I. Purpose

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

II. Application

- This guideline is applied for all types of Trillian FAU products as processes follow.

No	Process	Remark
1	Cutting and aging	
2	Laser marking	
3	FAU Preparation	
4	FAU Stripping	
5	Cerrocast	
6	Leak Inspection	
7	Encapsulation	
8	O/E Cap Cleaning	
9	Part Insertion	
10	Branching & Mapping	
11	Gathering	
12	Ferrule MT Assembly	
13	Ferrule LC Assembly	
14	Housing LC	
15	Polishing LC	
16	Polishing MT	
17	Housing MPO	
18	Length check	
19	Identification check	
20	Loss Inspection	
21	Reflectometer check	
22	PRD Inspection	
23	QC inspection 1	
24	QC Final Endface	
25	QC inspection 2	
26	Packing & Label	
27	Test report & Shipping	

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

III. Reference documents

- Specification:

Specification	Product name
HE-1321-004$004	Trillian Shuffle Assy
HE-1321-001$005	Trillian FAU-cap Assy_V4-MPOM
HE-1321-023$003	Trillian FAU-cap Assy_V5- No Loopback
HE-1321-024$005	Assy FAU-cap_Trillian

- QC flow chart: 4-QC-0302

IV. Term definition

- FOV: Fujikura Fiber Optics Vietnam Ltd.

V. Traceability control:

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

Type of record	Items	Record
Quality control items	Refer to: QC Flow chart *[4-QC-0302]*	Related Check sheet
Identification & trace ability record	4M information (if any): - Material Lot# - Machine/Tool-jig control number - Operator code - Manufacturing/ inspecting date	

VI. Content

- Product structure different

Specification	Sumitube	IRRAXR TUBE	Silicon tube 4.5 x 5.5 (blue)	Longest length from cerrocast	LC connector quantity	MPO connector quantity	MPO length different
HE-1321-004$004	No	No	Yes	LC	5	7	Yes
HE-1321-001$005	Yes	Yes	No	LC	4	6	No
HE-1321-023$003	Yes	Yes	No	LC	4	6	No
HE-1321-024$005	Yes	Yes	No	MPO	4	6	No

1. Cutting & aging

1.1. Process specification

- Cutting length

Material type	Tolerant (mm)	HE-1321-004$004		HE-1321-001$005		HE-1321-023$003		HE-1321-024$005		Remark
		Cutting length	Quantity	Cutting length	Quantity	Cutting length	Quantity	Cutting length	Quantity	
Silicon tube 1.4 (yellow)	± 2	115	2	110	6	110	6	-	-	
		125	1	-	-	-	-	-	-	
		145	1	-	-	-	-	-	-	
		165	1	-	-	-	-	-	-	
		175	1	-	-	-	-	-	-	
		195	1	-	-	-	-	-	-	
	± 2	-	-	-	-	-	-	770	6	
Hytrel tube 0.9 (Natural)	± 2	700	5	570	4	618	4	-	-	
Hytrel tube 0.9 (Blue)	± 2	-	-	-	-	-	-	554	4	
Sumitube 2.5X0.25 (black)	± 2	-	-	25	2	25	2	25	2	
Silicon tube (white) **(*)**	± 1	13	5	13	4	13	4	13	4	LC label
	± 2	40	1	40	1	40	1	40	1	Product label
Silicon tube 4.5 x 5.5 (blue)	± 2	300	1	-	-	-	-	-	-	
IRRAXRTUBE	± 2	-	-	25	2	25	2	25	2	

(*) Spiral cut

- Aging Hytrel tube: 24 hours @ 85oC

1.2. Process condition

Items	Condition
Cutting	Ruler, Jig, machine
Aging	Oven, recorder

2. Laser marking

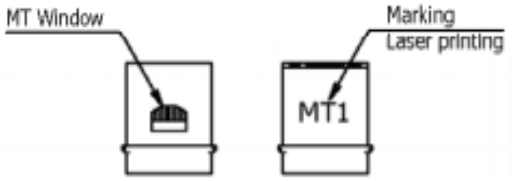
2.1 Process specification

Refer to 4-OP-577

- Laser mark on hytrel tube
- Laser mark on MT ferrule, coupling
- Laser mark on frame

❖ ***For all product (except Trillian Shuffle Assy):***

- Position and direction

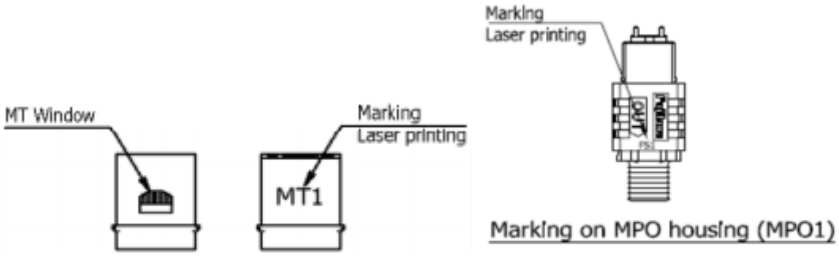


- Mark content

MPO No.	Coupling color	Mark Content on MT
1	Green	MT1
2	Orange	MT2
3	Blue	MT3
4	Black	MT4
5	Red	MT5
6	Beige	MT6

❖ ***For Trillian Shuffle Assy:***

- Position and direction



- Mark content

MPO No.	Coupling color	Mark Content on MT	Content on Coupling
1	Green	FS1	FS1
2	Orange	FS2	FS2
3	Dark Blue	FS3	FS3
4	Black	FS4	FS4
5	Red	FS5	FS5
6	Beige	FS6	FS6
7	Light Blue	FS7	FS7

