I. Purpose

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

II. Application

- This guideline is applied for FUSECONNECT-SC *as processes following*

No	Process name	Remark
1	Fiber cutting	
2	Adhesive mixing and injection	
3	Ferrule assembly	
4	Polishing, Inter, Endface	
5	Loss inspection	
6	Tube cutting	
7	Final Endface	
8	Qualify bare fiber end, reflectometer	
9	Assembly fusion splice sleeve tube	
10	Laser marking	
11	Assembly Housing parts	
12	Final Appearance & Packing	
13	Middle Packing	
14	QC Final Packing	
15	Shipping	

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

III. Reference Documents

- Customer specification: Refer 4-QC-182

IV. Term and Definition

FOV: Fujikura Fiber Optics Viet Nam
SIC: Section In Charge

V.Traceability control:

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

11

Type of record	Items	Record
Quality control items	Refer to: QC Flow chart 4-QC-182	Related Check sheet
Identification & trace ability record	4M information (if any): - Material Lot# - Machine/Tool-jig control number - Operator code - Manufacturing/ inspecting date	

V. Contents

1. Fiber cutting

1.1 Process specification

Items	Specifications
Fiber Type	SM/MM
Cutting length	520 ± 20 mm
Appearance	No damage, No dirty, No deformation

11

1.2 Process conditions

Items	Conditions
Length	Check by ruler/ bobbin
Cutting	By nipper
Appearance	Visual

2. Adhesive mixing and injection

- Refer to 4-OP-500

3. Ferrule assembly

- Refer to 4-OP-0470 for Fuse Connector

11

4. Polishing, End-face, Inter

4.1 UPC type

4.1.1 Process specification

Items	Specifications
Polishing	-Refer to 4-OP-526 for SPC/ UPC
Endface	- Refer to 4-OP-563: PNJHY-0001-40-04A
Interferometer	- Radius: curve radius: 10 ~ 25mm - Offset: 0 ~ 50um - FH: -50~ 50 nm - Ferrule length: **7.85 ~ 7.95 mm**

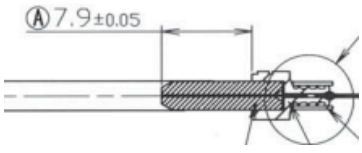


Figure 4.1 – Length of ferrule after polishing

4.1.2 Process conditions

Items	Conditions
Polishing	Polisher OFL-15
	Polishing Jig SC-UPC
End-face check	Microscope
Inter geometry	Interferometer
Length of ferrule	Dial gauge

4.2 APC type:

4.2.1 Process specification

Items	Specifications
Polishing	-Refer to 4-OP-526 for APC
Endface	- Refer to 4-OP-563: PNJHY-0001-40-04A
Interferometer	- Radius: curve radius: 5 ~ 12mm - Offset: 0 ~ 50um - FH: -50~100nm -Angle :7.5~8.5 -Ferrule length: **7.95~ 8.05 mm**

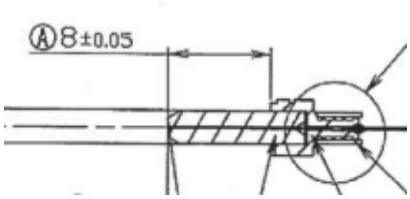


Figure 4.4 – Length of ferrule after polishing

4.2.2 Process conditions

Items	Conditions
Polishing	Polisher OFL-15
	Polishing Jig SC-APC
Endface check	Microscope
Intergeometry	Interferometer
Length of ferrule	Dial gauge

5. Loss Inspection:

5.1 Process specification

- Refer to **4-OP-506** (Insertion Loss Inspection) and **4-OP-507** (Return Loss Inspection) for all loss inspection steps of product with following specification.
- For Fusion Connector: sampling 1/1000 products.

11

5.2 Process condition

Items	Conditions
Measuring Loss	Loss system

5.3 Operation requirement

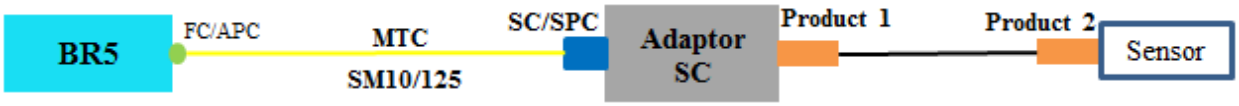
a. Insertion Loss

- Connector master cord light source to adaptor
- Insert Loss Measuring Tool and ferrule into dummy SC figure 5.1 (APC type)
- Connect measuring connector to Adaptor and another side connector to Adaptor of sensor to measure Insertion Loss.

