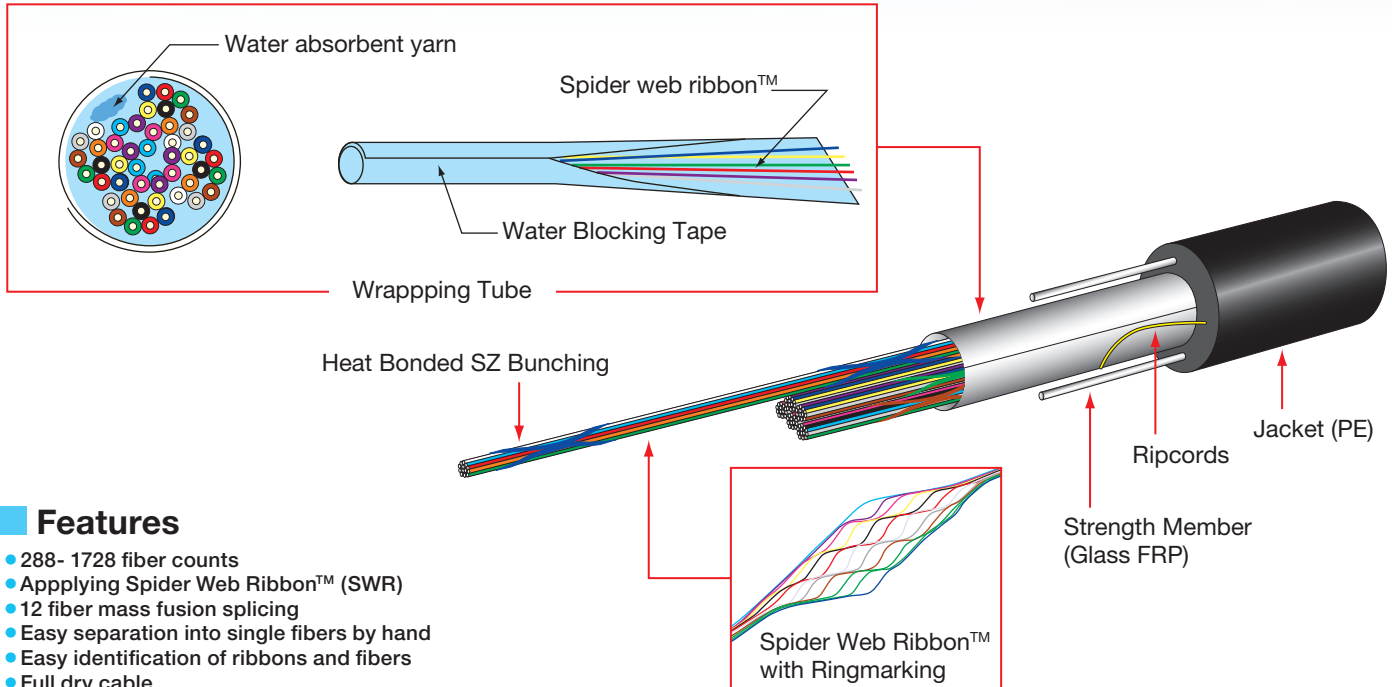
Option

1. Stranded core filled with jelly and steel central strength member are available.
2. Flame retardant sheath can be provided.
3. Various type of armor can be provided.
4. Self Supporting type can be provided.

Notes

Wrapping Tube Cable™ with Spider Web Ribbon™

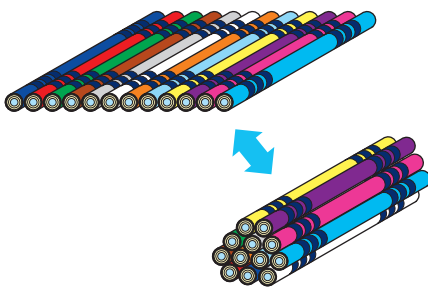
Cable construction



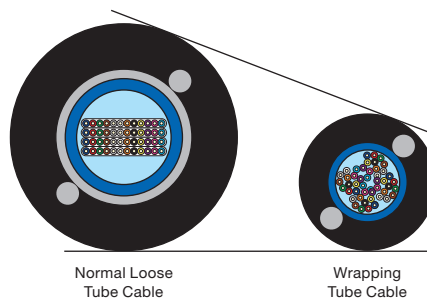
Features

- 288- 1728 fiber counts
- Applying Spider Web Ribbon™ (SWR)
- 12 fiber mass fusion splicing
- Easy separation into single fibers by hand
- Easy identification of ribbons and fibers
- Full dry cable
- Easy and quick access to fibers
- Smallest cable diameter and lightest weight in the world
- Long cable length per drum

