» New Products

Ultra-high Fiber Count (UHFC) 6912-Fiber Rollable Ribbon Cable and Ribbon Fiber Mass Fusion Splicer S124M12 and Related Tools

1. INTRODUCTION

Recently, the data traffic in the world is experiencing a swift increase due to the spread of internet services and cloud applications and further capacity enlargement of the optical fiber network is required. Demands of the ultra-high fiber count cable with over 3000 fibers is growing at the data centers and it is required to install as many fibers as possible in the existing ducts.

This time, we developed an optical cable of 29 mm outer diameter, which assembles 6912 optical fibers by using rollable ribbons with a small diameter fiber of 200μm outer diameter (200 μm-RR), and which is installable in an existing 1.5-inch-duct. We also released the mass fusion splicer S124M12 and the related tools which are necessary for connecting the cables. Using the tools which are optimized for 200 μm-RR, it is possible to connect the optical fiber cables within the same working hours as in conventional ribbon connected cables, and they contribute to expand the optical network.

2. 6912-FIBER CABLE

2.1 Cable Structure

2.1.1 Rollable ribbon

The structure of the 200 μm-RR used for the cable is shown in Figure 1. The rollable ribbon is constructed by bonding, at intervals, 12 pieces of optical fibers which have a small outer diameter of 200 μm. High-density assembly of the optical fibers in the cable becomes possible with a rolling form and a size reduction and a weight saving of the cable are achieved. On the other hand, the rollable ribbon is restored to ribbon form when it is taken out from the cable, therefore the working time of splicing can be shortened considerably by mass fusion splicing with a fusion splicer. Each ribbon can be identified easily by a bar code printed on the surface of the 200 μm-RR.

2.1.2 Cable structure

The structure of the developed 6912-fiber cable is shown in Figure 2. 48 units of 144-fiber unit are intertwined to construct a cable core. The cable core is wrapped around by a water-absorbent nonwoven fabric for waterproof and also covered collectively together with 2 non-metallic strength members and 2 rip cords in black polyethylene. The locations of the rip cords are identified by the prominences on the surface of the outer sheath.

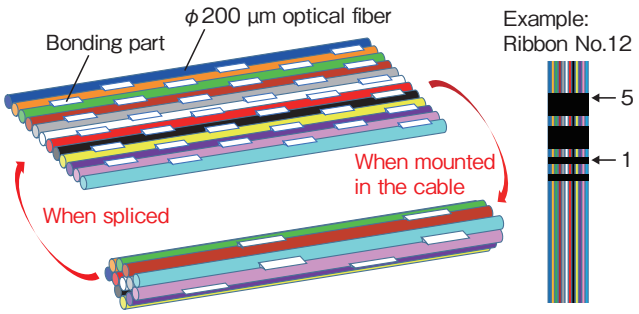

Figure 1 Structure of a 200 μm 12-fiber rollable ribbon (left). Barcode printed on the rollable ribbon of No.12 (right).

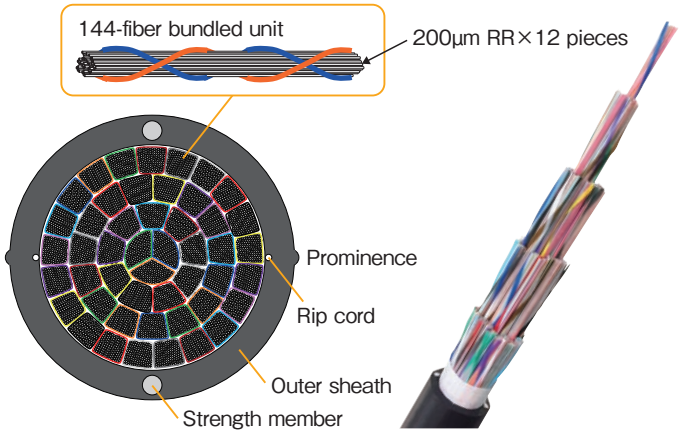

Figure 2 Structure of 6912F cable.

2.2 Characteristics of the Cable

The characteristics of the developed 6912-fiber cable are shown in Table 1. Good results are obtained on transmission loss, mechanical characteristics and environmental characteristics.

Table 1 Characteristics of 6912F cable.