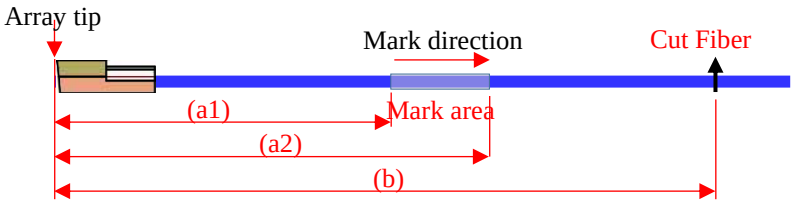
2.2 Process Condition

Items	Condition
Laser mark on tube	Machine, Jig, template
Laser mark on MT ferrule, coupling	Machine, Jig

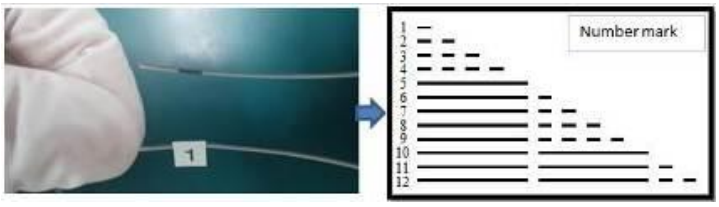
3. FAU preparation

3.1. Process specification

a. Mark and cut fiber



- Mark symbol one by one fiber tape based on label no.

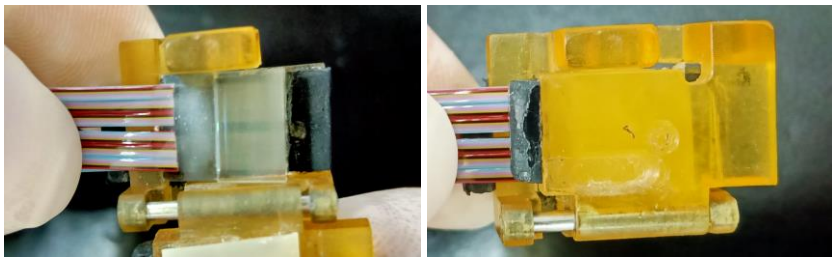


- Mark and cut position

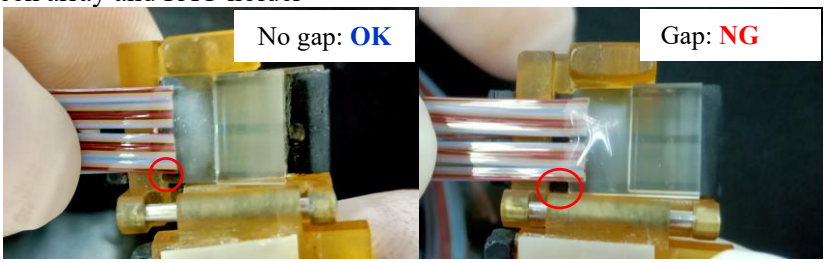
Position (mm)		Tolerant (mm)	HE-1321-004$004	HE-1321-001$005	HE-1321-023$003	HE-1321-024$005
Mark area	from (a1)	± 2	840	840	870	1230
	to (a2)		860	860	890	1270
Cut position	for LC fiber (b)		1440	1139	1190	-
	for MT fiber (b)		-	-	-	1416

b. Set product on jig

- Take FAU into FAU holder: V-Groove is downward and lid is upward



- Check gap between array and FAU holder



- Set FAU holder into prepare jig

+ Clamp to lock holder

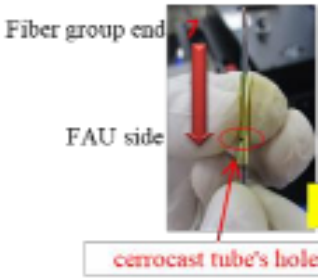
+ Split the ribbon pair and arrange into pin

- Select group 1 or group 2 to do one by one

Fiber	Group 1		Fiber	Group 2	
	Trace color	Mark symbol		Trace color	Mark symbol
9	Red		4	Blue	
3	Blue		10	Red	
8	Blue		5	Red	
2	Red		11	Blue	
7	Red		6	Blue	
1	Blue		12	Red	

- Arrange Fiber tape into slot: keep ribbon tape straight
- Close clamp No. 1, 2

- Insert cerrocast tube into six fiber tape of one fiber group: Cerrocast tube that have hole is inserted first



- Open clamp 2, when cerrocast move over clamp 2, close clamp 2 and open clamp 1, then move cerrocast reach near holder, close clamp 1

- Check trace fiber color as group

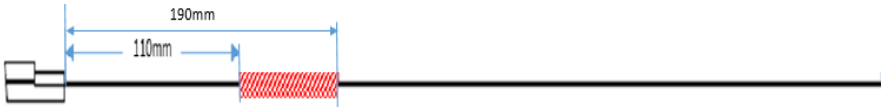
Fiber	Group 1		Fiber	Group 2	
	Trace color	Mark symbol		Trace color	Mark symbol
9	Red	▮▮▮▮▬	4	Blue	▮▮▮▮
3	Blue	▮▮▮	10	Red	▮▬
8	Blue	▮▮▮▬	5	Red	▬
2	Red	▮▮	11	Blue	▮▬▬
7	Red	▮▮▬	6	Blue	▮▬
1	Blue	▮	12	Red	▮▬▬

- Attach dummy tube inside cerrocast tube to prevent fiber damage

- Remove FAU holder and arrange fiber jig out of prepare jig

❖ Rework for Ribbon matrix peel off

- Define product can rework

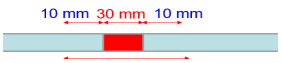


+ If have any defect on fiber in zone 110-190mm from FAU (red zone):
  - Reject: for FAU Material: detect before FAU preparation process
  - Rework: for FAU product already pass cerrocast process

