

Information Of The Document

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I. PURPOSE:

- To instruct operation method which implemented in Fujikura Fiber Optics Vietnam

II. APPLICATION:

- This guideline is applied for all kind of Fiber Laser Coupler products as processes following:

No.	Process
1	Fiber Cutting
2	Fiber Heating
3	Fiber preparation
4	Fusion & Elongation
5	Material preparation (Neoceram cleaning)
6	Material preparation (Tube cutting and cleaning)
7	Neoceram packing
8	Tube heating
9	Provisional Loss inspection
10	Appearance after elongation
11	Material preparation (SUS pipe cleaning)
12	Fiber Setting & SUS packing
13	Temperature cycling (24 H)
14	Loss inspection
15	Port coloring
16	QC Appearance inspection
17	QC Casing
18	Labelling and Air bubble packing
19	QC Packing
20	Shipping

- This document concerns to Production function, Production engineering function, Quality Assurance function and Planning function.

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III. REFERENCE DOCUMENTS:**1. Customer Specification**

No	Reference document	Product name	Remark
1	AOP82-2017-27-02(09)	CPL-WDM-1035/1090-FL-1	
2	AOP82-2017-27-03(10)	CPL-TAP-1085-45dB-FL-1	
3	AOP82-2017-27-05(07)	CPL-TAP-1035-5dB-FL-1	
4	AOP82-2017-27-01(09)	CPL-WDM-975/1035-FL-1	

**2. Working Direction No.:**

No	Working direction number	Application description	Process
1	PTE81-59-19-0008	Periodical quality check of elongation condition	Elongation
2	PTE81-59-19-0009	Quality check of fiber coat removing tool	Coat removing
3	PTE81-59-19-0010	Periodical quality check of elongation condition	Elongation
4	PTE81-59-19-0026	Specification of tension for daily check on elongation machine	Elongation

IV. TERM DEFINITION:

- FOV: Fujikura Fiber Optics Viet Nam
- SIC: Section In Charge
- QC: Quality Control
- RL: Return Loss
- WDM: Wavelength Division Multiplexing

V. TRACEABILITY CONTROL

The requirement of traceability record for each products shall follow the 9-PR-013 Data traceability procedure.

Type of Record	Items	Record
Quality control items	Refer to: 4-QC-242	Related Check sheet/ database
Identification and traceability record	4M information (if any):	
	- Material Lot#	
	- Machine/Tool-jig control number	
	- Operator code	
	- Manufacturing/ inspecting date	

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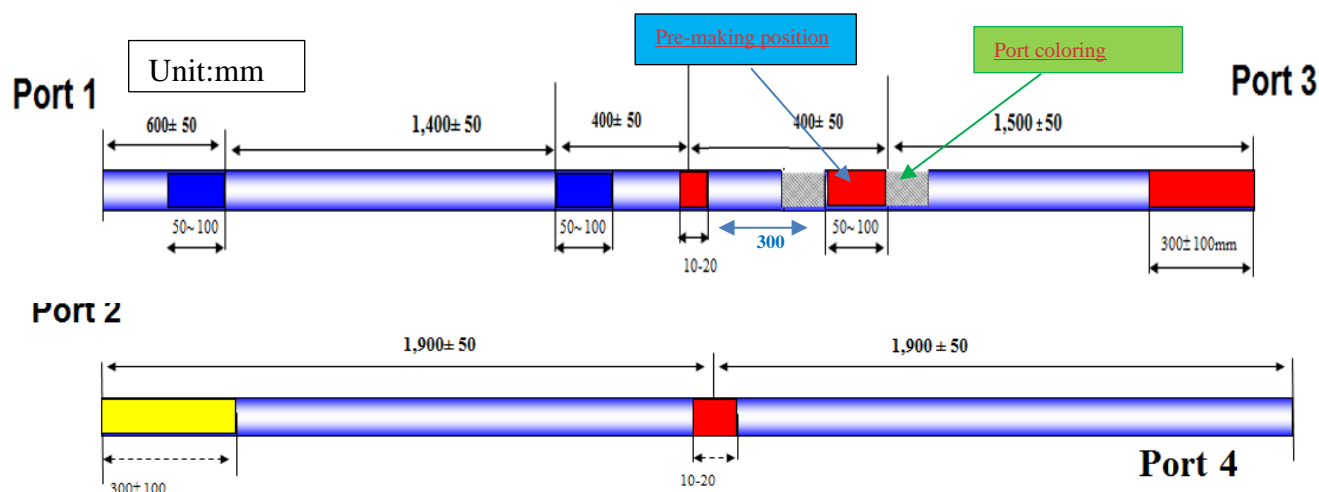
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VI. CONTENT:**1. Fiber cutting:****1.1 Process specification**

- Cutting length & marking:

Items	Specification
Fiber cutting	Cutting length: <ul style="list-style-type: none"> - Cutting length design: $L^* = L_s + 100\text{mm}$, where L_s is length of port fiber in Specification. - Port fiber cutting length: $L^* + D^*$, where D^* is extra length for measurement: <ul style="list-style-type: none"> + Input port: $L + (D = 800 \sim 900) \text{ mm}$ + Output port: $L + (D = 300 \sim 400) \text{ mm}$
Dot marking	- Marking UV coat stripping position: RED color
Fiber pre-coloring	<ul style="list-style-type: none"> - Each fiber port: there are some color marks near Red dot mark following the specification figures of each product as below. - The pre-coloring is located within port coloring area. <ul style="list-style-type: none"> + Starting point: It should 50mm far from start coloring area. It's around 300mm from red mark typically. + Pre-coloring length: around 50mm (or longer). + End point: not over end of coloring point and it should 50mm nearer than end coloring area.
End port marking	<ul style="list-style-type: none"> - Mark from end of pigtail around 300mm by ports as Figure 1.1 Port 3: red color Port 2: yellow color
Fiber appearance	- There is no damage or any contamination on UV coat of fiber.
Ionized treatment	- Ionized air blowing during operation
Fiber cleaning	- Dust Blowing System

**1.2 Process condition**

Items	Conditions
Fiber length	- Ruler
Marking	- Art line Marking pen
Fiber cutting	- Winding machine
Ionized treatment	- Ionized Air Blower (Ionized fan)
Appearance	- Visual
Wipe marking ink (dry cleaning)	- Cleanroom wiper

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2. Fiber heating:

2.1 Process specification

Items	Conditions
Temperature	120°C ±10°C
Heat time	150s – 600s (<i>optimum condition: around 180s</i>)

2.2 Process condition

Fiber was set straight on Hot Plate machine (Figure 2.1)



Figure 2.1 Hot plate machine.

3. Fiber preparation:

3.1 Process specification

Items	Specification	
Removing position	Red mark at center of fiber (see Fig 3.1)	
UV coat removing	Removing length: CPL-WDM-1035/1090-FL-1: 24 ± 1mm CPL-TAP-1085-45dB-FL-1: 24 ± 1mm CPL-WDM-975/1035-FL-1: 24 ± 1mm CPL-TAP-1035-5dB-FL-1: 32 +1/-2mm	
Fiber swelling	Around 120 seconds by wet dusper paper.	
Bare fiber screening (proof test)	FSR-01	FSR-07
	-Tension range (pulling force): 1.8kgf ~ 2.2kgf	- Tension range (pulling force): 1.96kgf ~ 2.04kgf
	-Proof Speed: N/A	-Proof Speed: 480 nm/min
	-Hold time: N/A	-Hold time: 2 seconds
Bare fiber appearance	Could not see dust/contamination on bare fiber after cleaning	

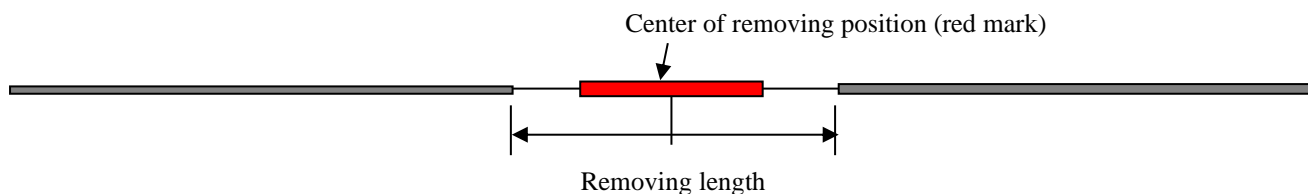


Fig3.1 Fiber coat removing position

Notice:

1. The blade of fiber coat removing tool must be replaced after 1000 times of using
2. It must be checked fiber broken tension daily for each Fiber removing tool, broken force must more than 4kgf. If it does not pass this test, related engineer will check this tool again. (Refer to 000-5-WI-0095).

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3.2 Process condition

Items	Conditions
Removing fiber coat	24mm fiber coat removing tool 32mm fiber coat removing tool
Stripping length	Template
Swelling time	Using Timer/clock for monitoring
Fiber tension	- Fiber proof testing machine

4. Fusion and Elongation:

4.1 Verification program after changing fabrication condition:

The elongation fabric condition must be passed the reliability requirements following 4-OP-599