Test item	Condition	Result
Transmission loss	1.55 μm	<0.3 dB/km
Tensile	Tension: 2700 N	<0.10 dB
Crush	2200 N/100 mm, 1 min retaining	<0.10 dB
Impact	10 N × 1 m	<0.10 dB
Repeated bending	20 D, 10 cycles	<0.10 dB
Torsion	± 90 deg. / m, 3 cycles	<0.10 dB
Temperature cycling	−30℃ - +70℃, 6 hours, 3 cycles	<0.10 dB
Water penetration	Tap water, water head length 1m, 10 days	<40 m

*Measurement wavelength: 1550nm

3. FUSION SPLICER AND RELATED TOOLS

3.1 Fusion Splicer

The look of the mass fusion splicer S124M12 is shown in Figure 3. We designed the overall height low so that it can be operated even in a narrow work space at the site of the telecommunication construction such as inside the closures, etc. The greatest feature of the S124 series is that the customer can exchange the V-groove which guides up to a maximum of 12 optical fibers. The V-groove is a part for positioning the optical fiber to be spliced with high precision and, in the past, the equipment was sent back to our service department or agency for the replacement and our expert staff carried out the replacement work. However, considering the convenience of customers who must splice various optical fiber cables as described before, we designed the V-groove to be easily replaceable by customers themselves. As a result, customers can quickly exchange the V-groove to the needed one by themselves and proceed with the splice work. It is possible to splice the 200 µm-RRs by changing the V-grooves.

Figure 3 S124M12 appearance.

Table 2 Specifications of S124 Series.

Item	Specification
Applicable fiber type	SMF, MMF, DSF, NZDSF
Corresponding cladding diameter	125 µm
Corresponding coating diameter	200 µm - 900 µm
Optical fiber cut length	10 mm
Splice loss	SMF: 0.05 dB
Splice time	SMF multi-fiber: Less than 15 seconds
Battery	Built-in lithium ion battery
Data communication port	USB 2.0 × 2 ports (Mini B: 1 port, Standard: 1 port)
Main body dimension	179W × 246D × 131H mm
Main body weight	2.0 kg (including the battery)

3.2 Related Tools

In order to associate to the 200 µm-RR cables whose demand will increase in the future, not only fusion splicers but also the associated peripheral accessories are required. Therefore we developed a new hot stripper and a new pitch conversion holder.

The 200 µm-RR is thinner than the conventional ribbon fiber and the heating type coating removal device (hot stripper) adequate to this cable requires a peeling mechanism with an accuracy higher than before. In order to address this issue, we have released S218R-200 (Figure 4). S218R-200 is a hot stripper optimized to 200 µm-RR. During the fusion splicing of a 200 µm-RR, the fiber holder compatible to the 200 µm-RR is also needed as well as the hot stripper.

In addition, in case of the splicing with a 200 µm-RR fiber and a conventional 250 µm-ribbon fiber, we have developed the pitch conversion holder PCH-01 (Figure 5) to change the pitch from 200 µm to 250 µm.

Figure 4 S218R-200 appearance.

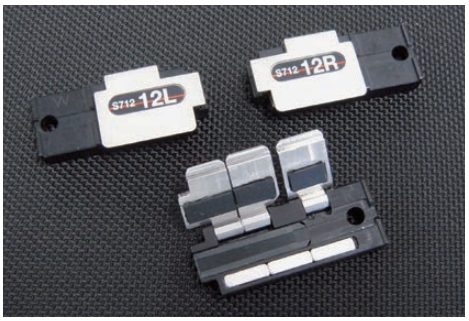

Figure 5 PCH-01 appearance.

4. CONCLUSION

6912-fiber cable which we developed this time has achieved the highest world's level of 10.5 core/mm^2 in core density and its cable outer diameter is less than 30 mm, therefore it can be installed into a 1.5-inch duct. Using rip cords, the cable can be disassembled easily without specialized tools and it is superior in workability during the installation because of it is an entirely dry construction that uses no jelly inside and it has a lightweight of 0.66 kg/m. When the optical fiber is spliced, each ribbon can be easily identified by the bar code printed on

the bundled units and the surface of the ribbons, therefore it can be handled efficiently.

As a promising solution to the rollable ribbon cable market where the further future increase is expected, we have developed the mass fusion splicer S124 series and the associated accessories. Currently, rollable ribbon cables are in a situation where new products are appearing one after another. We will continue to provide the necessary firmware updates and accessory offers for those splices.

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