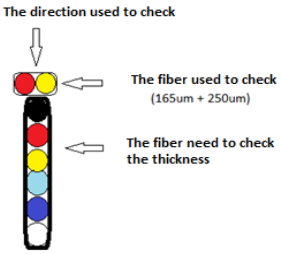
+ If outside red zone, it can be reworked

- Method:

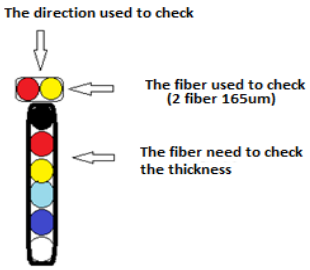
+ Lightly bending the fiber, use bamboo swab with alcohol to remove the ribbon matrix. DO NOT separate the ribbon matrix longer than 30mm
+ Check remove area under microscope 40X.
+ If no UV coating crack, cover by adhesive over peel off area ~ 10 mm both side



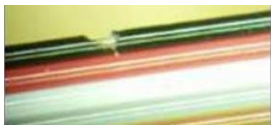
- In zone below apply RTV3140 adhesive
  - FAU material: from array end to 110 mm
  - FAU product already pass cerrocast process: from array end to cerrocast tube.
    + Cure condition: 90 min @ 85°C
    + Thickness of adhesive and ribbon < 450um (use the fiber 165um +fiber 250um, check under microscope, and compare each other).



- In zone: from 190mm to fiber tail: apply FAA adhesive
  + Thickness of adhesive and ribbon < 350um (use 2 fiber 165um, check under microscope, and compare each other).



+ If UV coating crack: reject



3.2. Process condition

Items	Condition
Mark	Pen, jig
Cut	Plier, jig
Fiber order	Jig
Epoxy curing dryness (Rework)	Heater
Fiber appearance (Rework)	Microscope

4. FAU Stripping

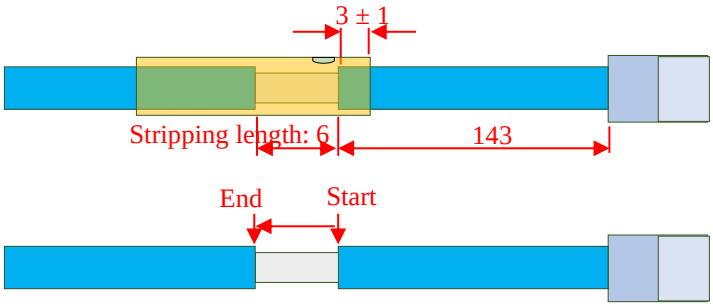
4.1. Process specification

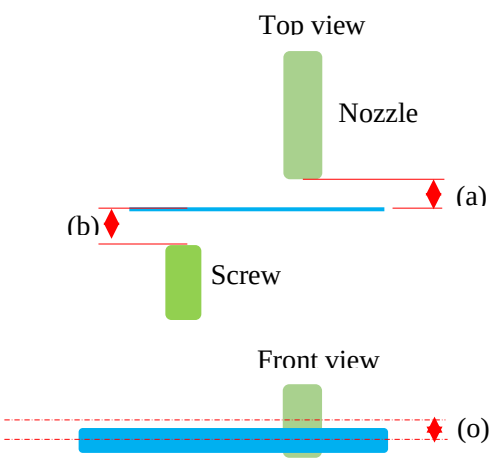
a. Hot air stripping condition

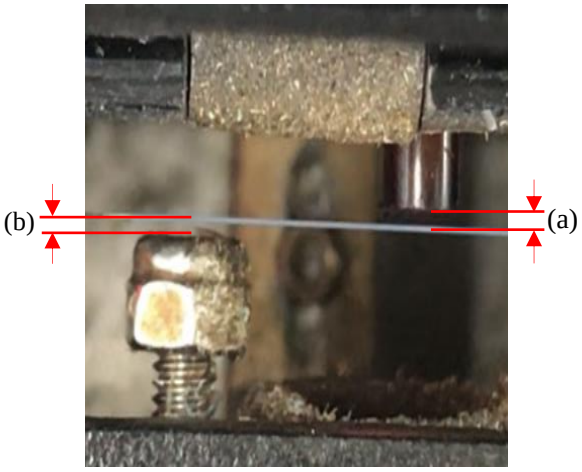
Parameter	Unit	Reference Program 5	Adjust range	Remark
Mode		0	-	
# of Windows		1	-	
Heater Temp	°C	910	850 ÷ 950	Set temp.to achieve target of actual temperature In case actual temperature not reach require, it can adjust over this range.
Strip Tension	N	4.0	3 ÷ 8	
Zero Mov't Length	mm	1	-	
Prooftest Tension	N	10	5 ÷ 15	
ProofTest Speed	mm/s	6	-	
Clamp Delay	ms	200	-	
Prooftest hold time	ms	0	-	
Preheat time	ms	4000	3000 ÷ 6000	
Readjust tension off/on		1	-	
Air on position	mm	0	-	
Strip Start position	mm	11	9 ÷ 12 (*)	+ Distance between cerrocast head and start stripping point: 3±1 + Stripping length about 6mm
Strip End Position	mm	16	14 ÷ 17 (*)	
Fiber up position	mm	0	-	
Air off position	mm	0	-	
Vacuum pre delay	ms	500	-	
Air pre delay	ms	20	-	
Start Speed	ms	3	2.8 ÷ 4.0	
Strip Speed	ms	4	2.8 ÷ 4.0	
Ramp Time	ms	20	-	
Air post delay	ms	10	-	
Vacuum post delay	ms	2000	-	
Air pressure	Mpa	2.5	2 ÷ 4	