4.2 Process specification:

4.2.1 Parallel adjust

- Tension before parallel contact 30+/-1g
- After parallel contact: 15 +/-1g

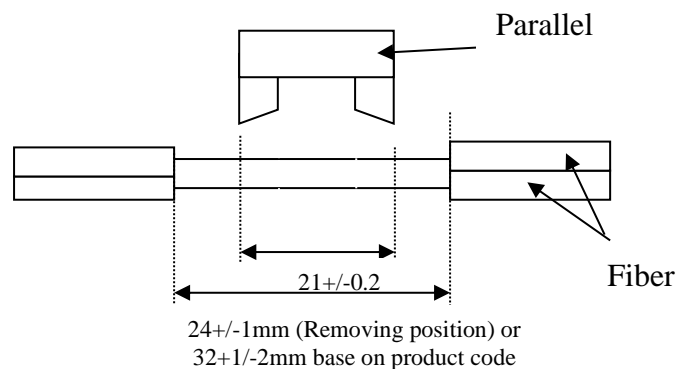


Fig4.1 Parallel tool position

- Parallel tool position
- Position and Size of resin after parallel adjust

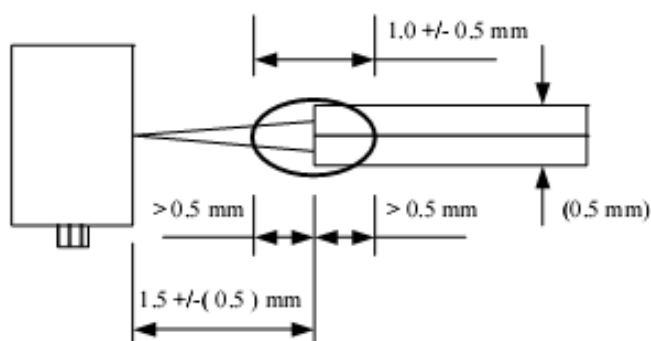


Fig. Pr-5-3-3-b UV resin : Position & Size

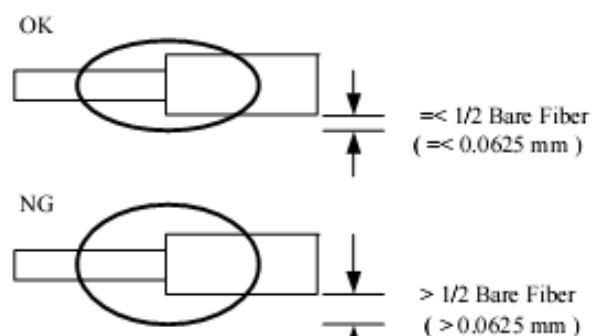


Fig. Pr-5-3-3-c Size of UV resin after curing

Fig4.2 Position and Size of resin after parallel adjust (Case 1)

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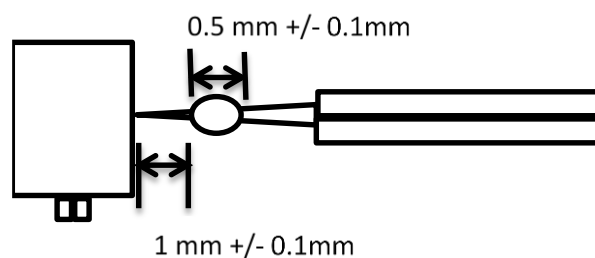


Fig4.3 Position and Size of resin after parallel adjust (Case 2)

4.2.2 Fiber tension

Items	Specification
Before Elongation	15g \pm 1
While Fusion & Elongation <10 g	Step 1: Typ. < 3~4g
	Step 2: Typ. < 2 g
	Step 3: Typ. ~ 0 g
	Step 4: Typ. < 8~9 g
Proof test	+ 1035/1090 nm WDM coupler: 200g \pm 1 + Tap couplers and 975/1035 nm WDM coupler : 250g \pm 1
Neoceram packing	20g \pm 1
Broken test	500g
Strength interval	1s
Fiber strength (broken test)	- Sampling: 1pc/week/machine/type for mass production. Note: If Proof test on Not good semi-product, the required for ExL < 1.5dB and coupling length OK (see 4.2.4) - Fiber broken tension: > 300gr for FLC WDM - Fiber broken tension: > 390gr for FLC Tap

4.2.3 Optical characteristic

Requirement: When the fiber ports are processed to connect to measurement system, the color marks in fibers end must be confirmed as figure below before fusing

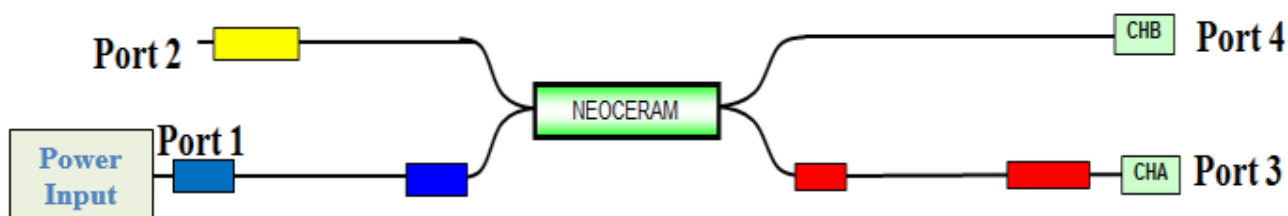


Fig4.4 Port configuration

Table 4.1. Optical characteristics

Product Code	Port	Insertion Loss spec (dB)	Wave length (nm)	Excess loss Spec (dB)
AOP82-2017-27-xx	Port 1 \rightarrow 3	Refer to detail requirement as relating Purchase specification number (and relating working direction).		< 0.14 (Elongation control)
	Port 1 \rightarrow 4			

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* Note: the IL specification is for reference only.

4.2.4 Elongation parameter

Elongation length (Coupling length):

Coupler name	Coupling length (mm)
CPL-WDM-1035/1090-FL-1	33.00 ÷ 34.75
CPL-TAP-1085-45dB-FL-1	5.05 ÷ 6.55
CPL-TAP-1035-5dB-FL-1	19.5 ÷ 22.5
CPL-WDM-975/1035-FL-1	30.25 ÷ 31.75

4.3 Process Condition

Items	Conditions
Parallel tool	- Visual
Elongation parameter	- Elongation machine
Optical characteristic	- Power meter, computer
Tension	- Tensile meter
Gas flow	- Gas flow control system
Screening (proof test)	- Tensile meter

5. Material preparation (Neoceram cleaning)

Refer to 4-OP-549



6. Material preparation (Tube cutting and cleaning)

Refer to 4-OP-549

7. Neoceram packing

7.1 Process specification:

7.1.1 Tension (After elongation)

- Tension range while Proof testing: 250/200g /1s
- Tension after Proof testing, while and after Neoceram packing: 19~21 g

7.1.2 Neoceram shell setting

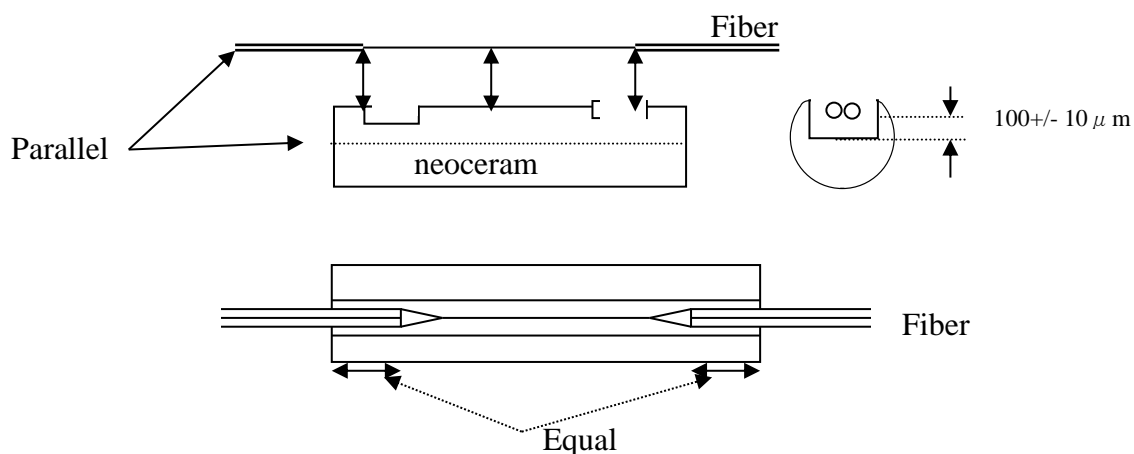


Fig 7.1 Neoceram shell setting

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7.1.3 UV-7 adhesive size and position

7.1.3 A Configurations

Table. Pr-6-2-1 Structure

	A(L), A(R)	A(L) - A(R)	B	C	D	E	F1, F2, F3	G	Y	L	X	S
Spec	2.0 ~ 5.0	< 0.7	3.0 ~ 5.0	> 1.0	0.1 ~ 0.9	5.0 ~ 7.0	< 0.6	1.0 ~ 5.0	> 0.5	4.0 ~ 7.0	34.0 ~ 36.0	No gap between fibers
Target	3.5	< 0.3	4.0	(1/2 B)	0.5	6.0	< 0.4	3.0	> 0.7	< 6.0	35.0	-----

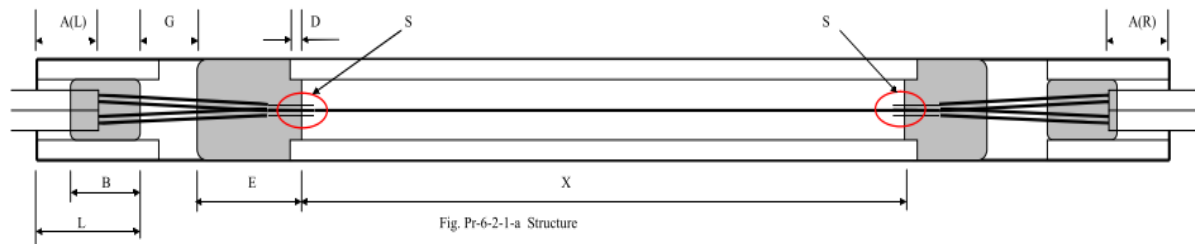


Fig 7.2 UV -7 adhesive resin configuration (size and position) (CPL-WDM-1035/1090-FL-1)

Table. Pr-6-2-1 Structure

	A(L), A(R)	A(L) - A(R)	B	C	D	E	F1, F2, F3	G	Y	L	X	S
Spec	6.0 ~ 8.0	< 0.7	7.0 ~ 9.0	> 0.8	10.0 ~ 11.0	4.5 ~ 5.5	< 0.6	> 0.5	> 0.5	< 9.5	10.5 ~ 14.5	No gap between fibers
Target	7.0	< 0.3	8.0	(>1)	10.5	5.0	< 0.4	> 1.0	> 0.7	(8.8)	12.5	-----