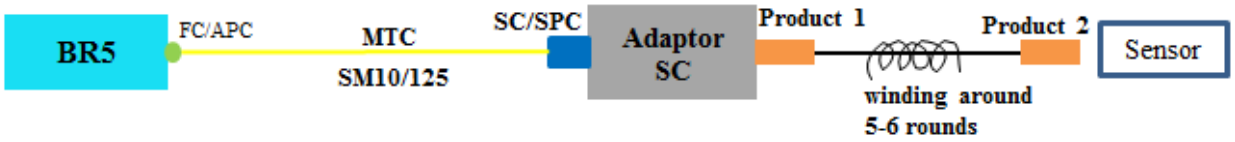
b. Return Loss

- One side contact with Master cord and other side wind around 5~6 rounds to measure Return Loss

IL



RL



6. Tube cutting

6.1 Process specification

Items	Specifications
Tube type	Silicon Tube
Cutting length	65 ±5 mm
Appearance	No damage, No dirty, No deformation

6.2 Process conditions

Items	Conditions
Length	Check by ruler/jig
Cutting	Machine/ razor
Appearance	Visual

7. Final End-face

7.1 Process Specification

Items	Specification
Length of ferrule insert into Silicon Tube	Length of ferrule insert into Silicon Tube is 1.5~2.5 mm for UPC, 2~3 mm for APC (if any) as *Figure 7*

7.2 Process condition

Items	Conditions
Length of silicon tube on ferrule	Template

7.3 Operation requirement:

- Refer to 4-OP-563: PNJHY-0001-40-04A
- After checking Endface, set ferrule into Silicon Tube (insertion length is 1.5~2.5 mm) as *Figure 7*

Figure 7- Insert silicon tube into ferrule

8. Qualify bare fiber end, reflectometer

8.1 Process Specification

Items	Specification
Ferrule setting	Ferrule is setting completely in Connector Holder
Fiber cutting	-Cutting position: cut fiber 30 ~ 35mm from end of ferrule's flange -For ferrule unit: the length belongs to spec.
Setting connector	Setting position as *Figure 8.1, 8.2* and stripping fiber as *Figure 8.3*
Fusion length	Cutting with length 16 ±0.2mm (from the end of holder flange to the end of bare fiber, control by jig)
Bare fiber length	About 10 mm
Bending angle	Deviation from vertical and horizontal axis less than 0.38m
Bare fiber apperance	- Checking angle of cutting surface as *Figure 9.2*: not greater **2.9^0** - There is no deformation and contamination on fiber Note: turn off ARC charging function before inspection
Splice ability	- No error signal during checking
Check fiber broken	- No broken point of fiber inside ferrule - Checking length at least 30 mm

8.2 Process condition

Items	Conditions
End-face	Microscope
Cutting	By Razor/Nipper
Stripping	Hot stripper /HJS-02
Cleaving	CT-30
Length & angle checked	Jig & microscope
Angle end-face checking	Using Fusion Splicer machine
Splice ability	
Appearance	Check by visual
Fiber broken	Machine

11

8.3 Operation requirement

- Set connector on holder

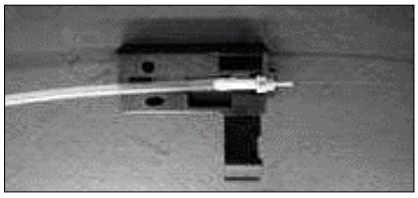


Figure 8.1

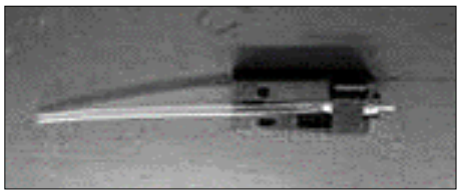


Figure 8.2

- Strip UV coating: set Connector holder on HTS12

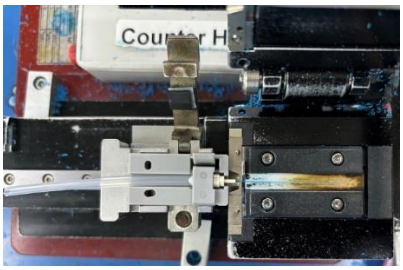


Figure 8.3

- Cleaning: use dusper wet alcohol to cleaning bare fiber and stripping point at both side. Do not use dusper for more than one product.

