Launching Ultra-High-Fiber-Count and High-Density Slotted Optical Cables for Duct Application

1. Outline

In recent years, the advancement of cloud computing, video distribution, and AI has led to a rapid increase in telecommunications traffic and the construction of large-scale data centers (DCs).

Since optical cables that connect DCs are usually installed in outdoor ducts, the technology for densely installing these cables in a limited duct space is indispensable.

In 2017, Sumitomo Electric Industries, Ltd. developed and commercialized an optical cable with the world's highest fiber count of 6,912. The Company also developed wiring solutions and has contributed to increasing cabling density and improving workability throughout DCs.

The Company has recently developed and started sales of a 3,168-fiber-count optical cable with 200 μm fibers and a 2,016-fiber-count optical cable with 250 μm fibers as ultra-high-fiber-count and high-density optical cables suitable for installation in ducts used in Japan and other areas. This paper describes the structure and features of these new cables.

2. Cable Design

The major specifications of the newly developed 3,168-fiber-count and 2,016-fiber-count optical cables are shown in Table 1.

Table 1. Major specifications of new optical cables

	3,168-fiber-count optical cable	2,016-fiber-count optical cable
Fiber diameter	200 μm	250 μm
Fiber ribbon	12-fiber Freeform Ribbon	8-fiber Freeform Ribbon
Slot	4-slot type	
Jacket	Flame-retardant polyethylene	
Cable outside diameter	24 mm	

Both optical cables have the same 4-slot structure. The 3,168-fiber-count optical cable uses 12-fiber Freeform Ribbon with 200 μm fibers, while the 2,016-fiber-count optical cable uses 8-fiber Freeform Ribbon with 250 μm fibers that are widely used in Japan. These Freeform Ribbons provide both flexibility and mass fusion spliceability that enable the design of an intermittent fiber ribbon structure having slits in the longitudinal direction for every two fiber ribbons. Compared with a fiber ribbon consisting of separated fibers, the new fiber ribbon structured as above makes it easier to fit the fibers in the V-grooves at the time of fusion splicing as shown in Fig. 1, and thus enhances the reliability of the new optical fiber cables.

The structure of the 3,168-fiber-count optical cable is shown in Fig. 2 as an example. This optical cable is thin and can be bent in any direction, and it is also fireproof with a flame-retardant jacket.

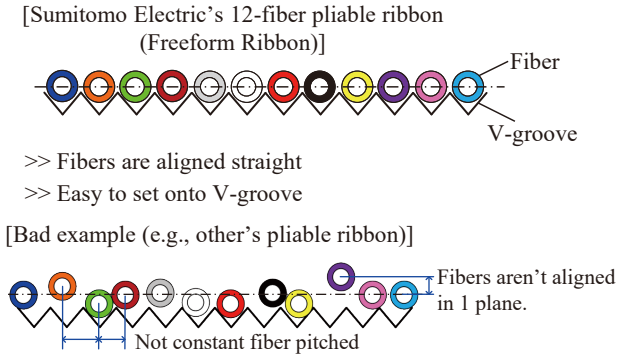

Fig. 1. Features of Sumitomo Electric's Freeform Ribbon

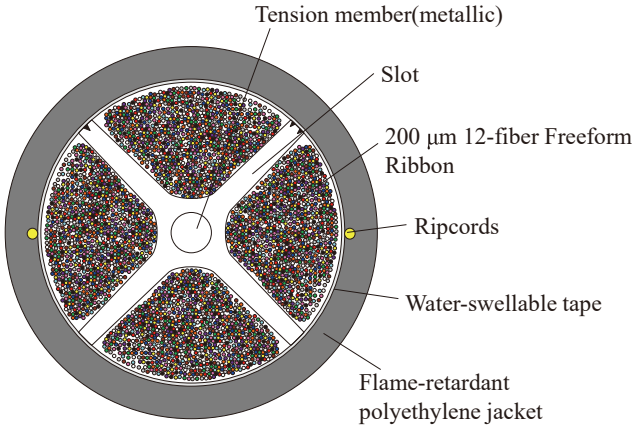

Fig. 2. Schematic illustration of the cross-section of 3,168-fiber-count optical cable

3. Features

(1) Improves conduit use efficiency: The new optical fiber cables are thin enough to be installed in conduits widely used in Japan, and their high density increases the number of fibers that can be installed in each conduit. (Conventional 2,000-fiber-count optical cable → 3,168-fiber-count optical cable)
(2) Easy to install in conduit: Due to a unique slot structure that allows direction-free bending, the new optical fiber cables can be routed in complexly curved conduits.
(3) Easy to splice: Both the 8-fiber and 12-fiber ribbons can be mass fusion spliced to conventional ribbons.