FTTH Optical Splitter Technical Specification

Contents

1. Scope and Classification

1.1 A range of application

This specification applies to the optical splitter for FTTH communication network construction that meet the requests.

1.2 Classification

1.2.1 Optical splitters for FTTH are classified as shown in [Table 1] below.

[표1] FTTH optical splitter

P/N	Code Part	Division	Abbreviation	Use and Function	Remark
FTTH Optical Splitter	General Type (Tight Buffer)	16 ports	FSP(1)-(2)P	Distribution and Combining Optical Signals	-
		12 ports			
		8 ports			
		7 ports			
		5 ports			
		4 ports			
	Ribbon Type (Ribbon)	32 ports	FSP(1)-(2)P		-
		16 ports			

※ Abbreviation

- F : FTTH

- SP : Splitter

- (1) : Module/Code Part (G : General, R : Ribbon)

- (2) : Numbers of distribution ports (Number : Number of Port, Number x Number : Number of ports in dual structure

ex) 16 : 16ports, 7 : 3+4 ports, 4x7 : 4port + 7port

(Dual) - P : Ports

2. A range of application

2.1 GR-1209-CORE Generic Requirements for Passive Optical Components

2.2 GR-1221-CORE Generic Reliability Assurance Requirements for Passive Optical Components

2.3 ITU-T G.657 Characteristics of a Bending Loss Insensitive Single Mode Optical Fibre and Cable for the Access Network

2.4 Korea Information and Communication Technology Association (TTA) Standard

3. General Information

3.1 If the requirements of this specification are not satisfied, it is premised that it is excluded from evaluation. 3.2 When proposing materials that satisfy this specification, detailed explanations and data on the performance and operation method of each material shall be provided. The data and original catalogs on the structure, specifications tolerances, and installation and methods of each materials shall be presented.

3.3 When requesting data related to improvement of material performance and communication service quality, even if it is not specified in this specification, shall be presented.

4. Requirements

4.1 General Information

4.1.1 In this section, technical requirements, such as material, structure, function, etc. of optical splitter required for FTTH communication network construction, were described from the users' point of view.

4.1.2 The optical splitter for construction of FTTH communication network should be manufactured to secure reliability and stability equal to the service level required in FTTH subscriber network in providing interactive multimedia service. 4.1.3 The optical splitter for construction of FTTH communication network should be manufactured to facilitate H/W replacement and other maintenance and testing.

4.2 Materials

4.2.1 Optical fiber core wire

4.2.1.1 The core and cladding of optical fiber core wires should be made of quartz glass as the main material.

4.2.1.2 The optical fiber used in this specification should be flexural reinforced optical fibers that is a standard for LWPF(Low Water Peak Fiber), only if the specific specification not mentioned.

4.2.1.3 The coating material of optical fiber should be made of plastic material.

4.2.1.4 Input part

The input part for optical fiber core wire should be coated as like 900umtight buffer with PVC or equivalent or higher materials.

4.2.1.5 Ribbon part

The optical fiber core wire of the ribbon part should be coated in a ribbon type using a resin-based coating material by arranging the optical fiber core wires in a row.

4.2.1.6 Code part

The optical fiber core wire of the cord part is coated in a 900um tight buffer form using PVC or equivalent or higher material, or it must be protected by being inserted into a low shrinkage loose tube.

4.2.2 PLC Chip (Planar Light-wave Circuit Chip)

The PLC chip used in this specification should be made of quartz-based material.

4.2.3 Fiber Array

The optical fiber array used in this specification should use a quartz-based material such as PLC chip.

4.2.4 Housing

The housing used in this specification should be made of aluminum, stainless steel, or equivalent or higher material to protect the optical distribution module and prevent corrosion.

4.2.6 Connector

The connector used in this standard must be made of a product that is resistant to mechanical environmental characteristics and chemical factors such as temperature change and vibration.

4.3 Structure and Dimensions

4.3.1 The optical splitter has a closed structure and must be a structure that can be accommodated in the optical terminal box.

4.3.2 Structure and dimensions of optical splitter, core color, and core wire arrangement should be the same as in ⟨Appendix 1⟩.

4.4 Manufacturing and Processing

4.4.1 It shall be protected from corrosion without changing its properties within the specified temperature range.

4.4.2 It should be light weight, excellent in flexibility, and easy to attach/detach on site.

4.4.3 The housing should be made of a material that is not oxidized when exposed to the outdoors and has excellent waterproof and moisture-proof properties, and should be able to prevent contamination and corrosion due to pollution.