Actual temperature	°C	840	790 ÷ 890	
Heat nozzle distance to fiber	mm	0.5	0.3 ÷ 0.5	
Screw distance to fiber	mm	0.5	-	
Nozzle and fiber offset (o)	-	~ 0	-	Keep center, visual check

(*) Reference for setting







b. Verify stripping quality

- Checking item

Checking item	Unit	Criteria	Remark	Checking frequency					
				Daily	Weekly	After machine repaired	Change condition	Before stripping	Before cerrocast
Pull force (single fiber)	N	≥ 4	Min value	o	-	o	o	-	-
	N	≥ 7	Average of 6 sample						
Screening (Ribbon fiber)	-	No break	Up, down 90 degree x 5 times	o	-	o	o	-	-
Nozzle & screw appearance	-	No burr		-	-	-	-	o	-
Setting temperature	°C	Setting temp. ± 3	Setting on machine	o	-	-	-	o	-
Actual temperature	°C	840 ±50	Measure by thermometer	-	o	o	o	-	-
Air pressure of heater	Mpa	2 ÷ 4		o	-	-	o	o	-
Heat nozzle distance to fiber	mm	0.5	dim (a)	o	-	o	-	-	-
Screw distance to fiber	mm	0.5	dim (b)	o	-	o	-	-	-
Distance from cerrocast tip to stripping position	mm	3 ±1		-	-	-	-	-	o

c. Operation step

- Fix position of FAU and FAU holder

- Check gap between of Jig and FAU holder

- Pick up one by one ribbon from arrange jig follow arrow direction.

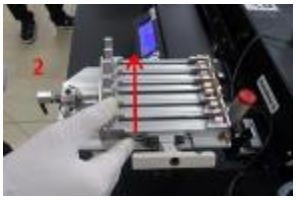
- Set ribbon on 2 clamp of stripper, keep fiber straight

- Close the cover and push button to start stripping

- Check fiber after strip:

+ UV coating removed. If remain a little burr, remove by plastic tweezers, DO NOT TOUCH on bare fiber.
+ No fiber break

- Set ribbon after strip on arrange jig as sequence follow arrow direct



4.2. Process condition

Items	Condition
Fiber ribbon order	Arrange jig
Array direction	Visual
Stripping point appearance	Visual
Fiber pull force	Pull force tool

5. Cerrocast

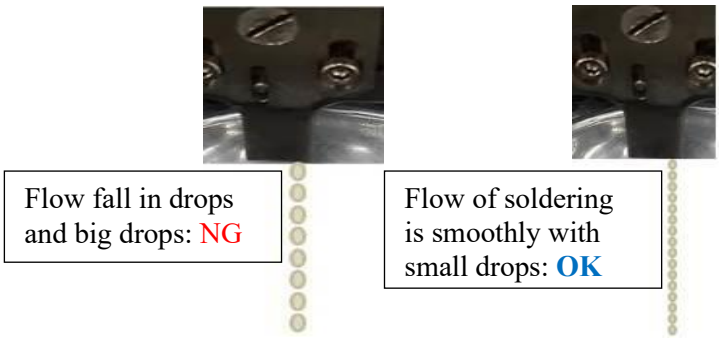
5.1. Process specification

a. Cerrocast condition

Parameter	Unit	Value	Remark
Air pressure	psi	30 ~ 50	
Temperature	°C	235~ 245	
Warm up time	s	12	Reference for setting PLC
Inject time	s	2~3	Reference for setting PLC
Warm after injection	s	10	Reference for setting PLC
Solder material	-	Tin-silver-bismuth solders (Alloy IND 58BI42SN SHOT)	

b. Verifying condition of Cerrocast machine daily

- Solder flow:

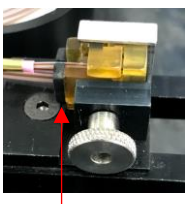


- Inject solder to cerrocast tube

+ Criteria:

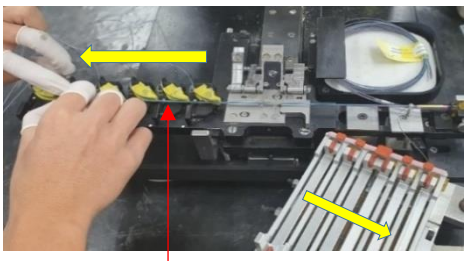
c. Operation step

- Set Fau holder into machine and check the gap

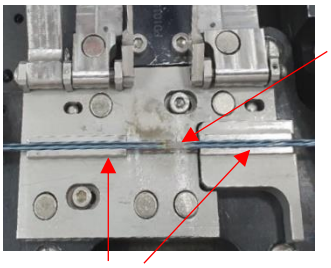


- Set fiber on nest jig: always keep fiber straight and a little tension until clamp fiber

DO NOT let bare fiber touch together



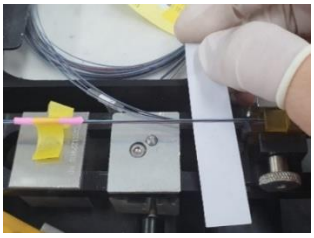
Fiber clamp



Fiber slot

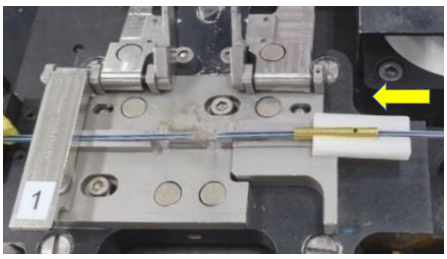
- Check bare fiber area

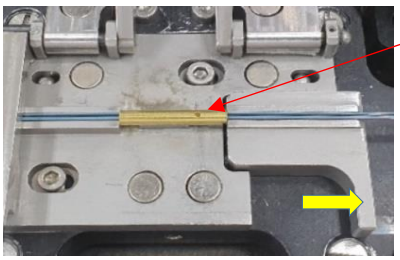
- Check fiber order: paper is at horizontal