Figure 8.4

Figure 8.5

- Screening: flick the fiber end in 3 times in four directions (up and down, right and left) at angle about 60^0 and in 2 seconds for direction each by clean dusper.

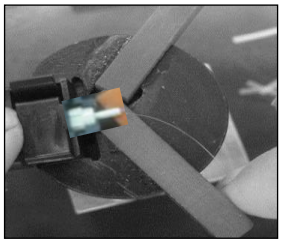


Figure 8.6

- Cleaving: use CT-30 to cut bare fiber. Push and hold connector holder firmly when cleaving.

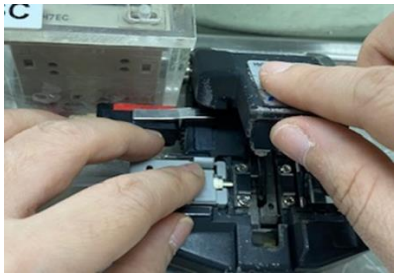


Figure 8.7

- Length and angle checking: set product on jig and check length of fiber (bare fiber length and fusion length) and bending angle under Microscope (check vertical and Horizontal direction)

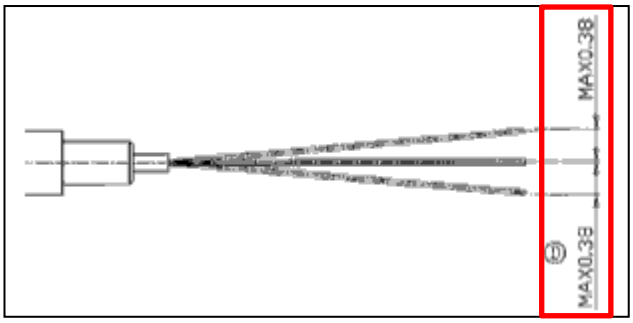


Figure 8.8

Figure 8.9

- Angle end-face checking & Splice ability: Checking endface of bare fiber by fusion splicing machine

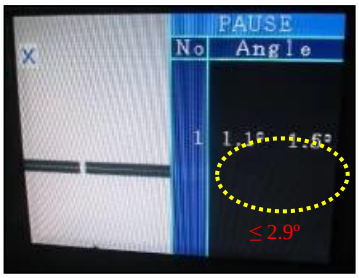


Figure 8.10

Figure 8.11

- Reflectometer checking: Refer to **4-OP-511** to ensure there is no fiber broken in product

9. Assembly Fusion Splice Sleeve tube

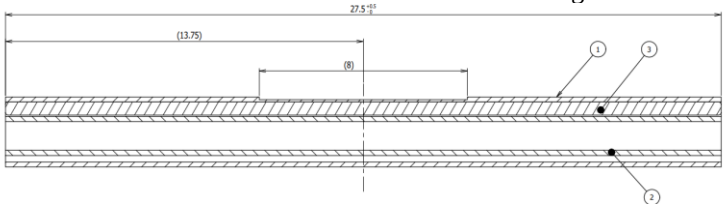
9.1 Process Specification

Items	Specification
Tube length, appearance	- Length tube is in length spec , no damage, deform
Part position	Correct position
Heating condition	Depend on material of tube
Time	Depend on material of tube

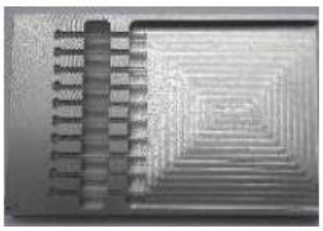
9.2 Process condition

***LCY 0.9mm tube**

- Cut outer tube 2.3 mm and inner tube 1.4 mm with length 27.5 mm. Then insert tube and pin each other

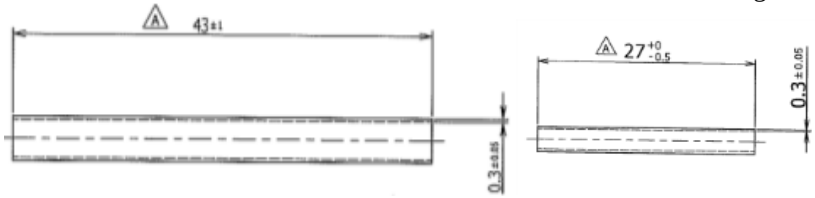


- Heating tube: put tube into jig and put into machine with heating 155 ± 5 degree, speed 400 ~ 500. Ensure correct pin position and heating position.