4.4.4 The ribbon part and the cord part shall be able to check the color of the fiber optic core wire as in 4.3.3 or be easily identified by attaching a number tag.

4.4.5 According to the user's request, a connector such as SC/PC or SC/APC type should be attached to the end of the cord for delivery.

4.4 Performance and Characteristics

4.5.1 Optical Characteristics

4.5.1.1 The optical Characteristics requirements of FTTH optical splitter are as follows.

Item	Ribbon Type		General Type							
	32 ports	16 ports	16 ports	12 ports	8 ports	7 ports		5 ports		4 ports
Port No.	#1~32	#1~16	#1~16	#1~12	#1~8	#1~3	#4~7	#1~4	#5	#1~4
SC/APC Type	not including	not including	not including	not including	including	not including	including	including	not including	including
Insertion Loss	below 17.0 dB	below 13.5 dB	below 13.5 dB	below 12.5dB	below 10.5 dB	below 7.0 dB	below 13.5 dB	below 10.5 dB	below 3.5 dB	below 7.5 dB
Uniformity	below 1.0 dB	below 0.8 dB	below 0.8 dB	below 1.0 dB	below 0.7 dB	below 0.5 dB	below 1.0 dB	below 0.5 dB	-	below 0.5 dB
P.D.L	below 0.3 dB	below 0.15 dB	below 0.15 dB	below 0.15 dB	below 0.1 dB	below 0.1 dB	below 0.15 dB	below 0.1 dB		below 0.1 dB
Return Loss	more than 55 dB									
Directivity	more than 55 dB									
Wavelength	1260 nm ~ 1650 nm (measured wavelength : 1270, 1310, 1490, 1550, 1620 nm)									

※ All standards are evaluated/determined under the same conditions as those of the above table.

※ In case of Dual Type, each evaluation/decision is made according to the above individual conditions.

4.5.1.2 Flexural Characteristics

The loss change shall be 1550nm when circular bending (one time) of the optical fiber core wire of the input, ribbon, and cord part with a diameter of 20mm.

It should be less than 0.2dB based on the wavelength band. However, if a general optical fiber is used at the request of the user, the change in loss should be less than 0.1 dB when measured at 1550 nm when the optical fiber core is wound 100 times in a 75 mm diameter cylinder.

4.5.2 Mechanical and Environmental Characteristics

Mechanical and environmental characteristics of optical splitter for FTTH should be as follows. However, the measurement error of the measuring instrument shall be within ±0.02 dB.

4.5.2.1 Temperature and Humidity

The optical splitter for FTTH communication network construction used in this specification should operate stably under the temperature and humidity conditions for each item shown in the following [Table 3].
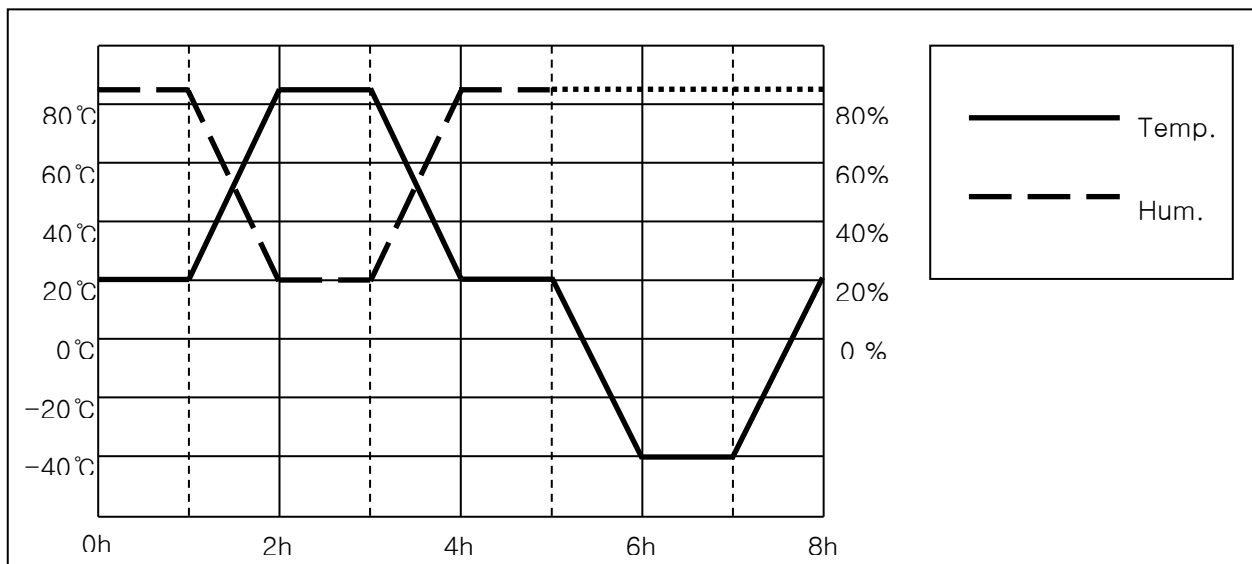
[Table 3] Temperature and Humidity Standard