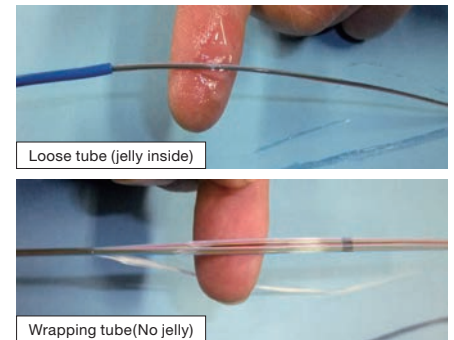
Spider Web Ribbon™



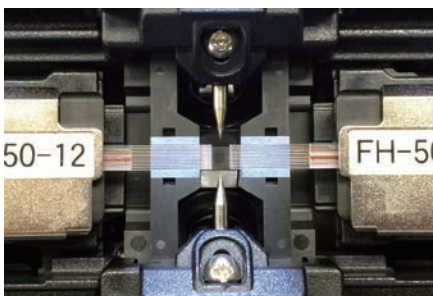
High Fiber Packing Density



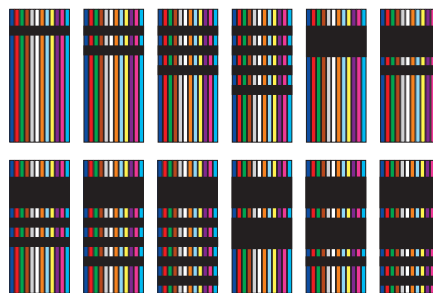
Full Dry Structure



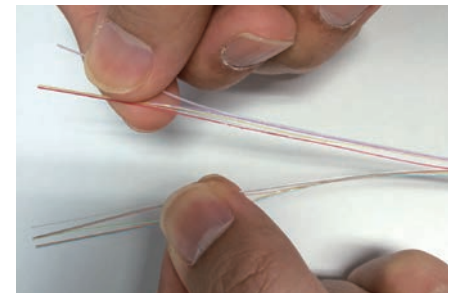
12F Mass fusion splice



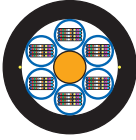
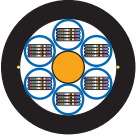
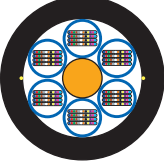
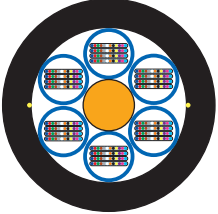




Stripe Ring Markings



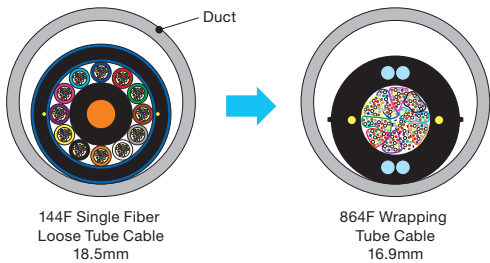
Easy Separation by hands



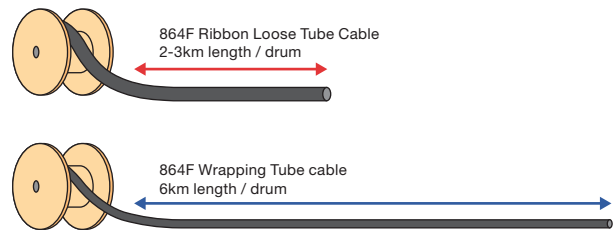
● Comparison of cable diameter

	288F	432F	864F	1728F
Ribbon Loose Tube Cable	 22.0mm	 22.0mm	 27.0mm	 35.1mm
Wrapping Tube Cable	 12.0mm	 13.5mm	 17.5mm	 22.7mm

● Examples for the advantage of small diameter cable



864F cable can be deployed into the same duct size of 144F single fiber loose tube cable



SWR/WTC's small diameter allows longer length of cable per drum than ribbon loose tube cable on the same drum size (Drum size on the above example; outer width: 1600mm, Flange Diameter; 2000mm)

■ Applications

- Duct and lashed aerial
- Suitable for Backbone and Feeder application

■ Mechanical Characteristics

Product code	Fiber count	Nominal diameter (mm)	Weight (kg/km)	Permissible tensile strength (N)		Bending radius (mm)	
				Installation	Service	Repeated bending	Cable bend
WTC-288C	288	12.0	105	2700	810	120	180
WTC-432C	432	13.5	135	2700	810	135	203
WTC-864C	864	17.5	220	2700	810	175	263
WTC-1728C	1728	22.7	340	2700	810	227	341

* Small fiber count cables (<288C) are also available upon request.
 * Corrugated steel armour jacket is also available upon request.
 * Specification may change without prior notice.