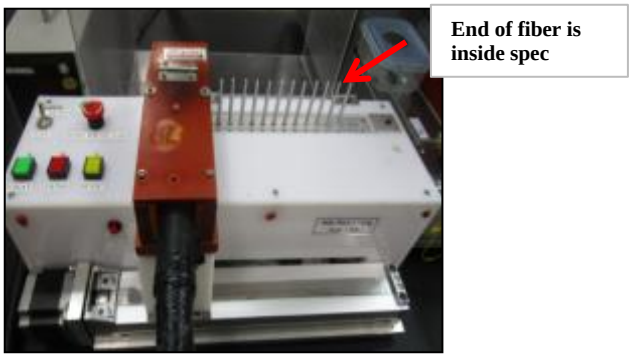


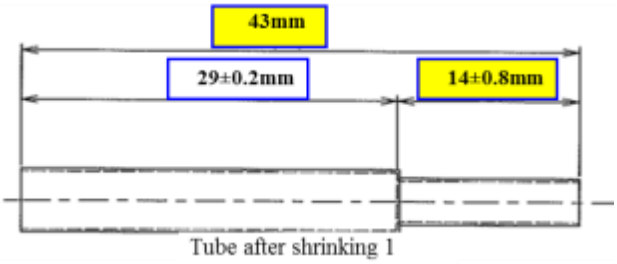
***SCY 3rd tube**

- Cut outer tube 4.7 mm and inner tube 3.5 mm with below length



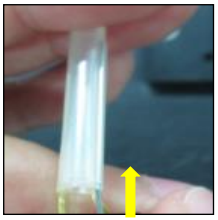
- Insert tube into heating 2 pin, then put into machine with heating 200 ± 5 degree, 75s





Tube after shrinking 1

- Insert inner tube 3.5 mm, Kevlar, tension member into outer tube 4.7 mm. Pull Kevlar into Blue mark position



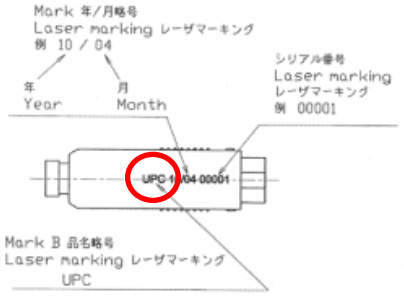
- Insert tube into heating 2 pin, then put into machine with heating 200 ± 5 degree, 75s

- Cut Kevlar remain

10. Laser making

10.1 Process Specification

Spec.	Specification
Marking	-Character and format as below fig
	-Correct with content, position and direction -Character is clearly (can be UPC/APC/GI5/… follow customer spec)
Material	Plug frame/ Stopring/ Coupling (Refer to relative master list)



10.2 Process condition

Items	Conditions
Laser marking	- Use laser printing machine for marking - Marking should be carried out before packing

11. Assembly Housing parts

11.1 Process specification

Items	Specifications
Tool assembly	Completely assembly ：Slider, Housing & Spring , stop ring
Mark length	1~ 3 mm

11.2 Process conditions

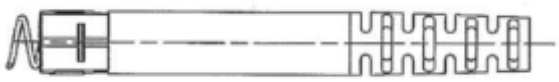
Items	Conditions
Housing assembly	By manual
Direction	Check by visual

- SC-SF

Assembly with Boot, slider and mark on stopring (if any)

- SC-QA

Assembly boot, Stopring, spring.