- Set Cerrocast: cerrocast hole is up center

DO NOT let cerrocast touch to bare fiber





- Cover cerrocast by aluminum sheet

- Tenson fiber again

- Check injection hole, clean if dirty

- Inject soldering

- Check appearance

+ Solder fullfil

No solder: **NG**

+ Solder not over flow > 2 mm both tube end

Over flow > 2mm

5.2. Process condition

Items	Condition
Cerrocast hole, position, stripping point	CCD camera
Soldering	Cerrocast machine
Appearance of Cerrocast	CCD camera, template

6. Leak inspection

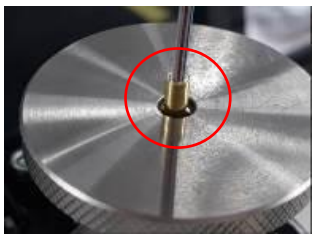
6.1. Process specification

Refer 4-OP-0404 for diagram and condition of Leak check.

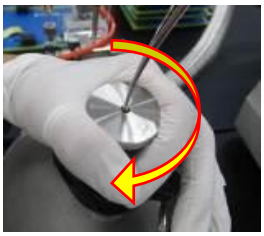
a. Leak check

- Fiber appearance on 2 sides of cerrocast by microscope with magnification 40X: No damage. No peel off, no abnormality.
- Insert product into chamber with hole of cerrocast over surface:





- Tighten screw by hand, do not tighten too strong, it will make damage cerrocast and cause inspection not correct



- Winding the fiber and close the chamber door.

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- Inject Heli at the end of cerrocast tube by leak system

- Take product out of chamber after inspection

7. Encapsulation

7.1. Process specification

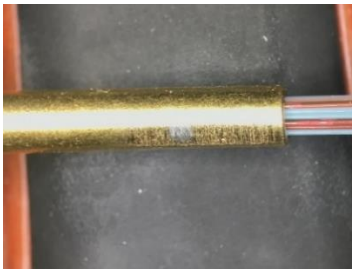
Remove solder (can apply auto machine or manual method)

- Grind solder overflow at cerrocast hole
  Manual method:



Auto machine:





- Check fiber appearance both side around 10 mm from cerrocast tube

- Apply RTV3410 adhesive

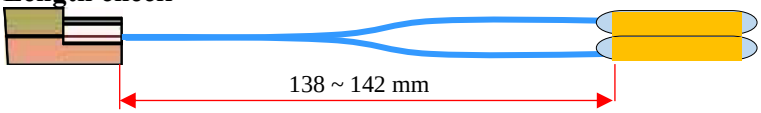
+ Position: on both side of cerrocast tube ~ 2 mm
+ Drying time: 30min

- Curing

+ Time: 1.5 hour
+ Temperature: 85 ± 5 oC

- Check appearance adhesive after curing

Length check



7.2. Process condition

Items	Condition
Solder remove	Holder, jig, auto machine, tool/ auto machine
Adhesive curing condition	Oven, timer
Appearance checking	Microscope
Length check	Template

8. O/E Cap Cleaning

8.1. Process specification

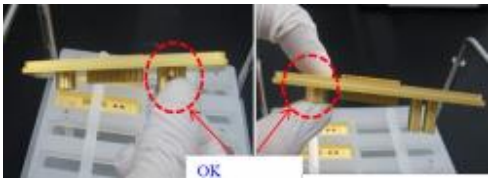
- Preparation cleaning solution

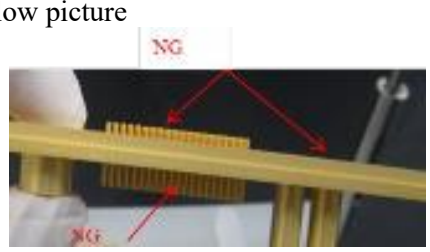
+ Mixing ratio: 6 (l) DI water: 120 (ml) Citranox
+ Reuse cleaning solution: 3 times

- Clean by ultrasonic

+ Put OE cap to jig and immerse jig into ultrasonic with cleaning solution

Note: The position can hold by hand as below picture





+ Cleaning condition:
    - Frequency: 37 kHz
    - Time: 20 min

- Clean solution on OE cap by DI water

- Dry OE cap by Nitro air
- Store OE cap in Nitro Cabinet with Silicagel

8.2. Process condition

Items	Condition
Cleaning	Ultrasonic, Nitro air, cleaning solution
Store condition	≤ 10% RH, Humidity recorder, Nitro cabinet

9. Part insertion

- Refer to 4-OP-0392.