■ Identification

Fiber & Bunching identification							
1	Blue	2	Orange	3	Green	4	Brown
5	Grey	6	White	7	Red	8	Black / Natural *
9	Yellow	10	Violet	11	Pink	12	Turquoise

* Black is used for #8 bunching and natural is used for #8 fiber of ribbon.

■ Environmental characteristics

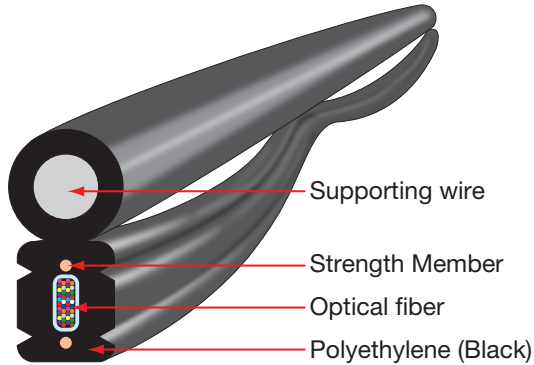
Condition	Temperature
Transportation & Storage	-30°C - +70°C
Installation	-30°C - +70°C
Operation	-30°C - +70°C

Notes

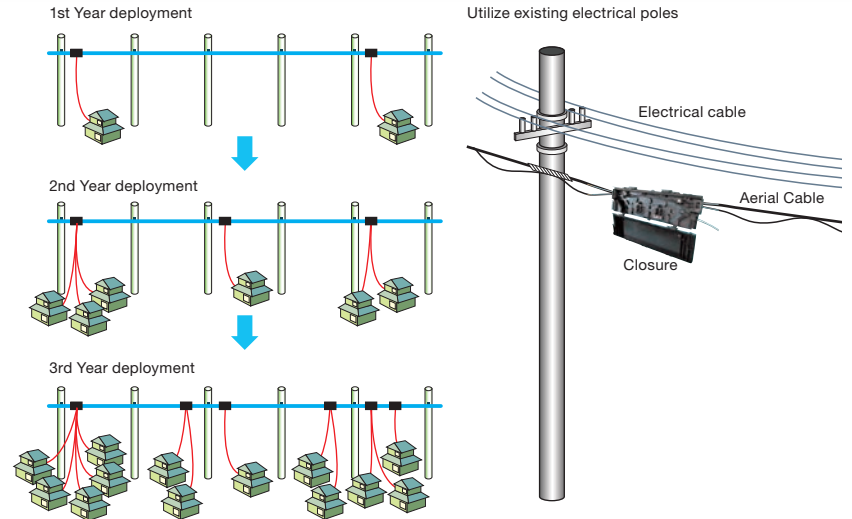
Aerial Distribution and Aerial Drop Optical Fiber Cables

Cable Construction

Aerial Distribution Cables



New Cabling technology has evolved from past difficulties



Features

- Flexible, reconfigurable, expandable network design
- On-Demand installation - Pay-&-Build-As-You-Grow concept
- Easy mid-span branching at any location
- Unusually short project schedules

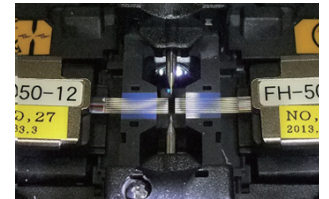
Applications

- Outdoor Distribution Networks
- Campus Networks
- Smart meter Projects

Easy Access to Fibers



Mass Fusion Splicing



Mechanical Characteristics

Product code	Fiber Count	Nominal dimension (mm)	Weight (kg/km)	Installation span (meters)	Permissible tensile strength during Installation (N)	Bending radius** (mm)
Aerial Distribution cables*						
AD-M-SSW-12 (F*)	12	4.0 × 10.5	70	50	1960	100
AD-M-SSW-24 (F*)	24	4.0 × 10.5	70	50	1960	100
Non-Metallic SSW Cables						
AD-NM-SSW-12 (F*)	12	6.0 × 12.8	65	50	2550	100
AD-NM-SSW-24 (F*)	24	6.0 × 12.8	65	50	2550	100
AD-NM-SSW-48 (F*)	48	6.0 × 12.8	75	50	2550	150

*F denotes fiber type: FutureGuide®SR15E = SR15E, FutureGuide®BIS-B = BIS-B

Fiber Identification

Unit No.	Ring Marking	Fiber No.											
		1	2	3	4	5	6	7	8	9	10	11	12
1	No ring marking	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Turquoise
2	■	Blue	Orange	Green	Brown	Grey	White	Red	Natural	Yellow	Violet	Pink	Turquoise
3	■■	Blue	Orange	Green	Brown	Grey	White	Red	Natural	Yellow	Violet	Pink	Turquoise
4	■■■	Blue	Orange	Green	Brown	Grey	White	Red	Natural	Yellow	Violet	Pink	Turquoise