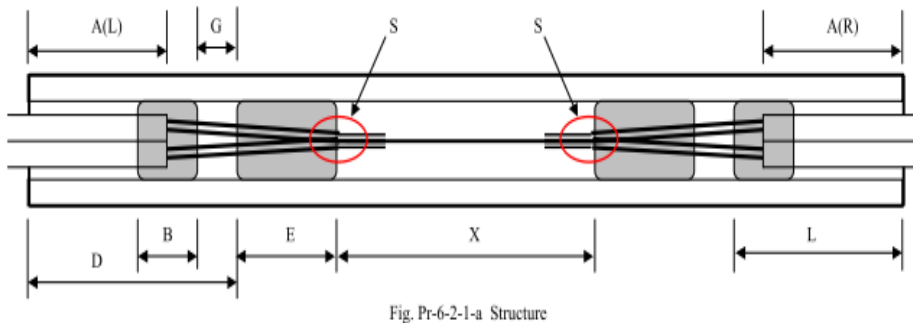


Fig 7.3 UV -7 adhesive resin configuration (size and position) (CPL-TAP-1085-45dB-FL-1)

Table. Pr-6-2-1 Structure

	A(L), A(R)	A(L) - A(R)	B	C	E	F1, F2, F3	G	Y	X	S
Spec	1.0 ~ 4.0	< 0.7	2.0 ~ 4.5	> 1	5.0 ~ 7.0	< 0.6	> 1.5	> 0.5	26.0 ~ 30.0	No gap between fibers
Target	2.0	< 0.3	4	(1/2 B)	6.0	< 0.4	6	> 0.7	26.0	-----

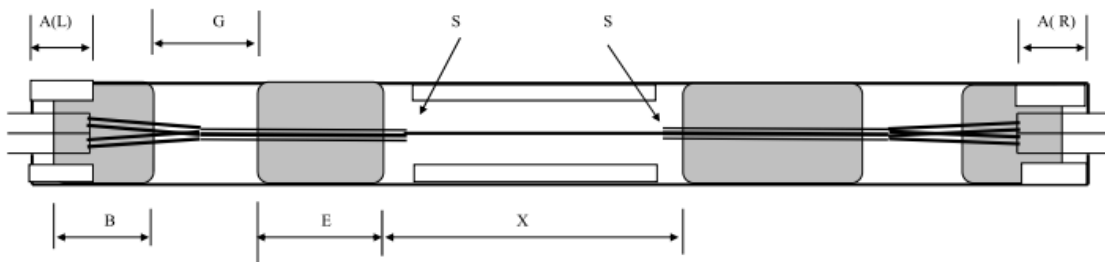


Fig 7.4 UV -7 adhesive resin configuration (size and position) (CPL-TAP-1035-5dB-FL-1)

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Table. Pr-6-2-1 Structure

	A(L), A(R)	A(L) - A(R)	B	C	D	E	F1, F2, F3	G	Y	L	X	S
Spec	3.0 ~ 6.0	< 0.7	2.0 ~ 4.0	> 1.0	0.1 ~ 0.9	4.0 ~ 6.0	< 0.6	0.5 ~ 4.0	> 0.5	4.0 ~ 7.5	36.0 ~ 38.0	No gap between fibers
Target	5.1	< 0.3	3.1	(1/2 B)	0.5	5.0	< 0.4	(> 2.0)	> 0.7	6.7	37.0	*****

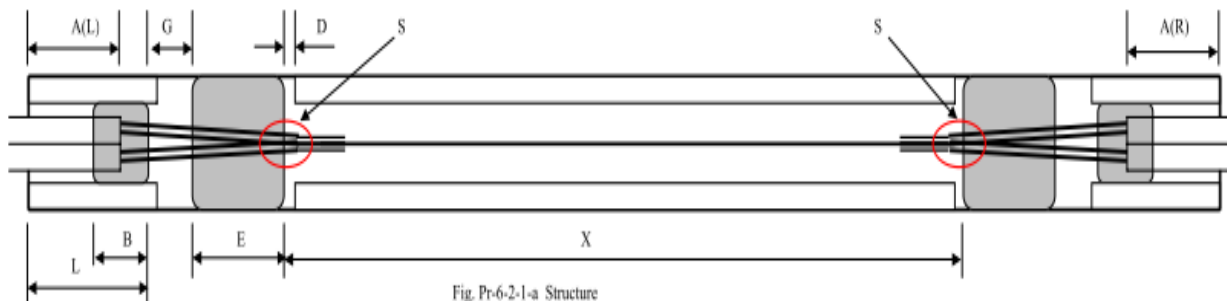


Fig. Pr-6-2-1-a Structure

Fig 7.5 UV -7 adhesive resin configuration (size and position) (CPL-WDM-975/1035-FL-1)

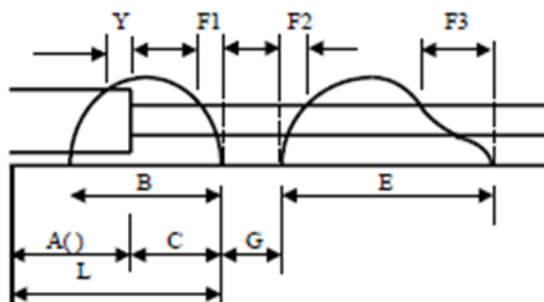


Fig 7.6: Size of UV-7 adhesive resin

7.1.3. B Requirements

Item/ factor	Detail requirement
UV curing	<ul style="list-style-type: none"> - UV intensity: 14.0 ~ 18.5 mW/cm² (UV meter: ORC UV-M03, Sensor: UV-35(1:10)) - Curing time: at least 30 seconds/point
Appearance	<ul style="list-style-type: none"> - UV-7 height does not go out of neoceram's perimeter. - Air Bubble inside UV-7 adhesive: diameter ≤ 0.3mm. - UV-7 does not stick out to fibers at S point. - No dust attach inside coupler (in case dust is fixed within resin and never reach fiber, it is acceptable)

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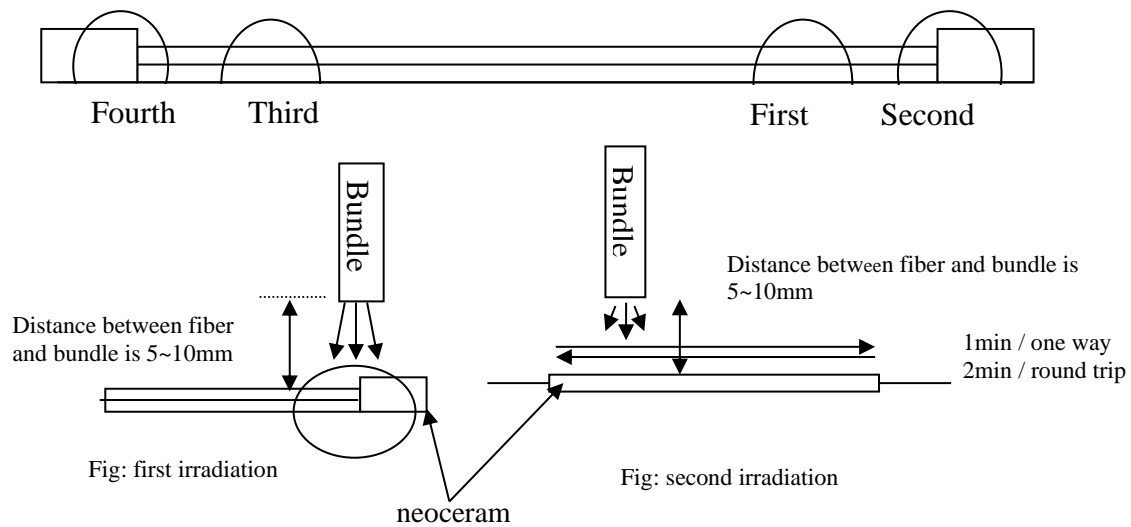


Fig 7.7 Requirement for UV irradiation

8. Tube heating

8.1 Process specification:

Items	Specification
Tube heating	<ul style="list-style-type: none"> - Heating temperature: 130~150 deg C (Target: Temp ~ 140 deg C) - Heating cycle: at least 3 times for 3 position of products (center, right/left side of heater's groove) - Tube position: see Figure 8.1; - Tube height: see Figure 8.2 & 8.3
Drop test	<ul style="list-style-type: none"> - Sampling: 1pc/week/machine - No fiber breakage (refer to 4-OP-546)

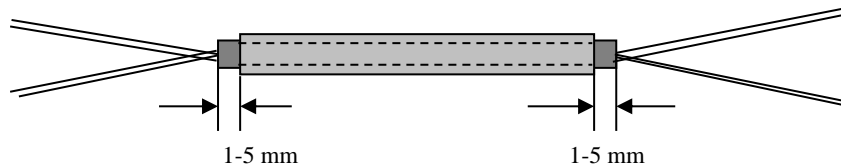


Fig8.1 Length of tube after heating

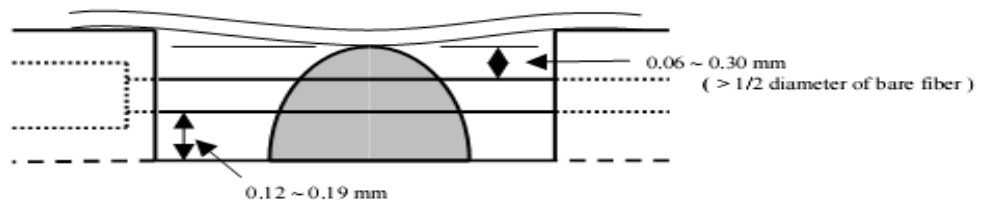


Fig 8.2. Height of tube after heating
(CPL-WDM-1035/1090-FL-1; CPL-TAP-1035-5dB-FL-1; CPL-WDM-975/1035-FL-1)

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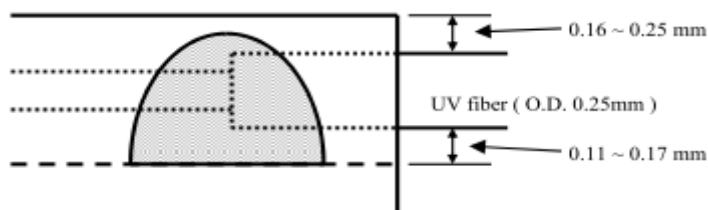


Fig 8.3. Height of tube after heating (CPL-TAP-1085-45dB-FL-1)

8.2 Process condition

Items	Conditions
Tube Heating	Heater
Loss value	Loss system
Drop testing	Drop test system