Division	Outside Temperature	Humidity
Normal Operation	- 40℃ ~ + 85℃	0 % ~ 85 %
Storage Condition	- 40℃ ~ + 85℃	0 % ~ 85 %

4.5.2.1.1 Temperature Cycle Characteristics

When the temperature cycle characteristics of 120 hours (15 cycles) are tested by putting the randomly extracted optical splitter in a thermostat and the following [Table 3] as 1 cycle, the change in loss during and at the end of the test is ±0.5 dB for products with connectors and without connectors. In the case of the product, it should be less than ±0.3dB, and the insertion loss value should be within the maximum insertion loss value of the optical splitter after completion of the test and natural storage at room temperature for 3 hours or more.

[Table 3] Temperature Change Process

4.5.2.1.2 Temperature and Humidity Acceleration Characteristics

When the randomly extracted optical splitter is put in a thermostat and the temperature and humidity acceleration characteristics are tested for a total of 168 hours at a temperature of 110°C and humidity of 100%RH, the loss value at the end of the test must be within the maximum insertion loss value of the corresponding optical splitter, and the loss change Should be within ±0.3 dB of the initial value. However, in the case of products including connectors, the test is conducted with the connector removed.

4.5.2.2 Vibration Characteristics

When the randomly extracted optical splitter is vibrated for 20 minutes each with a vibration period of 4 minutes, a frequency of 10 to 55 Hz, and an amplitude of 0.75 mm for each of the three axes (vertical axis, horizontal axis, and vertical axis), the loss change based on the 1550 nm wavelength band is ± 0.2 ㏈ It should be within. Also, there should be no deformation or damage of the optical splitter after vibration.

4.5.2.3 Ease of core wire separation (cord part ribbon type)

If the cord part is of ribbon type, the small core separation characteristics for the integral part of the ribbon must satisfy the following separation characteristics.

1) Sample Preparation : Prepare a finished product with a length of at least 2m in the integral part of the ribbon 1m in length of the separate part

2) Evaluation Core Wire : Ribbon arrangement the first and the last rows (Total two rows evaluation)

3) Initial Characteristics : Set the initial value by measuring the optical characteristics of the ribbon array to be evaluated

4) Preparation for Evaluation : Prepare for core wire separation evaluation by naturally holding the two cores to be evaluated with both hands in the vicinity of 5 to 20 cm in the direction of the ribbon separation unit from the intersection of the ribbon unit and the ribbon separation unit.

5) Separate evaluation: When separating the two cores to be evaluated in the left/right (horizontal) direction, the following must be satisfied.

   - Separation function: When the core wire is separated from the intersection point to the 1m point in the direction of the integral part of the ribbon, there should be no cutting of the optical fiber or deformation of the external shape, and the core wire separation should proceed naturally.

   - Optical characteristics : When the core wire is separated, the amount of change in optical loss of all core wires in the evaluation arrangement must satisfy 0.1dB or less.

6) Number of evaluations: Evaluates all the small core of the ribbon array to be evaluated.

5. Quality Guarantee

5.1 The contractor shall comply with all necessary conditions of this standard, unless otherwise specified in the contract. A test and inspection should be performed using an authorized organization, and the final responsibility for the quality of the product should be take. 5.2 In addition to the test and inspection for the requirements specified in this standard, the company may perform test and inspection for quality verification, if necessary.

5.3 The contractor shall be ultimately responsible for the quality of the product until the delivered material reaches the take-over site. 5.4 Values and tolerances that are not specified in this standard can be allowed within the range that does not interfere with use.