Environmental Characteristics

Criteria	Temperature
Transportation & Storage	-30°C to +70°C
Installation	-10°C to +50°C
Operation	-30°C to +70°C

Fiber Characteristics

Characteristics	Unit	Fiber type	
		FutureGuide®-SR15E	FutureGuide®-BIS-B
Geometrical Characteristics			
Mode field diameter at 1310nm	μm	8.6 ± 0.4	8.6 ± 0.4
Cladding diameter	μm	125 ± 0.7	125 ± 0.7
Core concentricity error	μm	≤ 0.5	≤ 0.5
Cladding non-circularity	%	≤ 1.0	≤ 1.0
Primary coating diameter (including color layer)	μm	250 ± 15	250 ± 15
Coating-cladding concentricity error	μm	≤ 12.5	≤ 12.5
Fiber curl radius	m	≥ 4	≥ 4
Transmission Characteristics			
Attenuation at 1310nm	dB/km	≤ 0.40	≤ 0.40
Attenuation at 1383nm*	dB/km	≤ 0.35	≤ 0.35
Attenuation at 1550nm	dB/km	≤ 0.30	≤ 0.30
Macro bending loss** φ 30mm, 10 turns, 1550nm	dB	≤ 0.25	≤ 0.03
Macro bending loss** φ 30mm, 10 turns, 1625nm	dB	≤ 1.0	≤ 0.10
Macro bending loss** φ 20mm, 1 turns, 1550nm	dB	≤ 0.75	≤ 0.10
Macro bending loss** φ 20mm, 1 turns, 1625nm	dB	≤ 1.50	≤ 0.20
Macro bending loss** φ 15mm, 1 turns, 1550nm	dB	-	≤ 0.50
Macro bending loss** φ 15mm, 1 turns, 1625nm	dB	-	≤ 1.0
Cut-off wavelength (λ _{co})	nm	≤ 1260	1260
Chromatic dispersion at 1310nm	ps/nm.km	≤ 3.5	≤ 3.5
Chromatic dispersion at 1550nm	ps/nm.km	≤ 18	≤ 18
Zero dispersion wavelength	nm	1300-1324	1300-1324
Zero dispersion slope	ps/nm ² .km	≤ 0.092	≤ 0.092
Mechanical Characteristics			
Proof stress level	%	1.5	1.5

*Attenuation increase due to hydrogen aging at this wavelength in bare optical fiber is tested in accordance with IEC60793-2-50 test procedure.

** This characteristic is measured before coloring process.

Packing

Cables are packed in wooden drums. Suitable protection means are applied to prevent damage of the cables during shipment and storage.

Ordering Information

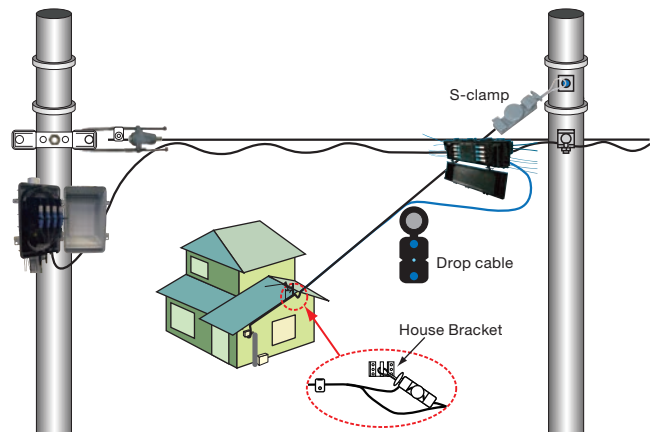
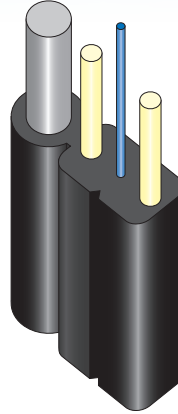
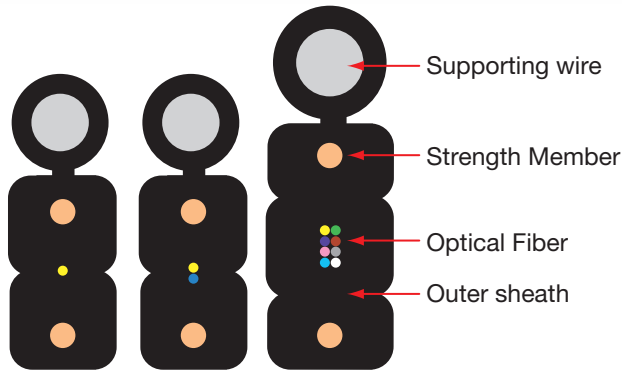
Product code	Fujikura product name
AD-M-SSW-12 (F*)	OGNM12WTGDE-SSW F × 12C
AD-M-SSW-24 (F*)	OGNM12WTGDE-SSW F × 24C
AD-NM-SSW-12 (F*)	OGNM12WTGDE-SSW(NM) F × 12C
AD-NM-SSW-24 (F*)	OGNM12WTGDE-SSW(NM) F × 24C
AD-NM-SSW-48 (F*)	OGNM12WTGDE-SSW(NM) F × 48C