9. Provisional Loss inspection:

9.1 Process specification:

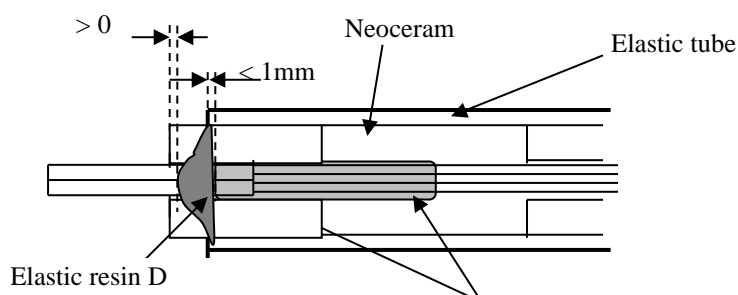
Items	Specification
Optical property	<p>Apply provisional inspection following specification in Loss inspection process if doubted in result or special requirement</p> <p>* Note: this sampling inspection can be carried out when:</p> <ul style="list-style-type: none"> a) There is 4M item changed that concerning to product reliability or production quality such as Fiber Lot changed, gas exchanged or fabrication modified... b) Carry out when Operator find out some things abnormal under Elongation. c) For the first running of new fabrication condition

9.2 Process condition

Items	Conditions
Loss value	Loss system

10. App after Elongation

10.1 Elastic resin at the ends of coupler



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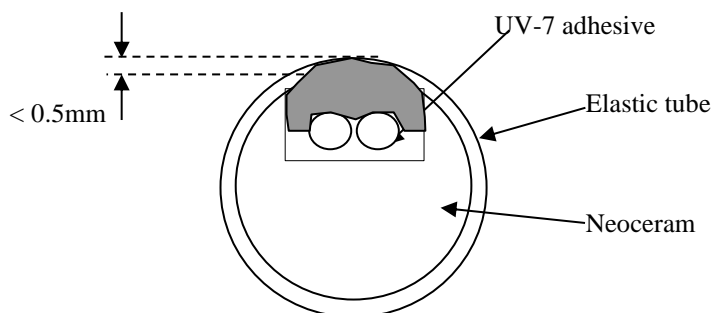


Fig 10.1 Elastic resin D at the end of coupler

Paste Elastic Resin D (KE-4896-T) at the ends of coupler in order to cover some holes between coupler and elastic tube.

10.2 Process condition

Item	Condition
Appearance	- Check by Microscope & scale
Resin D curing	Waiting at room temperature around 60 mins before next process.

11. Material preparation (SUS pipe cleaning)

Refer to 4-OP-549



12. Fiber Setting & SUS packing:

12.1 Process specification

Items	Specification
Coupler structure	See Figure 12.1 to Figure 12.3
Curing Loctite 5091	<ul style="list-style-type: none"> - UV light with intensity (for each UV light source): 8.00÷12.00 mW/cm² (measured by UV meter: ORC UV-M03, Sensor: UV-35(1:10)) - Curing time: 15~30 seconds, process control setting 20 seconds (1 time for 1 SUS head) - Curing distance: 5-10 mm
Appearance	<ul style="list-style-type: none"> - There's no flaw, dirt and fiber kink - Laser printing content: can read clearly as Figure 12.3

- Structure and dimesion:

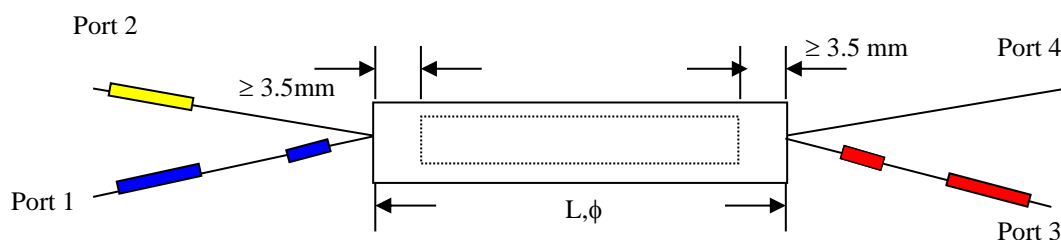


Fig12 .1 Shell / SUS pipe setting

- When port 1 and 2 is left side , you can read SUS pipe numbering

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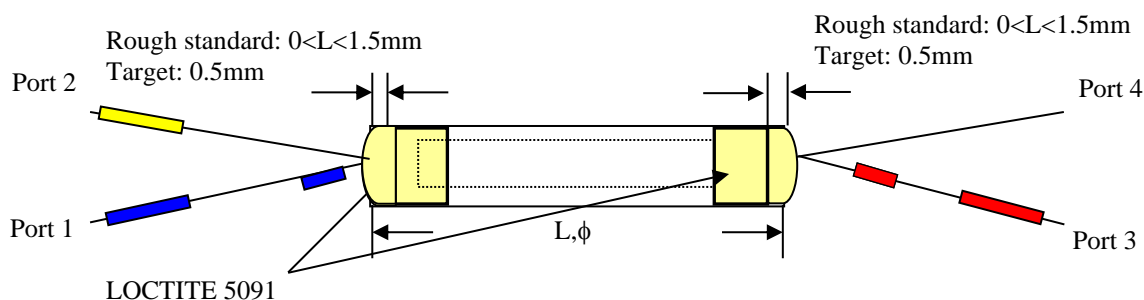
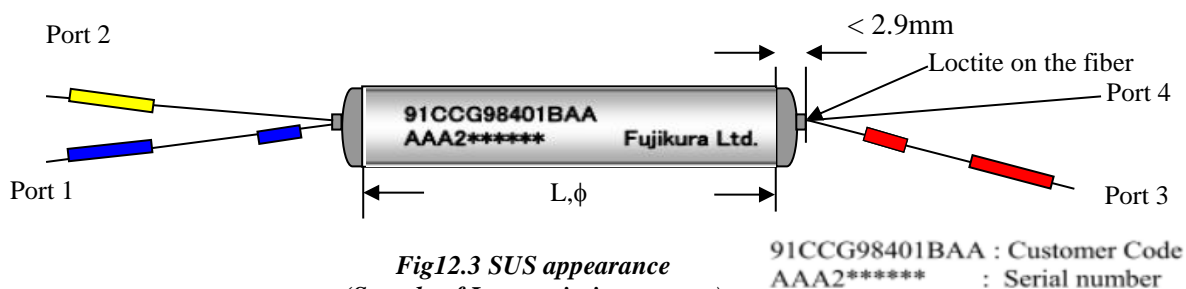


Fig12.2 Apply LOCTITE 5091

Fig12.3 SUS appearance
(Sample of Laser printing content)

12.2 Process condition

Items	Conditions
Appearance	Check by visual or under Microscope or magnifier (from x1 to x4)
Board use for SUS Packing	CPL-WDM-1035/1090-FL-1: Suitable for $\varnothing 3.0\text{mm} \times 75.0\text{mm}$ SUS pipe CPL-TAP-1085-45dB-FL-1: Suitable for $\varnothing 3.0\text{mm} \times 50.0\text{mm}$ SUS pipe CPL-TAP-1035-5dB-FL-1: Suitable for $\varnothing 3.0\text{mm} \times 70.0\text{mm}$ SUS pipe CPL-WDM-975/1035-FL-1: Suitable for $\varnothing 3.0\text{mm} \times 50.0\text{mm}$ SUS pipe
UV adhesive curing	UV light source (Photo cure 200 with IR filter) UV curing jig
Elastic resin curing	Waiting around 60 mins before next process at room temperature.

Operation process:

- SUS No.: check number on SUS pipe and all labels are same.
- Coupler fixing: move coupler body from the lower groove to the upper groove, then use tape to fix coupler with Neoceram was upward.
- Fiber fixing: keep fibers straightly and parallel, no gap between two fibers, then using tape to fix first side.
- Fiber setting: Set fiber of first side tidy on tray and fix by sponge.
- SUS insertion: Release fiber on second side and insert SUS pipe into Coupler, then adjust SUS position (marking side on upside) and fixing fibers by tape after adjusting as first side.
- Fiber winding: winding fiber on second side onto board and fix by sponge.
- Loctite adhesive applying: set board on shell in vertical direction, fill adhesive onto inner wall of SUS, wait about 30 seconds and re-applying. Repeat 2 or 3 times, after that waiting about 5 minutes for resin settled down and injection extra if needed to meet the volume required, then curing adhesive by jig, after that doing same for next side.

Notice:

- Do not spread adhesive on fiber during operation
- Using dusper or cotton stick to clean adhesive if flow out on SUS pipe or fiber.

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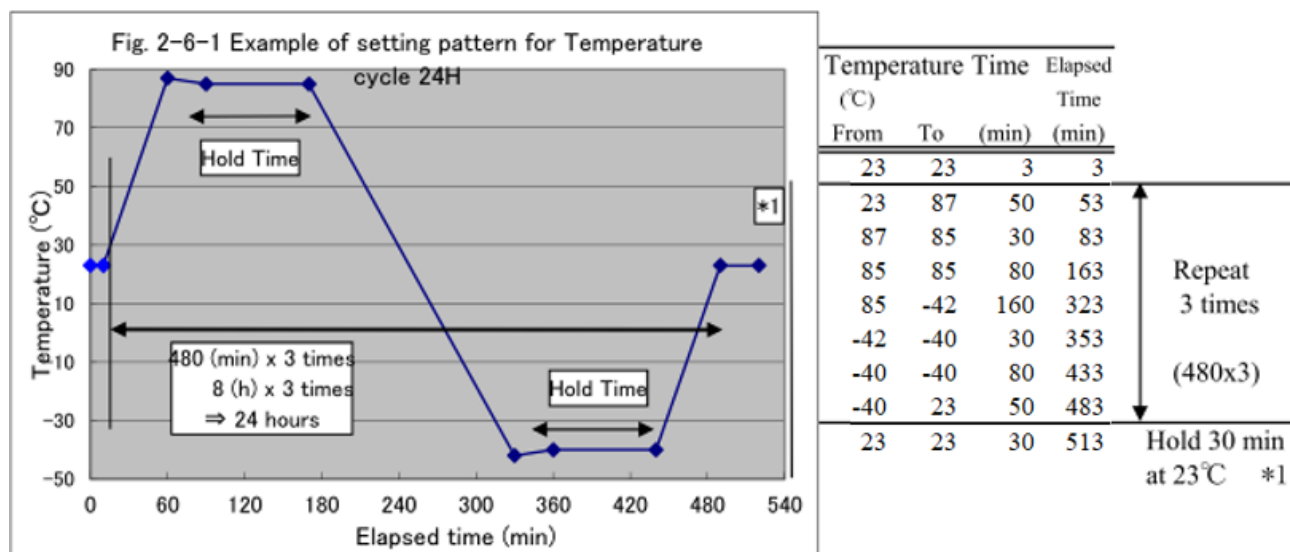
13. Temperature cycling (24 H):**13.1 Process specification**