6. Others

6.1 This standard shall enter into force from the date of enactment.

6.2 The material supplier shall immediately support the following support request from the company.
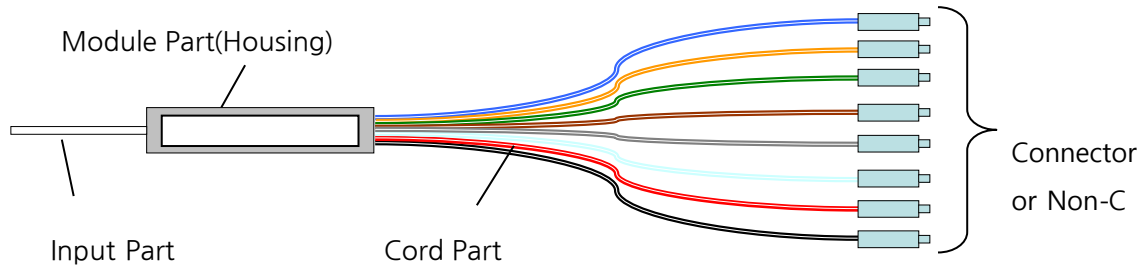
6.2.1 When necessary for material quality control

6.2.2 When support is required due to other material related matters

6.3 In special cases related to the company's business, items recognized by the company may be specified as separate matters.
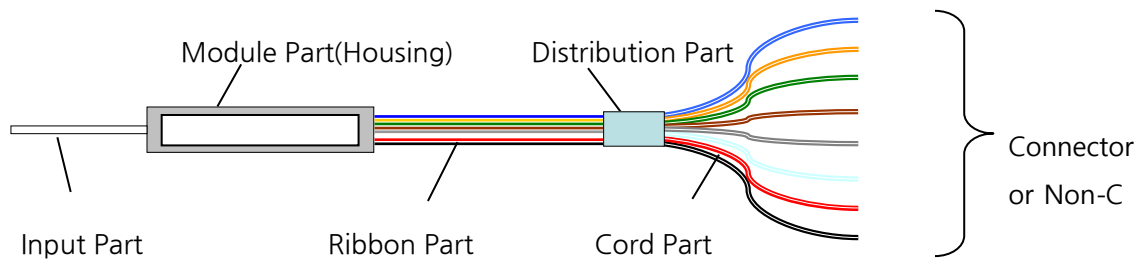
6.4 If there is any disagreement in the interpretation of this standard, it shall be interpreted by the company.

NO.	Apprendix 1	
		Structure and Dimensions of Optical Splitter for FTTH

○ General Type

Module Part(Housing)

Input Part   Cord Part   Connector or Non-C

○ Ribbon Type (Distribution shape is followed by the user's request)

Module Part(Housing)   Distribution Part

Input Part   Ribbon Part   Cord Part   Connector or Non-C

[Structure/ Material and Dimensions]

Division		Structure and Material	Dimensions(㎜)	Error(㎜)
Input Part		900um Tight Buffer	1,000	5
Module Part	* General Type 16,12p * Dual Type	Aluminum, stainless or equal or higher (waterproof and moisture-proof	60(L) x 12(W) x 4(H)	±0.5
	* General Type 8,7,5,4p * Ribbon Type 8,16,32p		55(L) x 7(W) x 4(H)	
Ribbon Part		8 core ribbon	400	5
Cord Part		900um Tight Buffer or in the low-shrink tube flexural reinforced optical fiber insertion	Tube 800 +Stripping100(Master), with Connector 500 (Slave)	5
Connector	Master	Without cord part Connector	-	
	Slave	With cord part Connector (SC/APC or SC/PC)		

※ Dimensions and markings should be individually applied according to user requirements or conditions of the installed items

ex) Code length, general/integrated labeling, tube color variation for uneven channel classification, etc

[Optical fiber core wire Color]

Division					Color
Input Part					WHITE
Ribbon and Cord Part	#1	#9	#17	#25	BLUE
	#2	#10	#18	#26	ORANGE
	#3	#11	#19	#27	GREEN
	#4	#12	#20	#28	BROWN
	#5	#13	#21	#29	SLATE
	#6	#14	#22	#30	WHITE
	#7	#15	#23	#31	RED
	#8	#16	#24	#32	BLACK

※ If requested by the company, the color of the protective tube and optical fiber coating should be changed.

[Ribbon core wire arrangement order]

1×16

Ribbon 1 — 8 7 6 5 4 3 2 1 — 흑 적 백 회 갈 녹 등 청
Ribbon 2 — 흑 적 백 회 갈 녹 등 청 — 16 15 14 13 12 11 10 9

1×32

Ribbon 3 — 24 23 22 21 20 19 18 17 — 흑 적 백 회 갈 녹 등 청 | Ribbon 1 — 8 7 6 5 4 3 2 1 — 흑 적 백 회 갈 녹 등 청
Ribbon 4 — 흑 적 백 회 갈 녹 등 청 — 32 31 30 29 28 27 26 25 | Ribbon 2 — 흑 적 백 회 갈 녹 등 청 — 16 15 14 13 12 11 10 9

※ Ribbon core wire arrangement order and branch shape should be applicable according to user's request