*F denotes fiber type: FutureGuide®SR15E = SR15E, FutureGuide®BIS-B = BIS-B

Notes

Aerial Distribution and Aerial Drop Optical Fiber Cables

Cable Construction



Features

- Easy installation, reconfiguration and maintenance
- Support On-Demand installation
- UV resistant

Applications

- Outdoor Drop application
- Short distance campus duct

Mechanical Characteristics

Product code	Fiber Count	Nominal dimension (mm)	Weight (kg/km)	Installation span (meters)	Permissible tensile strength during Installation (N)	Bending radius** (mm)
Metallic Messenger Wire						
ADO-M-1 (F*)	1	2.0 x 5.3	20	30	600	15
ADO-M-2 (F*)	2	2.0 x 5.3	20	30	600	15
ADO-M-R-4 (F*)	4	2.0 x 6.0	21	30	600	15
ADO-M-R-8 (F*)	8	2.0 x 6.0	21	30	600	70
Non-Metallic Messenger Wire						
ADO-NM-1 (F*)	1	3.5 x 7.0	23	30	700	15
ADO-NM-2 (F*)	2	3.5 x 7.0	23	30	700	15

*F denotes fiber type: FutureGuide®SR15E = SR15E, FutureGuide®BIS-B = BIS-B

Fiber Identification

Fiber No.											
1	2	3	4	5	6	7	8	9	10	11	12
Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Turquoise

Environmental Characteristics

Criteria	Temperature
Transportation & Storage	-30°C to +70°C
Installation	-10°C to +50°C
Operation	-30°C to +70°C

Fiber Characteristics

Characteristics	Unit	Fiber type	
		FutureGuide®-SR15E	FutureGuide®-BIS-B
Geometrical Characteristics			
Mode field diameter at 1310nm	µm	8.6 ± 0.4	8.6 ± 0.4
Cladding diameter	µm	125 ± 0.7	125 ± 0.7
Core concentricity error	µm	≤ 0.5	≤ 0.5
Cladding non-circularity	%	≤ 1.0	≤ 1.0
Primary coating diameter (including color layer)	µm	250 ± 15	250 ± 15
Coating-cladding concentricity error	µm	≤ 12.5	≤ 12.5
Fiber curl radius	m	≥ 4	≥ 4
Transmission Characteristics			
Attenuation at 1310nm	dB/km	≤ 0.40	≤ 0.40
Attenuation at 1383nm*	dB/km	≤ 0.35	≤ 0.35
Attenuation at 1550nm	dB/km	≤ 0.30	≤ 0.30
Macro bending loss** φ 30mm, 10 turns, 1550nm	dB	≤ 0.25	≤ 0.03
Macro bending loss** φ 30mm, 10 turns, 1625nm	dB	≤ 1.0	≤ 0.10
Macro bending loss** φ 20mm, 1 turns, 1550nm	dB	≤ 0.75	≤ 0.10
Macro bending loss** φ 20mm, 1 turns, 1625nm	dB	≤ 1.50	≤ 0.20
Macro bending loss** φ 15mm, 1 turns, 1550nm	dB	-	≤ 0.50
Macro bending loss** φ 15mm, 1 turns, 1625nm	dB	-	≤ 1.0
Cut-off wavelength (λ _{co})	nm	≤ 1260	1260
Chromatic dispersion at 1310nm	ps/nm.km	≤ 3.5	≤ 3.5
Chromatic dispersion at 1550nm	ps/nm.km	≤ 18	≤ 18
Zero dispersion wavelength	nm	1300-1324	1300-1324
Zero dispersion slope	ps/nm ² .km	≤ 0.092	≤ 0.092
Mechanical Characteristics			
Proof stress level	%	1.5	1.5

*Attenuation increase due to hydrogen aging at this wavelength in bare optical fiber is tested in accordance with IEC60793-2-50 test procedure.

** This characteristic is measured before coloring process.

Packing

Drop cables are packed in styrofoam or ply-wood reels. Suitable protection means are applied to prevent damage of the cables during shipment and storage.