Specification of process is shown as follows:

Item	Specification
Aging	Time: total 24 hours (8hours x 3 cycles)
Temperature tolerance	- Upper limit: $85 \pm 4^{\circ}\text{C}$ - Lower limit: $-40 \pm 4^{\circ}\text{C}$ - Holding time at high and low level at least 1 hour.
Appearance	- Fiber does not bulge out of board before and after aging. - SUS does not have any abnormalities after aging

13.2 Process Condition

Item	Condition
Aging	- Chamber type : Large type (PU-4K) or equivalent - There isn't water dropping inside chamber. - Temperature pattern should be record by thermal recorder RT-30S or RT-31S, RT-32S type or equivalent - Aging condition: see Figure 13.1 <u>Note:</u> the value in Figure 13.1 can be adjusted to meet requirement of Temperature pattern.
Appearance	- Check by visual

**Figure 13.1-Temperature pattern**

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14. Loss inspection**14.1 Process specification**

Items	Specification
Optical parameter(s)	Refer to detail requirement as relating Purchase specification number (and relating working direction).
Measuring configuration	- See the port connection as Pattern(s) below - Identify port number by side (input/output) and end port marking

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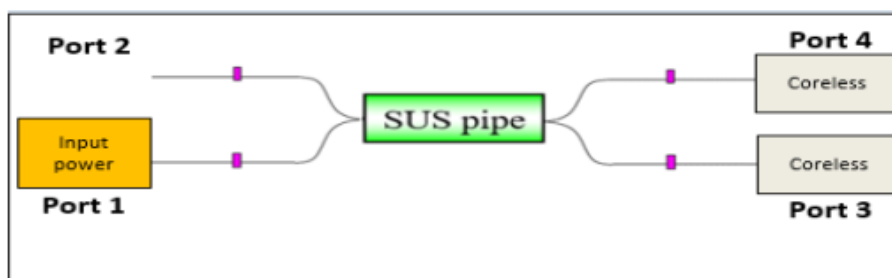


Figure 14.1 – Fiber connection & measurement

Requirement: When the fiber ports are processed to connect to measurement system, the color marks in fibers end (Port 1 → blue coloring - Port 2 → yellow coloring - Port 3 → red coloring) must be confirmed as Figure 14.1.

Table 14.1. Sampling RL measurement

Items	Specification
Return loss (RL)	Refer to detail requirement as relating Purchase specification number (and relating working direction).
RL sampling size	1 pc/shipping day 3pc if one of three conditions below change: + Elongation condition change(H2 flow ,O2 flow ,Velocity of clamp,Velocity of torch) + Lot of fiber changes + Elongation system change (Torch , clamp change)
Measuring configuration	- See the port connection as Pattern(s) as below - Identify port number by side (input/output) and end port marking



14.2 Process condition

Items	Conditions
Loss value	Loss system

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15. Port coloring

15.1 Process specification

Items	Specification
Port coloring: color & length	<ul style="list-style-type: none"> - Port 1: Blue - Port 2: Colorless - Port 3: Red - Port 4: Colorless (see Figure 15.1)
Appearance inspection	<ul style="list-style-type: none"> - UV fiber: No scratch or dirty on fiber over limited on coloring zone - Resin appearance: No any rip or crack on adhesive at the end of SUS pipe

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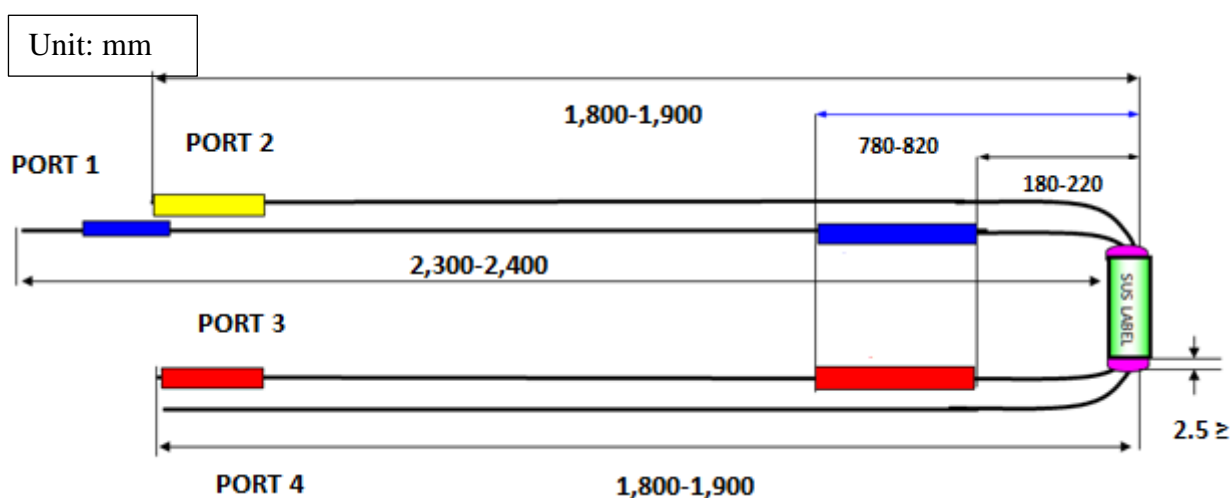


Fig15.1 Port coloring configuration (Reference)

Requirement: identify Port No. and confirm marking color before coloring as Figure 15.1 , release fiber to template and confirm end port marking of fiber:

- Port 1: Blue pre-coloring and blue dot at end port → then coloring Blue continuously.
- Port 2: yellow marking at end port
- Port 3: Red pre-coloring and red marking at end port → then coloring Red continuously.
- Port 4: no coloring.

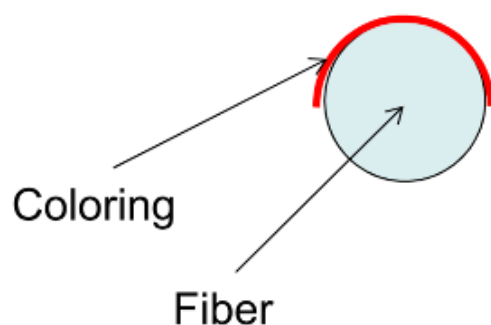


Fig15.2 Specification of port marking

Note:

- Meanings of port coloring is distinguish each port fiber
- No need uniform coloring
- No need Circumference coloring (Half-Circumference coloring is OK)
- Staining is OK.
- Clean & check UV fiber of coloring zone before apply color.


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15.2 Process Condition

Items	Conditions
Coloring	Art line marking pen
Length	Template
Appearance inspection	Visual inspection 
Port fiber identification	<p>The following condition are used to identify port fiber on each coupler (refer detail in Process specification):</p> <ul style="list-style-type: none"> - Side: input/ output (or left/right side of SUS pipe as direction of laser printing), upper/lower as laser printing position. - Pre-coloring (if any): see Figure 15.3 <ul style="list-style-type: none"> 1) The same color with coloring specification on port fiber accordingly. 2) Starting and ending point must be within coloring area. - End port marking color: the same color with coloring specification on port fiber accordingly

Notice:

- Do not make high pulling tension on fiber, special on SUS end, during operation
- Do not make strong pressing on fiber to prevent any damage on fiber.

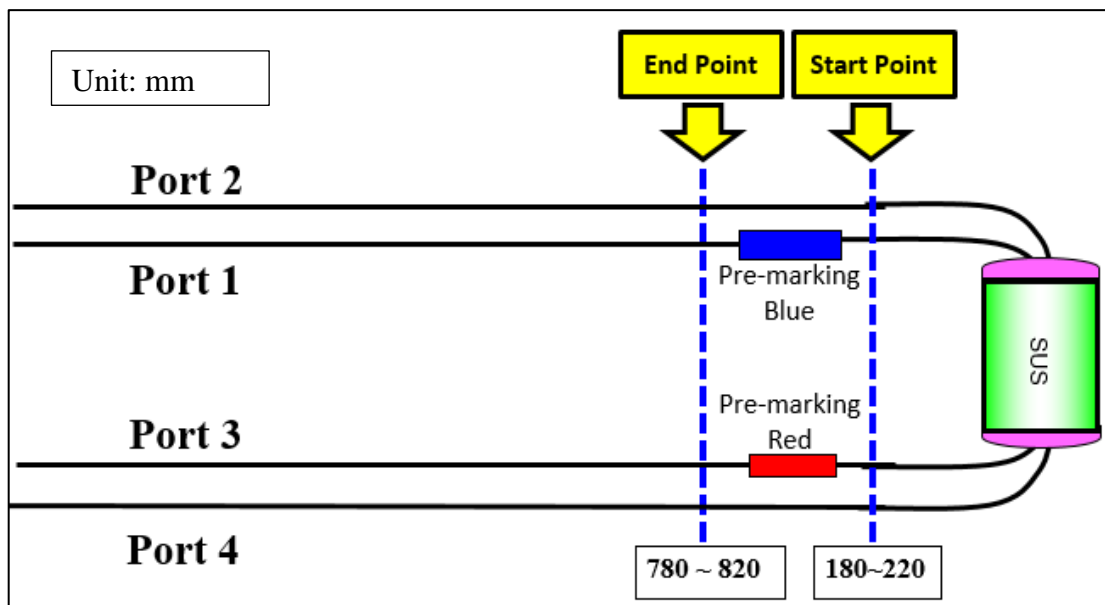


Fig15.3 Demonstration of checking pre-marking before port (Reference)

16. QC Appearance inspection

16.1 Process specification

Items	Specification
SUS laser marking content	- Refer to detail requirement as relating Purchase specification number (and relating working direction).
Port coloring: color, length, position	- Port 1: Blue coloring; - Port 2: Colorless
Port length (mm)	- Port 3: Red coloring; - Port 4: Colorless
	Note: - Port 1: check the blue mark near to end of fiber and fiber coloring are same.