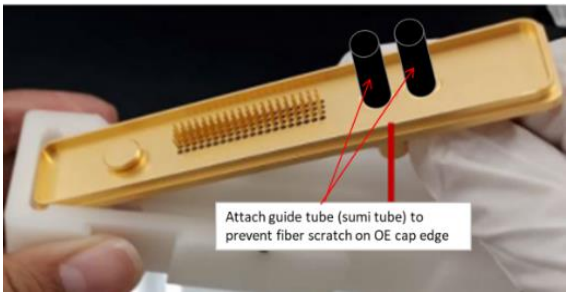
10. Branching & Mapping

10.1. Process specification

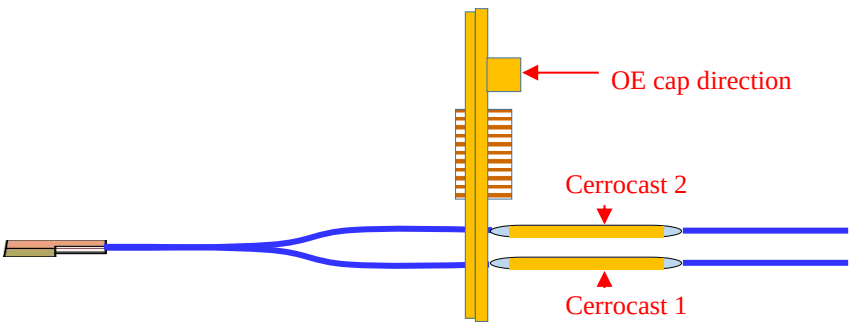
Step	HE-1321-004$004	HE-1321-001$005	HE-1321-023$003	HE-1321-024$005
OE cap insertion	O	O	O	O
Insert IRRAXRTUBE, Sumi tube	-	O	O	O
Marking	O	O	O	O
Branching LC fiber	O	O	O	O
Cut LC fiber	-	-	-	O
Insert LC label and hytrel tube	O	O	O	O
Cut MT fiber	O	O	O	-
Gathering Ribbon	-	O	O	O
Heat Sumi tube	-	O	O	O
Insert Yellow tube	-	O	O	O
Branching MT fiber	O	O	O	O
Insert Yellow tube	O	-	-	-
Mapping MT fiber	O	O	O	O
Cut MT fiber	O	-	-	-

a. O/E Cap insertion

- Apply temporary sumi tube on OE cap hole to prevent fiber damage



- Define cerrocast group, then insert to OE cap by using O/E anti-reverse jig: position of cerrocast 1, 2 follow direction of OE cap



- Check cerrocast tube 1, 2 with OE cap direction after inserting

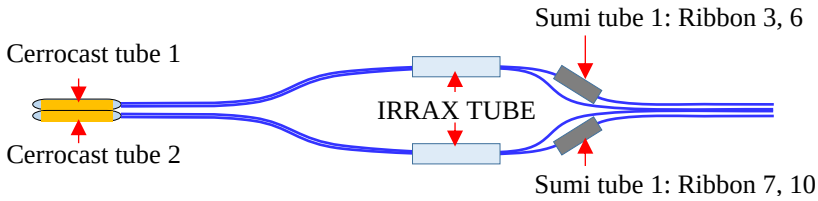
- Put O/E Cap into O/E box with silica gel

b. Insert IRRAXRTUBE and Sumi tube

Insert IRRAX TUBE, sumi tube, separate single fiber:

Spec		HE-1321-001$005 HE-1321-023$003 HE-1321-024$005	HE-1321-004$004
Length	Sumi tube IRRAX tube Silicon tube	25mm±2mm 25 ±5mm 12.5 ±2.5mm	N/A N/A 12.5 ±2.5mm

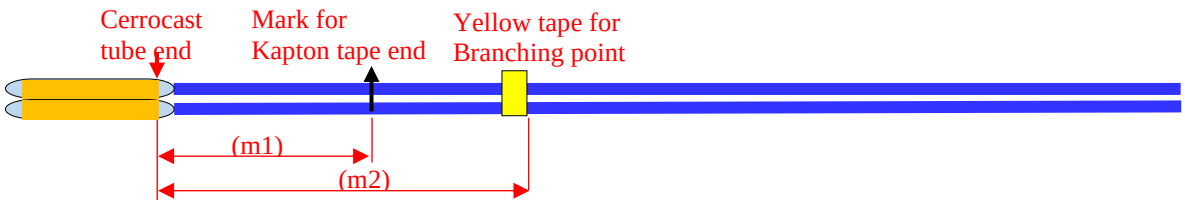
❖ ***For all product (except Trillian Shuffle Assy):***



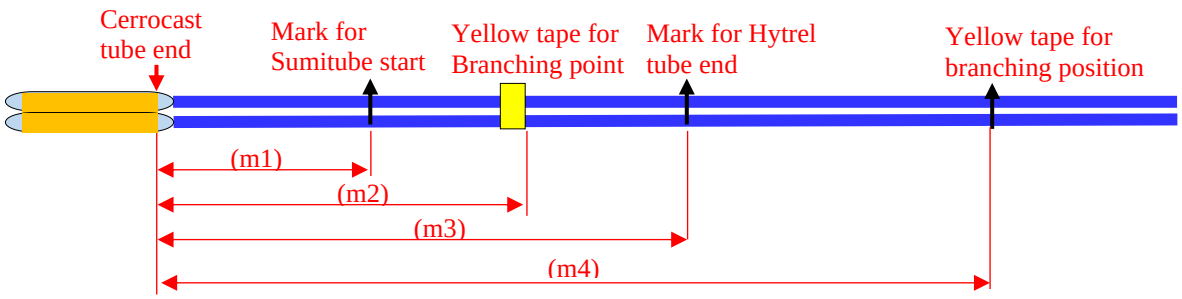
c. Marking

Position (mm)	Tolerance (mm)	HE-1321-004$004	HE-1321-001$005	HE-1321-023$003	HE-1321-024$005
Mark for Kapton tape end (m1)	± 10	300	-	-	-
Mark for Sumitube start (m1)	± 2	-	358	358	288
Yellow tape for Branching point (m2)		341	368	368	298
Mark for hytrel tube end (m3)		-	376	376	306
Yellow tape for branching position (m4)		-	740	740	1165