Ordering Information

Product code	Fujikura product name
ADO-M-1 (F*)	FR-OGNMGDE-SSD F × 1C
ADO-M-2 (F*)	FR-OGNMGDE-SSD F × 2C
ADO-M-R-4 (F*)	FR-OGNM4UTGDE-SSD F × 4C
ADO-M-R-8 (F*)	FR-OGNM4UTGDE-SSD F × 8C
ADO-NM-1 (F*)	FR-OGNMGDE-SSD (NM) F × 1C
ADO-NM-2 (F*)	FR-OGNMGDE-SSD (NM) F × 2C

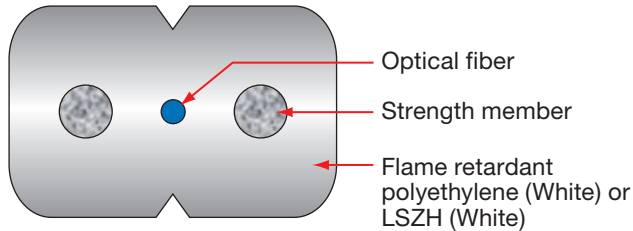
*F denotes fiber type: FutureGuide®SR15E = SR15E, FutureGuide®BIS-B = BIS-B

Notes

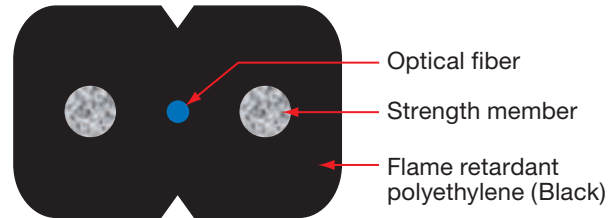
Low Friction Indoor Optical Fiber Cable

Cable Construction

Indoor type



Indoor/Outdoor type

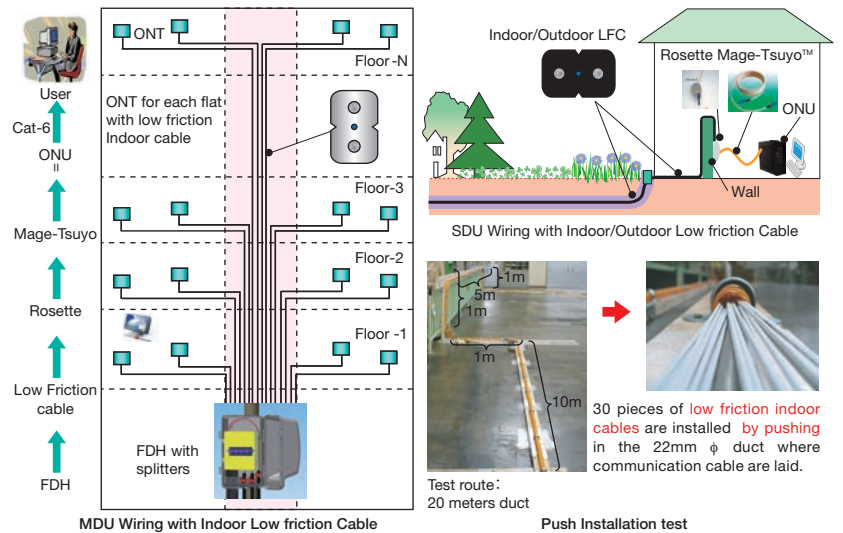


Features

- Very low coefficient of friction that makes installation extremely easier
- Pushing installation method can be employed with metallic strength members.
- Helps to build fast and simple FTTH networks with reduced CAPEX.
- Indoor/Outdoor type is UV resistant and flame retardant as per IEC 60332-1

Applications

- Premise and Indoor
- FTTx



Mechanical Characteristics

Product code	Fiber count	Structure	Nominal dimension (mm)	Weight (kg/km)	Permissible tensile strength (N)	Bending radius (mm)
Indoor type						
IN-M-1 (F*)	1	Metallic	1.6 × 2.0	7	220	15
IN-M-2 (F*)	2	Metallic	1.6 × 2.3	7	220	15
IN-M-4 (F*)	4	Metallic	1.6 × 2.8	8	220	15
IN-M-8 (F*)	8	Metallic	2.0 × 3.4	10	220	70
IN-M-1-LSZH (F*)	1	Metallic	1.6 × 2.0	8	220	15
IN-M-2-LSZH (F*)	2	Metallic	1.6 × 2.4	8	220	15
IN-NM-1 (F*)	1	Non-metallic	1.6 × 2.0	4	80	15
IN-NM-2 (F*)	2	Non-metallic	1.6 × 2.3	5	80	15
IN-NM-4 (F*)	4	Non-metallic	1.6 × 2.8	5	80	15
IN-NM-8 (F*)	8	Non-metallic	2.0 × 3.4	7	80	70
IN-NM-1-LSZH (F*)	1	Non-metallic	1.8 × 2.6	8	150	30
Indoor/Outdoor type						
INO-M-1 (F*)	1	Metallic	1.6 × 2.0	7	220	15
INO-M-2 (F*)	2	Metallic	1.6 × 2.3	8	220	15
INO-M-4 (F*)	4	Metallic	1.6 × 2.8	9	220	15
INO-M-8 (F*)	8	Metallic	2.0 × 3.4	12	220	70
INO-NM-1 (F*)	1	Non-metallic	1.6 × 2.0	4	80	15
INO-NM-2 (F*)	2	Non-metallic	1.6 × 2.3	5	80	15
INO-NM-4 (F*)	4	Non-metallic	1.6 × 2.8	6	80	15
INO-NM-8 (F*)	8	Non-metallic	2.0 × 3.4	8	80	70

* F denotes fiber type : FutureGuide®-SR15E = SR15E, FutureGuide®-BIS-B = BIS-B.

