

***FURUKAWA ELECTRIC***

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*No. FA-KL4308*

***Specification***  
***for***  
**Loose Tube Fiber Optic Cable**  
**(Figure-8, G.652D)**

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1. General

This specification describes the construction and properties of loose tube fiber optic cable of Figure-8 type self-supporting for aerial application. Optical fiber used in this cable is in compliance with ITU-T recommendation G.652.D.

2. Construction

2.1	Optical fiber	:	Table 1
2.2	Loose tube	:	Table 2
2.3	Cable	:	Table 3 and Fig. 1
2.4	Color code	:	Table 4

3. Characteristics

3.1	Optical properties of the optical cable	:	Table 5
3.2	Mechanical and Environmental properties of optical cable	:	Table 6
3.3	Mechanical and Environmental characteristics of optical cable	:	Table 7

4. Sheath printing

The following shall be printed on the cable sheath in one meter intervals:

Manufacturer name, Year of manufacture, Length of markings in one meter intervals

5. Packing

5.1 Drum

The cable will be delivered in the length required on a wooden drum.

5.2 Cable end

The running end shall be fitted with a suitable cap, or pulling grip or eye by customer's request and the other end shall be fitted with a suitable cap.

Table 1. Construction of optical fiber

Item			Specification
Type			Single-mode
Material	Core		Doped silica
	Cladding		Silica
	Primary	Inner layer	UV curable acrylate
	Coating	Outer layer	UV curable acrylate
Mode field diameter			$9.2 \pm 0.5\mu\text{m}$
Core concentricity error			Max. $0.8\mu\text{m}$
Cladding diameter			$125 \pm 1\mu\text{m}$
Cladding non-circularity			Max. 2%
Colored fiber diameter			$250 \pm 15\mu\text{m}$
Identification			Color coding
Proof stress			Min. 0.69GPa

Table 2. Construction of loose tube

Item		Specification	
Optical fiber	Number	Max. 6 / tube	Max. 12 / tube
Filling	Material	Synthetic gel	
Tube	Material	PBT with color coding	
	Diameter	Nominal 2.0 mm	Nominal 2.5 mm
	Color Code	Table 4	

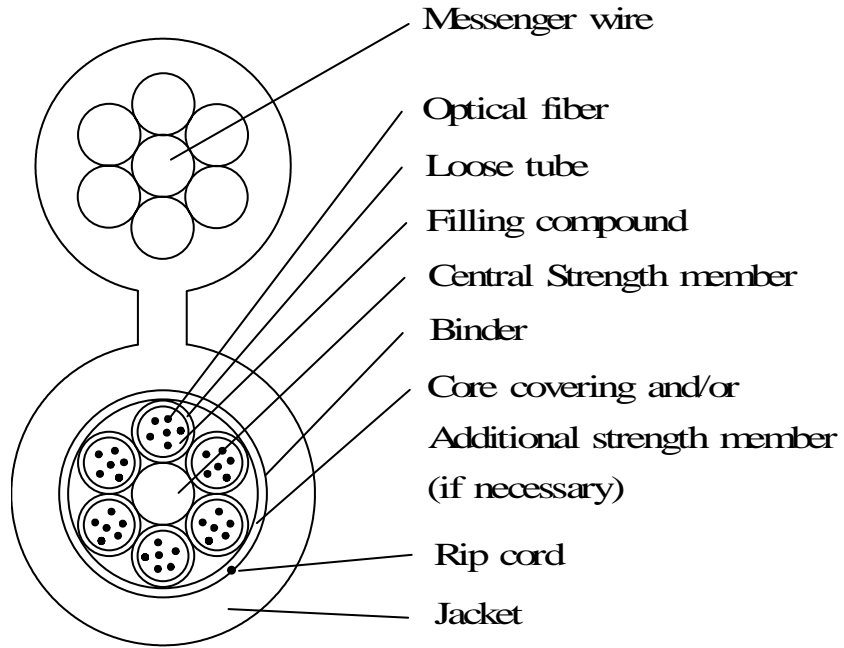
Table 3. Construction of cable

Item		Specification				
Fiber count		1-36	37-72	73-96	97-120	121-144
Loose tube	Spec.	The same as Table 2.				
	Fiber per tube	Max. 6	Max. 12	Max. 12	Max. 12	Max. 12
	Number	1-6	1-6	7-8	9-10	11-12
Filler	Material	Plastic rod, pipe or appropriate filler(s) if necessary				
Central strength member	Material	FRP (coated with plastic material if necessary)				
Binder	Material	Plastic thread(s)				
Water blocking element	Material	Suitable water swellable material				
Core covering (*1)	Material	Plastic tape(s) or Water blocking tape(s) if necessary				
Additional strength member (*1)	Material	Aramid yarn(s) or Fiberglass yarn(s) if necessary				
Ripcord	Material	Plastic thread(s)				
Jacket (Cable part)	Material	MDPE, colored black				
	Thickness	Nominal 1.4 mm				
Messenger wire	Material	Steel wire strand				
	Size	Nominal 7/2.03mm				
Overall diameter (approx.)		20.0mm	21.5mm	23.0mm	24.5mm	26.0mm
Cable diameter (approx.)		10.5mm	11.5mm	13.0mm	14.5mm	16.5mm
Cable weight (approx.)		280 kg/km	300 kg/km	330 kg/km	370kg/km	400kg/km
Structure		Fig. 1				