❖ **For product apply Kapton tape**



❖ **For product apply Sumi tube**



d. Branching LC fiber

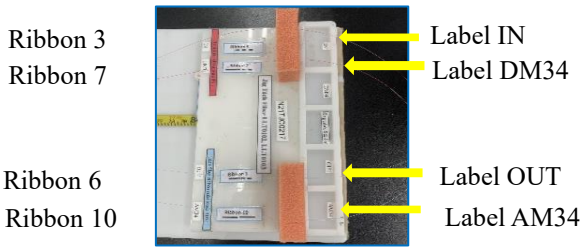
- Separate single fiber for LC connector

Spec	HE-1321-004$004			HE-1321-001$005 HE-1321-023$003 HE-1321-024$005		
Fiber LC	LC label	Ribbon No	Fiber color	LC label	Ribbon No	Fiber color
	C1 Add	3	Red	DM34	7	Red
	C2 Add	7	Red	AM34	10	Aqua
	Loading	9	Aqua	IN	3	Red
	C1 Drop	6	Aqua	OUT	6	Aqua
	C2 Drop	10	Aqua			

e. Insert LC Label

❖ ***For all products (except Trillian Shuffle Assy):***

Put 4 labels that attached on the silicon tube on the jig: IN, DM34, OUT, AM34



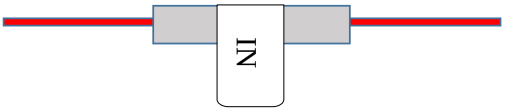
+ Insert fiber one by one with label IN, DM34 for red fiber color. Label OUT, AM34 with aqua fiber

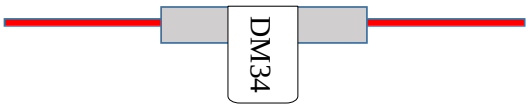
Red fiber- Label IN, DM34

Aqua fiber- Label OUT, AM34

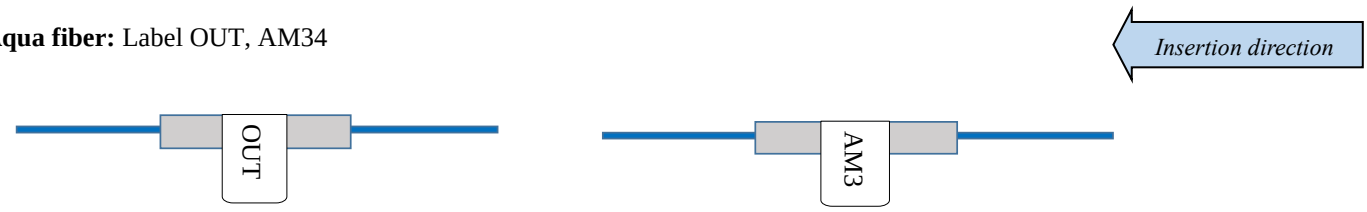
Red fiber: Label IN, DM34

Insertion direction





Aqua fiber: Label OUT, AM34



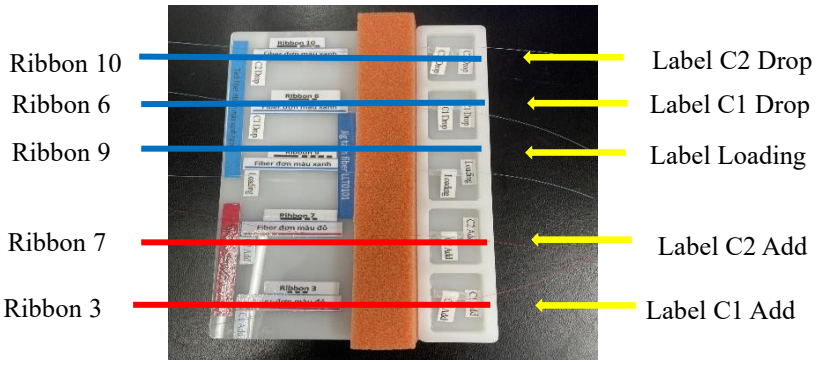
+ Check label on fiber compliance with label on jig. IN-IN, DM34-DM34, OUT-OUT, AM34-AM34

❖ ***For Trillian Shuffle Assy:***

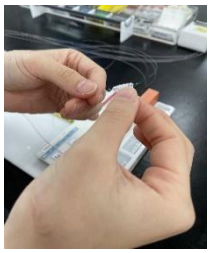
a. Take one aqua fiber of ribbon 10, take one aqua fiber of ribbon 6 and take one aqua fiber of ribbon 9 put into the jig

Take one red fiber of ribbon 7, take one red fiber of ribbon 3 put into the jig

+ Put 5 labels that attached on the silicon tube on the jig: C2 Drop, C1 Drop, Loading, C2 Add, C1 Add



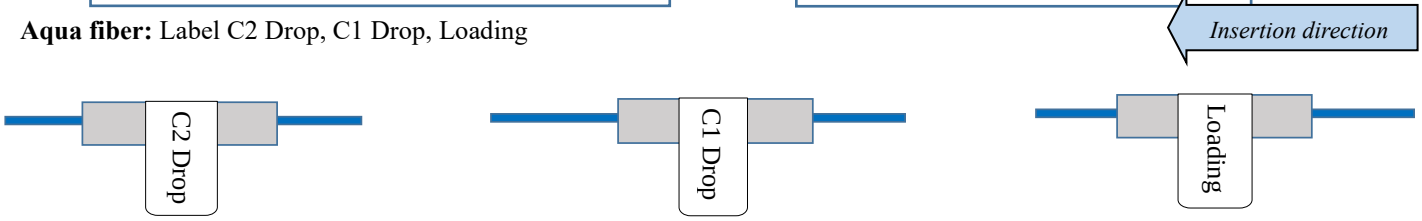
+ Insert fiber one by one with label C2 Drop, C1 Drop, Loading for aqua fiber color. Label C2 Add, C1 Add with red fiber