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	<ul style="list-style-type: none"> - Port 4: check the red mark near to end of fiber and fiber coloring are same. - General product configuration as Figure 16.1
Laser printing appearance	Could read the content clearly
Label content	<ul style="list-style-type: none"> - CPL No. on tray and checksheet are same - SUS No. on coupler and checksheet, packing label are same.
Appearance	<ul style="list-style-type: none"> - No scratch or dirty on fiber - No adhesive flow out on SUS or fiber - No any rip or crack on adhesive at the end of SUS pipe

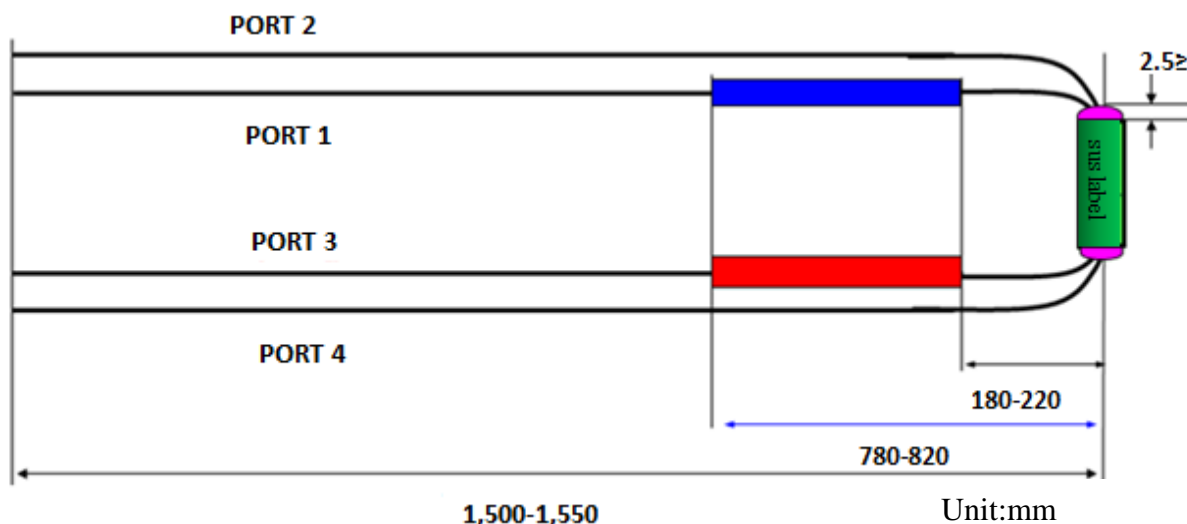


Figure 16.1 Product appearance and configuration (after cutting) (Reference)

16.2 Process condition

Item	Condition
Appearance	<ul style="list-style-type: none"> - Check by visual - For checking adhesive on SUS end: by visual or by magnifier (from x1 to x4)
Length	- Check by template

17. QC Casing.

17.1 Process Specification

Step	Operation description	Specification
1	Set one product into groove of plastic tray with correct direction	- Character on SUS and tray are same direction (see Figure 17.2)
2	<ul style="list-style-type: none"> - Winding fiber each port and use Fushigi tape to keep the coil. - Set fiber into tray completely and use sponge to fix fibers 	<ul style="list-style-type: none"> - Taping: see Figure 17.1 - Product after casing: see Figure 17.2
3	Close tray cover	<ul style="list-style-type: none"> - The PET marking is same position - Tray cover and tray body are fixed completely. (see Figure 17.2)
4	Paste Product label on product tray	<ul style="list-style-type: none"> - Label size : 85 x 17mm - Barcode font : Barcode Code 128 - Barcode display: Arial font, size - Barcode display format as Figure 17.3: Product type – SUS No (SUS No. – 6digits) - Appearance: the label is clearly. - Pasting direction and position: see Figure 17.4

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5	General	<ul style="list-style-type: none"> - There is no dust or contamination on product or tray. - There is no damage on tray.
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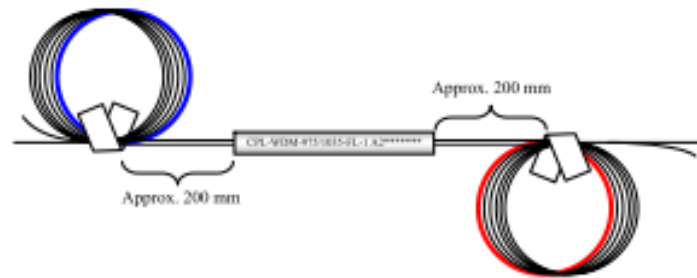


Figure 17.1 Fiber winding and taping

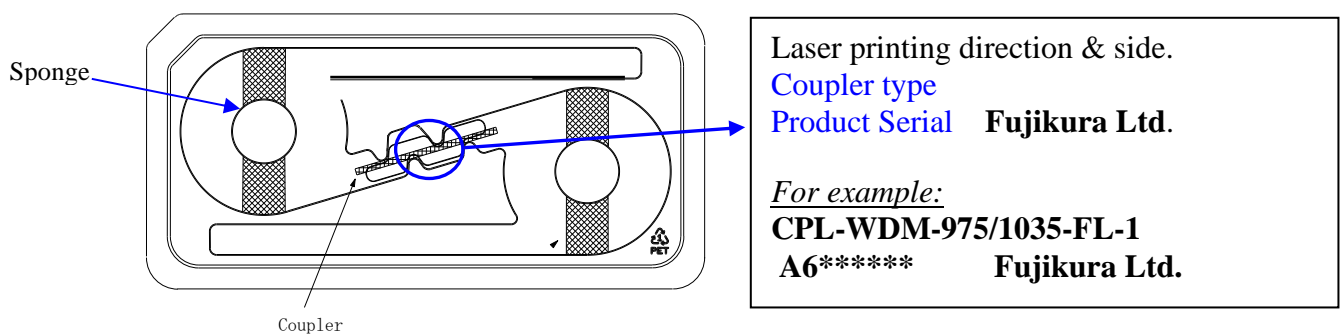


Figure 17.2 Tray packaging



Figure 17.3 – Product label (sample)

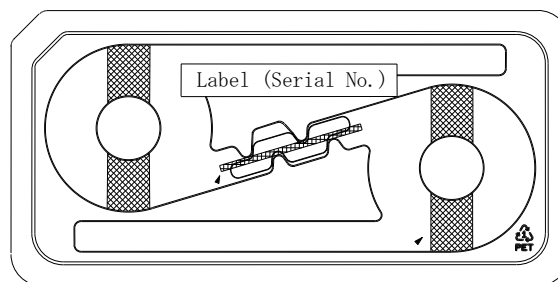


Figure 17.4 Label fixing

17.2 Process condition

Item	Condition
Appearance	Check by visual
Operation	By hand (using gloves when operate)

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18. Labelling and Air bubble packing.

18.1 Process Specification

No.	Inspection item	Specification
1	SUS pipe	<ul style="list-style-type: none"> - The SUS pipe number match with label - The laser printing can read clearly. - Direction: character can read from right to left (see Figure 17.2) - There is no damage or contamination.
2	Fiber	<ul style="list-style-type: none"> - Fiber was winded and taping correctly: see Figure 17.1 - Sponge were fixed correct position and enough 2pcs each side. - Product after casing: see Figure 17.2
3	Tray	<ul style="list-style-type: none"> - The PET marking is same position - Tray cover and tray body are fixed completely. (see Figure 17.2)
4	- Pile up maximum 5 trays in one block (See Figure 18.1)	<ul style="list-style-type: none"> - All trays are same product kind and P/O No. - All trays in one block are same direction
5	Wrapping the block with air bubble sheet or air bubble bag	See Figure 18.2
6	- Put one product label and shipping label in PE bag (see Figure 18.3)	<ul style="list-style-type: none"> - Label size : 86 x 86mm - Barcode font: Barcode Code 128 - Barcode display: Arial font, size - Label format: Part Number (Customer's number), Supplier, Patch (P/O No.), Quantity (see Figure 18.4)
7	Storage	Refer to detail requirement in 4-OP-543 for: <ul style="list-style-type: none"> - Storage condition - Storage leaf time