12. Final Appearance & Packing

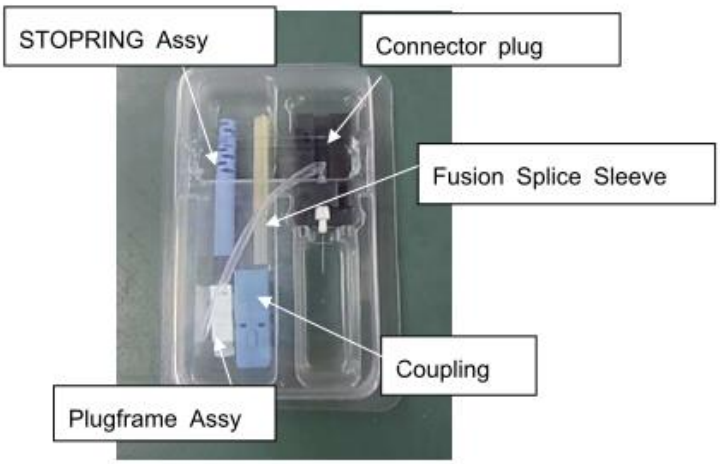
12.1 Process Specification

Items	Specification
Appearance	- Check Epotek remain from flange's ferrule which is less than 0.5 mm. - Laser marking format and content. - Stain of material is not > 5mm - Scratch should not be felt by finger nail - No crack, no contamination, no burr
Packaging	Manual
Appearance	Check by visual

12.2 Process condition

Items	Conditions
Appearance	By visual

Check appearance and pack product with Connector Holder + Housing part + Slice tube into case



Material list

Material Name	Material Code
Connector case	Refer to relative master list
PLUG FRAME	
Housing and Boot	
Cap	
Fusion splice sleeve	

13. Middle Packing:

13.1 Process Specification : Not open the case

Items	Specification
Manual	Correct specification of manual
Quantity of product	Must be correct as spec required
Label	Must be correct as spec required

Refer to relevant purchase spec for detail packing method.

- Example for packing method

Attach label for each case

Packing 10 cases + manual into 1 PE bag

13.2 Process condition

Items	Conditions
Manual	By visual
Quantity of product	Program
Label	By visual

14. QC Final Packing

14.1. Process specification

Items	Specifications
Quantity of product/ box	Must be correct as spec required
Kind of carton box	Must be correct as spec required
Content of product label	Must be correct as spec required
Position and direction of label	Must be in correct direction for label & box as spec required

Refer to relevant purchase spec for detail packing method.

- Example for packing method

14.2. Process condition

Items	Conditions
- Packing method	Visual
- Check Product label's content, appearance, letter position	Visual
- Product label's position	Visual
- Quantity of Label - Products Quantity/box - Product Name - Carton box size	Visual & program

15. Shipping

- ❖ Shipping Q'ty and product name must be confirmed correct with P/O from Customer
- ❖ Test report of that shipment will be sent to Customer latest one day after product is ex-factory

❖ The content of test report included items that are request in Product spec.

REVISION HISTORY

Date	PIC	Version	Description		Requester	Reason of change
			Old contents	New contents		
10.Sep.2024	Ngan nlt	11	Item 1. Fiber cutting -Cutting length: 310 ± 10 mm Item 3: Ferrule assembly Item 5: Loss Inspection + Sampling fusion loss 1/5000 products. Item 8. Qualify bare fiber -Appearance: Check by visual under Microscope	- Correct numerical order of process compliance to QC flow chart Item 1. Fiber cutting -Cutting length: 520 ± 20 mm Item 3: Ferrule assembly Refer to 4-OP-0470 for Fuse Connector Item 5: Loss Inspection + Sampling fusion loss 1/1000 products. Item 9: Assembly Fusion Splice tube: Add LCY 0.9mm Item 8. Qualify bare fiber -Appearance: Check by visual	PRE1	-Apply new template 0-PR-001-0-TEM-0008 -Standardize document -Cancel Appearance by microscope follow 4M 9-PR-0014-9-FO-0001-4-RC-0142
	Phuongtm		Item 15. QC Appearance	Item 15. Middle packing, update control item.	QAE	Cancel QC Appearance follow 4M 9-PR-0014-9-FO-0001-9-RC-0006
28.9.18	Nguyen Ha Thuy Van	10		-Section 2:Application +Cancel process: Part insertion, adhesive applying (specification revise) +Add process: Final endface (improve damaged endface). -Section 5: Contents +Fiber cutting process: Change length of fiber from 600~750mm to 300~320mm.(specification revise). +Loss inspection process Make clear diagram to measure IL, RL by 2 products.	PRE1	Revise
22.10.11	Hua Cong Nghiep	9		Cancel process: Hytrel preparation	PRE1	Revise
20.12.10	Hua Cong Nghiep	8		Update item number Combine SC & SC-SM	PRE1	Update
25.12.09	Trinh Huu	7		Update checking by the Fusion machine 60S	PRE1	Update