Fiber Identification

Fiber count	Fiber color
1	Blue
2	Blue, Orange
4	Blue, Orange, Green, Brown
8	Blue, Orange, Green, Brown, Grey, white, Red, Black

* Fiber colors can be customized as per requirement.

Environmental Characteristics

Criteria	Indoor type	Indoor/Outdoor type
Transportation & Storage	-10°C - +40°C	-15°C - +70°C
Installation	-10°C - +40°C	-10°C - +50°C
Operation	-10°C - +40°C	-15°C - +70°C

Fiber Characteristics

Characteristics	Unit	Fiber type	
		FutureGuide®-SR15E (ITU-T G.657.A1)	FutureGuide®-BIS-B (ITU-T G.657.A2)
Geometrical Characteristics			
Mode field diameter at 1310nm	μm	8.6 ± 0.4	8.6 ± 0.4
Cladding diameter	μm	125 ± 0.7	125 ± 0.7
Core concentricity error	μm	≤ 0.5	≤ 0.5
Cladding non-circularity	%	≤ 1.0	≤ 1.0
Primary coating diameter (including color layer)	μm	250 ± 15	250 ± 15
Coating-cladding concentricity error	μm	≤ 12.5	≤ 12.5
Fiber curl radius	m	≥ 4	≥ 4
Transmission Characteristics			
Attenuation at 1310nm	dB/km	≤ 0.40	≤ 0.40
Attenuation at 1383nm	dB/km	≤ 0.35	≤ 0.35
Attenuation at 1550nm	dB/km	≤ 0.30	≤ 0.30
Macro bending loss** φ 30mm, 10 turns, 1550nm	dB	≤ 0.25	≤ 0.03
Macro bending loss** φ 30mm, 10 turns, 1625nm	dB	≤ 1.0	≤ 0.10
Macro bending loss** φ 20mm, 1 turns, 1550nm	dB	≤ 0.75	≤ 0.10
Macro bending loss** φ 20mm, 1 turns, 1625nm	dB	≤ 1.50	≤ 0.20
Macro bending loss** φ 15mm, 1 turns, 1550nm	dB	-	≤ 0.50
Macro bending loss** φ 15mm, 1 turns, 1625nm	dB	-	≤ 1.0
Cut-off wavelength (λ _{co})	nm	1260	1260
Chromatic dispersion at 1310nm	ps/nm.km	≤ 3.5	≤ 3.5
Chromatic dispersion at 1550nm	ps/nm.km	≤ 18	≤ 18
Zero dispersion wavelength	nm	1300-1324	1300-1324
Zero dispersion slope	ps/nm ² .km	≤ 0.092	≤ 0.092
Mechanical Characteristics			
Proof stress level	%	1.5	

*Attenuation increase due to hydrogen aging at this wavelength in bare optical fiber is tested in accordance with IEC60793-2-50 test procedure.