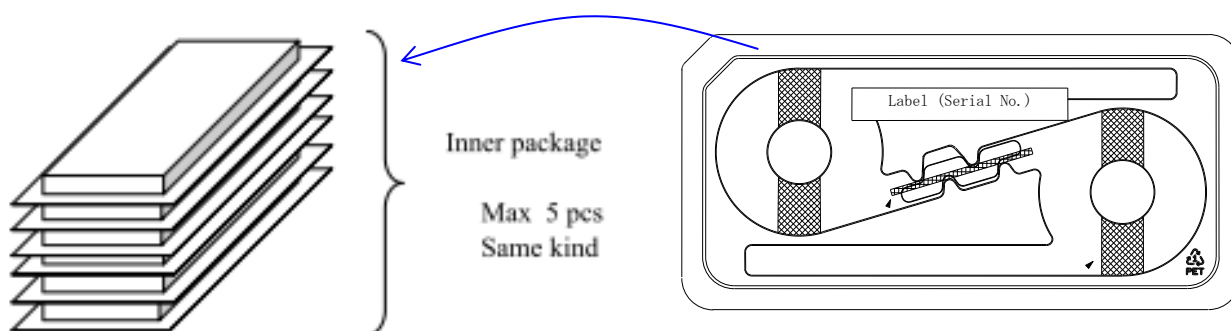


Figure 18.1 Product block

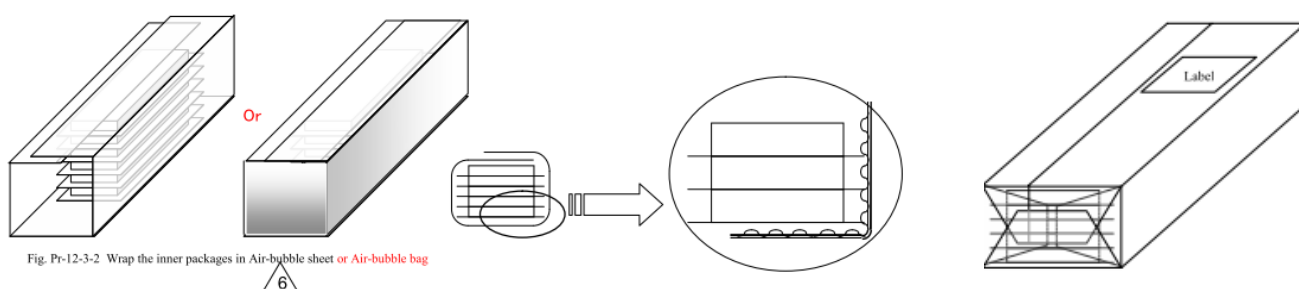


Fig. Pr-12-3-2 Wrap the inner packages in Air-bubble sheet or Air-bubble bag

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Figure 18.2 Wrapping

Figure 18.3 After packaging

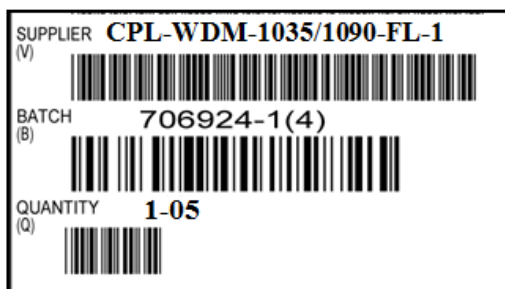


Figure 18.4-Shipping label (example)

18.2 Process condition

Item	Condition
Appearance	Check by visual
Operation	By hand (using gloves when operate)
Sealing	Scotch tape

19. QC packing

19. 1. Process specification

Step	Operation description	Specification
1	- Put blocks into inner box: - Maximum 12 blocks - Put cushioning around product (see Figure 19.1)	- Products should be same kind and P/O No. - Inner box dimension: L400 x W300 x H460mm
2	- Paste inner box label on the inner box	- Shipping label format: Product name, P/O No., Quantity, manufacturing date, origin of goods (see Figure 19.3)
3	- Put inner box into shipping box - Put cushioning around inner box (see Figure 19.2)	- Inner box be sealed by tape. - Shipping box dimension: L500 x W410 x H570mm
4	- Paste shock watch label on shipping box - Paste shipping label on box (see Figure 19.2)	- Shock watch label color: Orange (L-35) - Shipping label format: Product name, P/O No., Quantity, manufacturing date.

- Block direction in inner carton box: Position of Block is not leaned to one side and almost center of inner carton box (see Figure 19.1 below)

- Inner carton box direction in outer carton box: Center and not lean to one side (see Figure 19.2 below)

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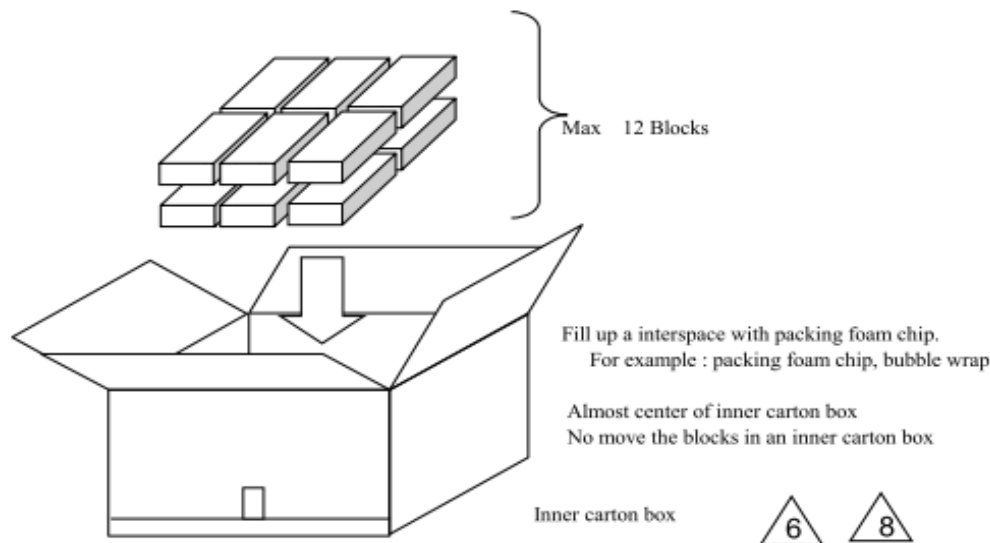


Figure 19.1 Inner carton box packing

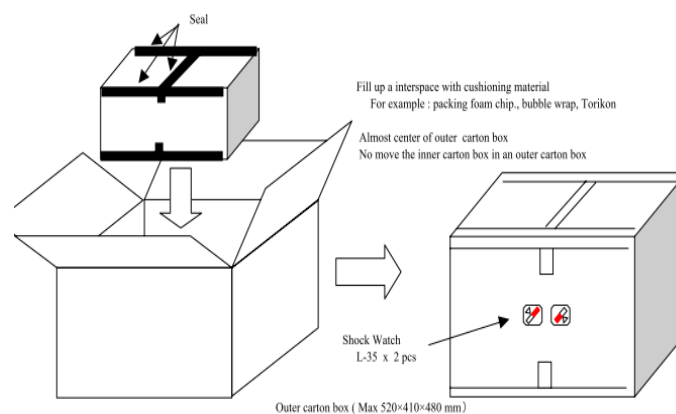
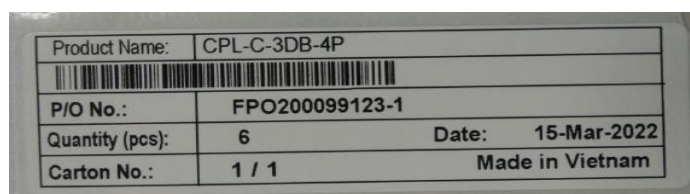


Figure 19.2 Outer carton box packing



(*1) : Format : "P/O Number" + " - " + "Carton No." + " / " + "Total box" + "Quantities in Box"
Bar code type : code128 without check digit

Figure 19.3 Format of label on inner box

- **TEST REPORT DATA** The deliverable data has to be uploaded to FTP server (IP:10.16.248.4) on the same day of shipping.

The format for Test report as below:

Table 19.1a – Related data (only send for shipment FOV → FJK)

No.	CPL Name	SUS pipe No.	Fiber Lot No.	P/O	Spec.	Shipping date	Remarks
1							
2							

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Table 19.1b– Related data (only send for shipment FOV → Final Customer)

No.	CPL Name	SUS pipe No.	Fiber Lot No.	Shipping date
1				
2				

Table 19.2– Measurement data of sampling inspection of RL

Table 5-2-2 Measurement Data of sampling inspection of Return loss

A	B	C	D	E	F	G	H	I	J	K	L	M
CPL No	[CPL No]						Program Version	[Program Ver]				
1		first	second	third	forth							
2	P2	[P2 1st]	[P2 2nd]	[P2 3rd]	[P2 4th]		IL12[dB]	[IL12]		WDM+TAP ref	[Ref]	
3	P3	[P3 1st]	[P3 2nd]	[P3 3rd]	[P3 4th]		IL13[dB]	[IL13]		TAP ref	[Ref]	
4	P0	[P0 1st]	[P0 2nd]	[P0 3rd]	[P0 4th]		ExLoss[dB]	[ExLoss]	Judgement	WDM ref	[Ref]	Judgement
5	Ref	[P0 1st]	[P0 2nd]	[P0 3rd]	[P0 4th]							
6	Judgment of 975-1035WDM											
7	Items		IL (dB)	Judgment		Items		IL (dB)	Judgment			
8	IL12@1033nm		[IL12@1033nm]	[Judge]		IL13@1033nm		[IL13@1033nm]	[Judge]			
9	IL12@1038nm		[IL12@1038nm]	[Judge]		IL13@1038nm		[IL13@1038nm]	[Judge]			
10	IL12@1087nm		[IL12@1087nm]	[Judge]		IL13@1087nm		[IL13@1087nm]	[Judge]			
11	IL12@1093nm		[IL12@1093nm]	[Judge]		IL13@1093nm		[IL13@1093nm]	[Judge]			
12	Min@IL12		[Min@IL12]									
13	Min@IL13		[Min@IL13]									
14												
15	Wavelength(nm)	Ref	IL12	IL13	IL12 : Calib	IL13 : Calib						
16	1000	[]	[]	[]	[]	[]						
17	1001	[]	[]	[]	[]	[]						
18	1002	[]	[]	[]	[]	[]						
19	1003	[]	[]	[]	[]	[]						
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Table 19.3 – Measurement data

Table 5-2-3 Measurement Data

A	B	C	D	E	F	G	H	I	J	K
CPL No	[CPL No]						Program Version	[Program Ver]		
1		first	second	third	forth					
2	IL@976nm	P2	[P2 1st]	[P2 2nd]	[P2 3rd]	[P2 4th]	IL12[dB]	[IL12]		
3	P3	[P3 1st]	[P3 2nd]	[P3 3rd]	[P3 4th]		IL13[dB]	[IL13]		
4	P0	[P0 1st]	[P0 2nd]	[P0 3rd]	[P0 4th]		ExLoss[dB]	[ExLoss]		
5										
6	Judgment of 975-1035WDM					Judgment of 1035-1090WDM				
7	Items		IL (dB)	Judgment		Items		IL (dB)	Judgment	
8	IL12@976nm		[IL12@976nm]	[Judge]		IL12@1035nm		[IL12@1035nm]	[Judge]	
9	IL12@1033nm		[IL12@1033nm]	[Judge]		IL12@1040nm		[IL12@1040nm]	[Judge]	
10	IL12@1038nm		[IL12@1038nm]	[Judge]		IL13@1087nm		[IL13@1087nm]	[Judge]	
11						IL13@1093nm		[IL13@1093nm]	[Judge]	
12						ExLoss		[ExLoss]	[Judge]	
13	Min@IL12		[Min@IL12]							
14	Min@IL13		[Min@IL13]							
15										
16										
17	Wavelength(nm)	Ref	IL12	IL13	IL12 : Calib	IL13 : Calib				
18	1000	[]	[]	[]	[]	[]				
19	1001	[]	[]	[]	[]	[]				
20	1002	[]	[]	[]	[]	[]				
21	1003	[]	[]	[]	[]	[]				
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19.2. Process condition

Process conditions are shown in table

Items	Conditions
Operation	Manual
Appearance	Visual

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20. QC Final packing**20.1. Process specification:**

Step	Operation description	Specification
1	Storage carton after carton packing	- Keep indoor (except pallet packing and shipping) - Storage at temperature 15°C ~ 30°C
2	Check carton's, shock indicator's appearance	- Carton is not damaged - Shock indicator is not activated

20.2. Process condition:

Item	Condition
Appearance	Check by visual
Operation	By hand

21. Shipping**21.1. Process specification:**

Step	Operation description	Specification
1	Check cargo's, shock indicator's appearance	- Cargo is not damaged - Shock indicator is not activated
2	Check PO, check quantity	- Correct PO, quantity of shipment

21.2. Process condition:

Item	Condition
Appearance	Check by visual
Operation	By hand

Note: Attach label outside carton box to indicate: Specific of product type, Specification Number, and serial No.