\* Manufacturer may use additional suitable tape(s), thread(s) and / or filler(s) for manufacturer's reason.

\*1 Manufacturer may use suitable core covering or additional strength member if necessary.

36 fiber cable



72 fiber cable

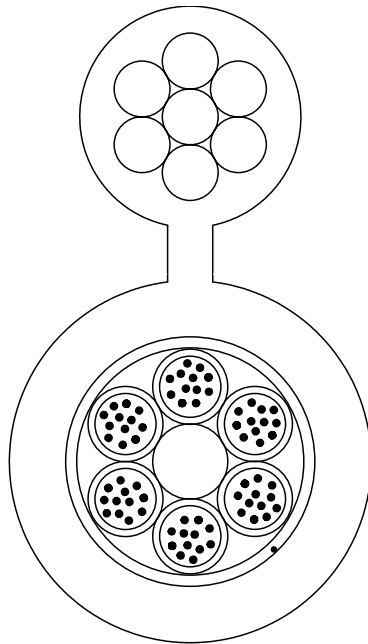
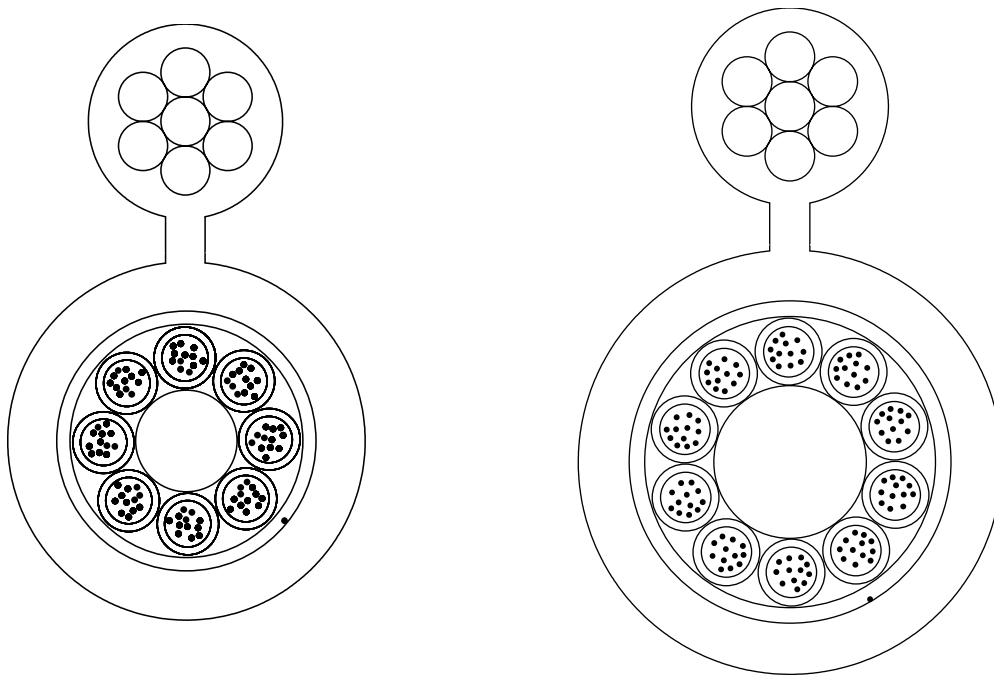