Packing

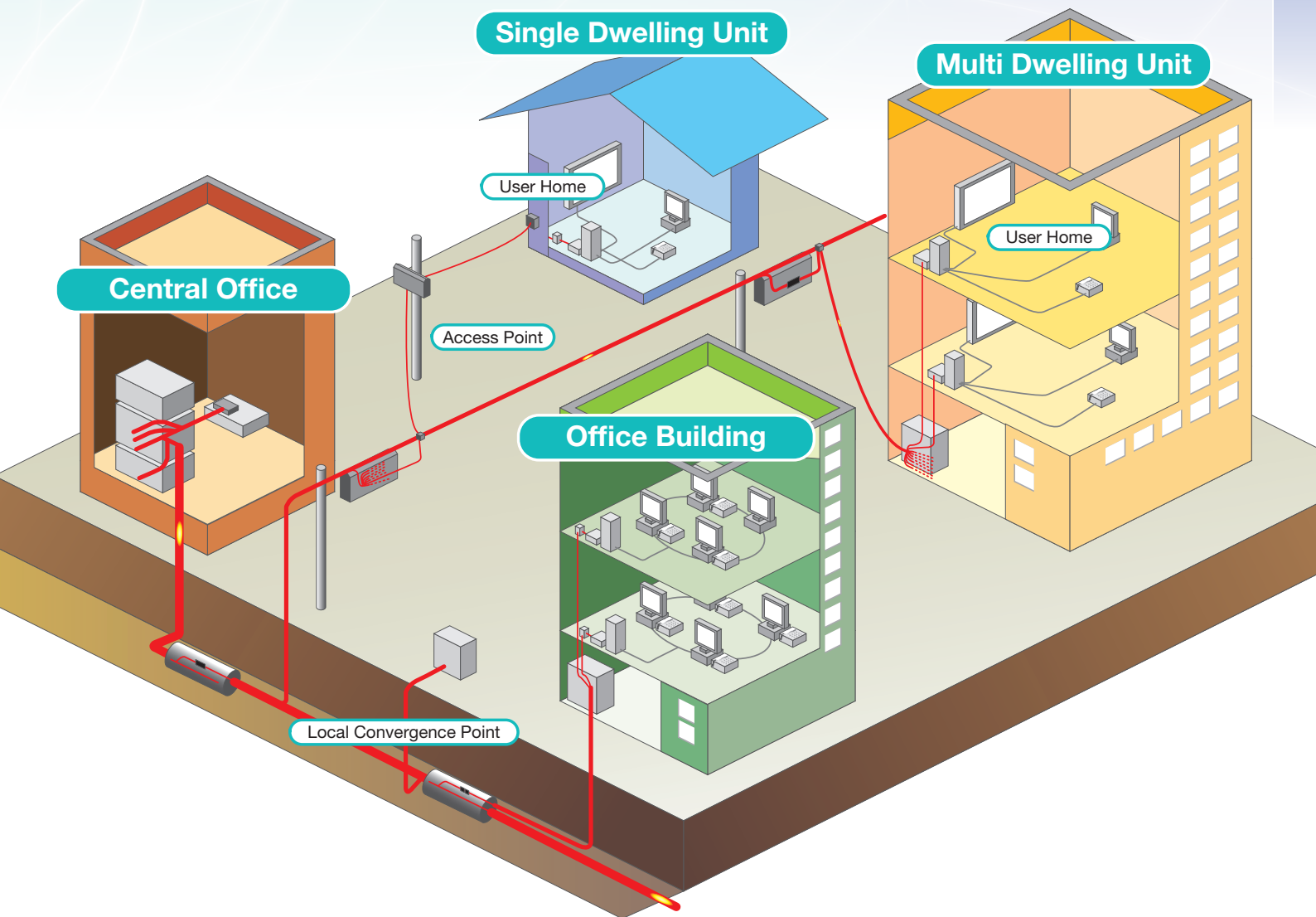
Cables are packed in suitable reels / boxes and suitable protection means are applied to prevent damage of cables during shipment and storage.

Ordering Information

Product code	Fujikura product name
Indoor type	
IN-M-1 (F*)	FR-OGINHE F × 1C
IN-M-2 (F*)	FR-OGINHE F × 2C
IN-M-4 (F*)	FR-OGINHE F × 4C
IN-M-8 (F*)	FR-OGINHE F × 8C
IN-M-1-LSZH (F*)	LSZH-OGINHE F × 1C
IN-M-2-LSZH (F*)	LSZH-OGINHE F × 2C
IN-NM-1 (F*)	FR-OGNMINHE F × 1C
IN-NM-2 (F*)	FR-OGNMINHE F × 2C
IN-NM-4 (F*)	FR-OGNMINHE F × 4C
IN-NM-8 (F*)	FR-OGNMINHE F × 8C
IN-NM-1-LSZH (F*)	LSZH-OGINHE F × 1C
Indoor/Outdoor type	
INO-M-1 (F*)	FR-OGINHE F × 1C
INO-M-2 (F*)	FR-OGINHE F × 2C
INO-M-4 (F*)	FR-OGINHE F × 4C
INO-M-8 (F*)	FR-OGINHE F × 8C
INO-NM-1 (F*)	FR-OGNMINHE F × 1C
INO-NM-2 (F*)	FR-OGNMINHE F × 2C
INO-NM-4 (F*)	FR-OGNMINHE F × 4C
INO-NM-8 (F*)	FR-OGNMINHE F × 8C

* F denotes fiber type : FutureGuide®-SR15E = SR15E, FutureGuide®-BIS-B = BIS-B.

Notes



Application Site	Product Names	Features
Central Office	FTM Series, optional racks	Ultra-high density, large capacity, start of feeder cables
Local Convergence Point	ODC-C, HRB Solution	Larger capacity, connect feeder cables with distribution cables
Network Access Point	FTB-601, FODP, ODP-HRB	Middle capacity, connect distribution cables with drop cables
User House	FPB Series, FOPT Series	1~4F capacity, termination of drop cables