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REVISION HISTORY

Preparing Date	Person	Version	Description		Preparing Date	Person
			Old content	New content		
15-Jul-2024	Thang 10641	27	- I. Purpose - II. Application - III. Reference Document No have customer specification Have related OP document Have Table III.1 Product application information - IV. TERM DEFINITION No information - No have V. Traceability control - V. CONTENT: Include Controlling items of each process - REVISION HISTORY	- I. New Purpose - II. New Application - III. Reference Document Add 1. Customer specification Remove related OP document Remove Table III.1 Product application information - IV. TERM DEFINITION Add information - Add V. Traceability control - VI. CONTENT: Remove Controlling items of each process (transfer to item V) - New format REVISION HISTORY	Follow NEW OPERATION PROCEDURE TEMPLATE 0-PR-001-0-TEM-0008 ver 1	PRE2 Manager Dao Ngoc Trung
			5. Material preparation (Neoceram cleaning): refer to 4-OP-555	5. Material preparation (Neoceram cleaning): refer to 4-OP-549	Combine content of 4-OP-555 and 4-OP-556 into 4-OP-549 to simplify document structure	
			14. Material preparation (SUS pipe cleaning): Refer to 4-OP-556	14. Material preparation (SUS pipe cleaning): Refer to 4-OP-549		
			13. Temperature cycling (24H) 13.2 Process condition Figure 13.1 Temperature pattern and setting condition (Reference) First step: Time: 10 min	13. Temperature cycling (24H) 13.2 Process condition Figure 13.1 Temperature pattern and setting condition (Reference) First step: Time: 3 min	Reduce pre-heat time follow Change Order No: 9-PR-0014-9-FO-0001-4-RC-0135	
			15. Port coloring 15.1 Process specification Item - Appearance inspection No scratch or dirty on fiber over limited on coloring zone	15. Port coloring 15.2 Process condition Item - Appearance inspection +UV fiber: No scratch or dirty on fiber over limited on coloring zone +Resin appearance: No any rip or crack on adhesive at the end of SUS pipe	Follow Change Order No.: 9-PR-0014-9-FO-0001-4-RC-0087	
19-Sep-23	Viet 10546	26	III. Reference Documents	III. Reference Documents Table III.2 Application working direction + Remove AOR81-59-16-0015 + Remove PTE81-59-20-0004 + Remove PTE82-59-21-0001 + Remove PTE81-59-21-0002 + Remove PTE82-59-21-0002 + Remove PTE82-59-21-0003 + Remove PTE82-59-21-0004 + Remove PTE81-59-21-0012 + Remove PTE81-59-22-0001 + Remove PTE81-59-23-0008	AOP82-2017-27-01, AOP82-2017-27-02, AOP82-2017-27-03, AOP82-2017-27-05 combine WD contents to Spec documents and upgrade new version.	PRE3 section manager
			UV coat removing length of CPL-TAP-1035-5dB-FL-1: 32 +1/-2mm	UV coat removing length of CPL-TAP-1035-5dB-FL-1: 32 +1/-2mm	Correction typo mistake	
			4.2.2 Fiber Tension Proof test FLC Tap: 250g ±1 FLC WDM: 200g ±1	4.2.2 Fiber Tension Proof test 1035/1090 nm WDM coupler: 200g ±1 Tap couplers and 975/1035 nm WDM coupler : 250g ±1	Correction follow Customer Specification	
			4.2.2 Fiber Tension Fiber strength (broken test) - Fiber broken tension: ≥ 300gr for FLC WDM - Fiber broken tension: ≥ 390gr for FLC Tap	4.2.2 Fiber Tension Fiber strength (broken test) - Fiber broken tension: > 300gr for FLC WDM - Fiber broken tension: > 390gr for FLC Tap	-Correction follow 000-4- RC-0081	
			Item 4.3 * Note: Do not wear glove when injection adhesive.	Item 4.3 Remove “Note: Do not wear glove when injection adhesive”.	Action for reduce contamination	
			Item 7.1.1 -Tension before and after Neoceram packing: 19~21 g -Tension while Neoceram packing: 17~23 g	Item 7.1.1 - Tension after proof testing, while and after Neoceram packing: 19~21 g	Correction for match with requirement on Customer Specification	
			Table 14.1. don't have RL sampling when some conditions changing	Table 14.1. add RL sampling when some conditions changing	Correction	
				Remove V.Record	Move to QC (Follow requirement of 0-Pr-004)	

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19-Jul-23	Viet 10546	25	II. Reference Documents: - PTE81-59-20-0031	II. Reference Documents: - PTE81-59-23-0008	New Customer's WD to combine all WD related to Return loss	PRE3 section manager
			II. Reference Documents: PTE81-59-21-0002: + Applying description: Applying specification change for FLC (RL and Laser printing on SUS pipe) + Process: Loss & SUS	II. Reference Documents: PTE81-59-21-0002: + Applying description: Applying specification change for FLC (Laser printing on SUS pipe) + Process: SUS + QC Appearance	- PTE81-59-21-0002 upgrade new version and change content	
26-May-2023	Viet 10546 Trang 10401 Voc 10887	24	Table III.2 Application working direction PTE81-59-22-0004	Table III.2 Application working direction Remove PTE81-59-22-0004	Customer not require anymore	PRE3 section manager
			1. Fiber cutting 1.1 Process specification - NA	1. Fiber cutting 1.1 Process specification - Add Dust Blowing System	4M amendment: 4-PR-007-4-FO-001-4-RC-1248.	
			Have no requirement at QC Final Packing and Shipping process	Add process QC Final packing And add the requirement at Shipping	Follow action in CAPA: CAPA-BSI-23-006	
			12. Fiber Setting & SUS packing: 12.1 Process specification -UV light in-density: 14.0÷18.5mW/cm2 (measured by UV meter: ORC UV-M03, Sensor: UV-35(1:10)) -Curing time: 30second (2 times for 2 sides) 12.2 Process condition - Condition - Operation process: b) Coupler fixing: pick CPL body from transport board to SUS packing board, using tape to fix SUS pipe, noted that, fiber both side are parallel with packing board. g) Loctite adhesive applying: set board on shell in vertical direction, fill adhesive onto inner wall of SUS, wait at least 90seconds and re-applying. Repeat 2 or 3 times, then curing adhesive, after that doing same for next side.	12. Fiber Setting & SUS packing: 12.1 Process specification - UV light with intensity (for each UV light source): 8.00÷12.00 mW/cm2 (measured by UV meter: ORC UV-M03, Sensor: UV-35(1:10)) - Curing time: 15~30 seconds, process control setting 20 seconds (1 time for 1 SUS head) - Curing distance: 5-10 mm 12.2 Process condition - Condition Add: UV curing jig - Operation process: b) Coupler fixing: move coupler body from the lower groove to the upper groove, then use tape to fix coupler with Neoceram was upward. g) Loctite adhesive applying: set board on shell in vertical direction, fill adhesive onto inner wall of SUS, wait about 30 seconds and re-applying. Repeat 2 or 3 times, after that waiting about 5 minutes for resin settled down and injection extra if needed to meet the volume required, then curing adhesive by jig, after that doing same for next side.	4M amendment: 4-Pr-007-4-Fo-0007-4-RC-0012 4M amendment: Apply new board: 4-PR-007-4-FO-001-4-RC-1145 Standardize waiting time and apply 4M amendment: 4-Pr-007-4-Fo-0007-4-RC-0012	
21-Jul-22	Viet 10546 Trang 10401 Tung 10745	23	Table III.2 Application working direction	Table III.2 Application working direction -Add PTE81-59-22-0001 -Add PTE81-59-22-0004	New Customer requirement	PRE3 section manager
			19. QC packing - 19.1: - -19.2: - -19.3: -	19. QC packing - 19.1: + Add inner box label with content + Add "origin of goods" -19.2: + Remove items "Carton box information, shock watch, cushion material" + Add items: Operation, Appearance -19.3: Add item "Inner box label"		
			13. Temperature cycling (24H) 13.2 Process Condition -	13. Temperature cycling (24H) 13.2 Process Condition - Chamber type: Add "or equivalent" - Add recorder "RT-32S type or equivalent"	Update and standardize with 4-OP-0366	
			3.1 Process specification UV coat removing: -CPL-TAP-1035-5dB-FL-1: 32 +/-2mm	3.1 Process specification UV coat removing: -CPL-TAP-1035-5dB-FL-1: 32 +/-2mm	Correction follow Customer specification	
			4.2.4 Elongation parameter CPL-TAP-1035-5dB-FL-1/Coupling length: 20 ÷ 23 mm	4.2.4 Elongation parameter CPL-TAP-1035-5dB-FL-1/Coupling length: 19.5 ÷ 22.5 mm	Correction follow Customer specification	