Fig. 1-1 Cross sectional view of optical cable

Not to scale

96 fiber cable

120 fiber cable



144 fiber cable

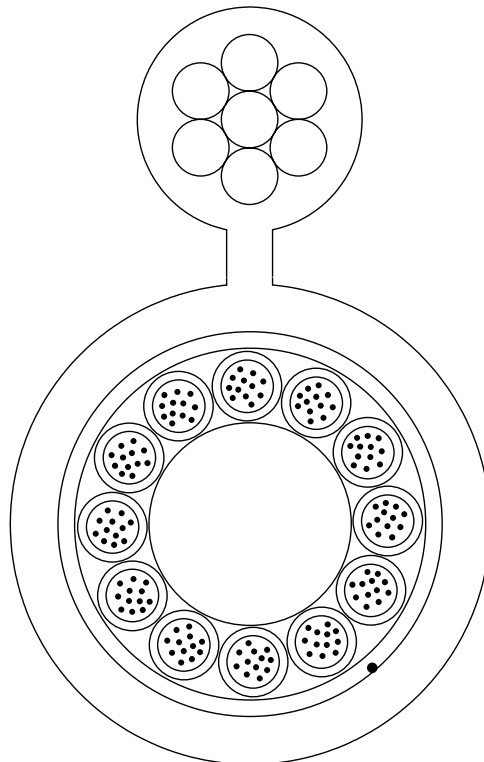


Fig. 1-2 Cross sectional view of optical cable

Not to scale

Table 4. Color code of optical fiber and loose tube

<b>Color code of optical fiber</b>		<b>Color code of loose tube</b>	
<b>Fiber No.</b>	<b>Color code</b>	<b>Tube No.</b>	<b>Color code</b>
1	Blue	1	Blue
2	Orange	2	Orange
3	Green	3	Green
4	Brown	4	Brown
5	Slate	5	Slate
6	White	<b>6</b>	<b>White</b>
7	Red	<b>7</b>	<b>Red</b>
8	Black	<b>8</b>	<b>Black</b>
9	Yellow	<b>9</b>	<b>Yellow</b>
10	Violet	<b>10</b>	<b>Violet</b>
11	Rose	<b>11</b>	<b>Rose</b>
12	Aqua	<b>12</b>	<b>Aqua</b>

Table 5. Optical properties of the optical cable

<b>Item</b>	<b>Specification</b>
Attenuation	$\leq 0.35$ dB/km at 1310 nm $\leq 0.35$ dB/km at 1383 nm (*) $\leq 0.23$ dB/km at 1550 nm $\leq 0.35$ dB/km at 1625 nm
Point discontinuity in attenuation	$\leq 0.1$ dB/km
Macrobend loss performance of optical fiber	Radius: 30 mm, Number of turns: 100, $\leq 0.5$ dB/km at 1550 and 1625nm
Zero dispersion wavelength	1300-1324 nm
Slope at Zero dispersion wavelength	$\leq 0.093$ ps/nm <sup>2</sup> .km
Chromatic dispersion	$\leq 3.5$ ps/nm.km in 1285-1330nm $\leq 18$ ps/nm.km at 1550nm
PMDQ	$\leq 0.2$ ps/km(1/2)
Cable cut-off wavelength	$\leq 1260$ nm

(\*1) after hydrogen aging according to IEC 60793-2 regarding the B1.3 fiber category.

Table 6. Mechanical and Environmental properties of optical cable

Item		Specification
Temperature range	Storage	- 40 - + 75 degree C
	Installation	- 30 - + 60 degree C
	Operation	- 40 - + 70 degree C
Maximum pulling tension (for Figure-8 cable)	Up to 72 fibers	8000 N
	Up to 96 fibers	8500 N
	Up to 120 fibers	9000 N
	Up to 144 fibers	9700 N
Maximum pulling tension (for only cable part)		2700 N
Min. bending radius		20 x Cable OD (for dynamic) 10 x Cable OD (for static)

Table 7. Mechanical and Environmental characteristics of optical cable

Cable Test	Test Method	Criteria
Tensile Test	TIA/EIA-455-33A / IEC 60794-1-2-E1A Test sample: Min. 25m Tensile load: Max. pulling tension	Max. attenuation increase ≤0.1 dB at 1550nm
Repeated Bending Test	TIA/EIA-455-104A / IEC 60794-1-2-E6	Max. attenuation increase ≤0.1 dB at 1550nm
Crush Test	TIA/EIA-455-41A / IEC 60794-1-2-E3 Load: 220N/cm	Max. attenuation increase ≤0.1 dB at 1550nm
Impact Test	TIA/EIA-455-25B / IEC 60794-1-2-E4 (7b)	Max. attenuation increase ≤0.1 dB at 1550nm
Twist Test	TIA/EIA-455-85A / IEC 60794-1-2-E7	Max. attenuation increase ≤0.1 dB at 1550nm
Low and High Temperature Bend Test	TIA/EIA-455-37A / IEC 60794-1-2-E11A Temperature: -30 and +60 degree C	Max. attenuation increase ≤0.1 dB at 1550nm
Water Penetration	EIA/TIA-455-82B / IEC 60794-1-2-F5B	No flow after 24 hours from one meter length of cable
Temperature Cycling	TIA/EIA-455-3A / IEC 60794-1-2-F1 Temperature range: -40 - +70 degree C	Max. attenuation increase ≤0.1 dB/km at 1550nm