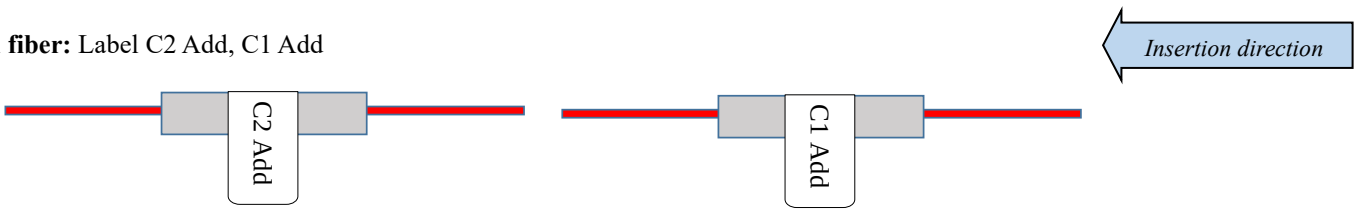
Aqua fiber- Label C2 Drop, C1 Drop, Loading

Red fiber- Label C2 Add, C1 Add

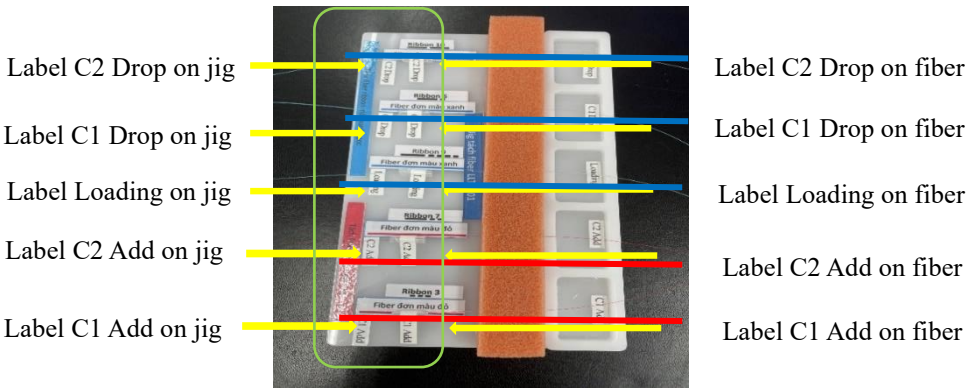
Aqua fiber: Label C2 Drop, C1 Drop, Loading



Red fiber: Label C2 Add, C1 Add

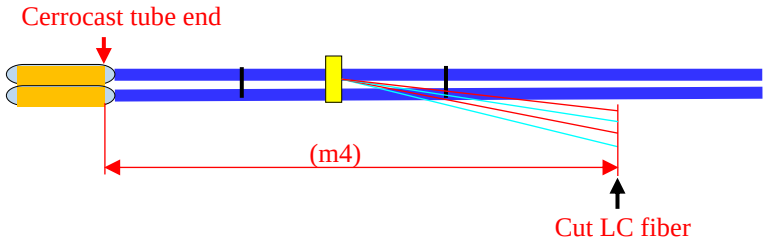


Check label on fiber compliance with label on jig. C2 Drop- C2 Drop , C1 Drop- C1 Drop, Loading- Loading; C1 Add- C1 Add, C2 Add- C2 Add



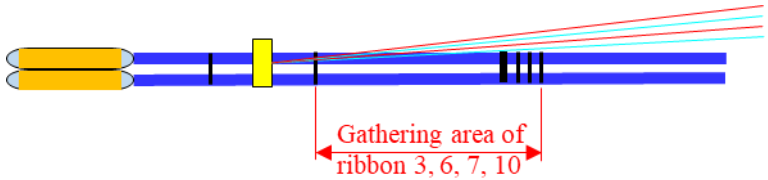
f. Cut LC fiber

Position (mm)	Tolerant (mm)	HE-1321-004$004	HE-1321-001$005	HE-1321-023$003	HE-1321-024$005
Cut for LC fiber (m4)	± 2	-	-	-	887



g. Gathering ribbon (*except Trillian Shuffle Assy)*

- Apply FAA-03A adhesive on ribbon 3, 7, 6, 10 from mark for hytrel tube end to mark for ribbon group
- Adhesive drying: around 3 minutes

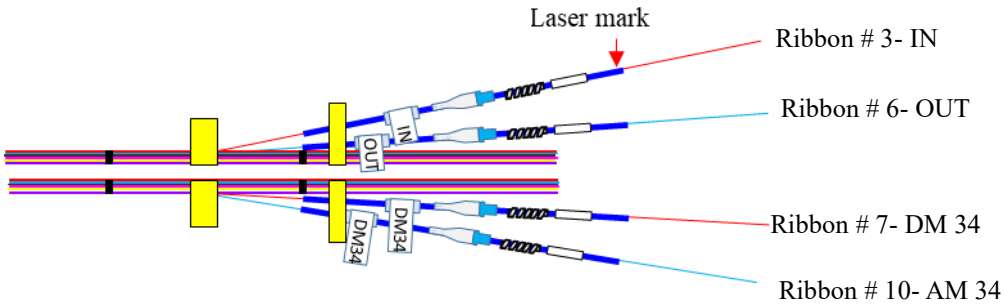


h. Insert hytrel tube

❖ ***For all product (except Trillian Shuffle Assy):***

- Insert hytrel tubes with housing part into two fibers of ribbon 3 with label IN, ribbon 6 with label OUT. Laser mark on hytrel tube toward to fiber end

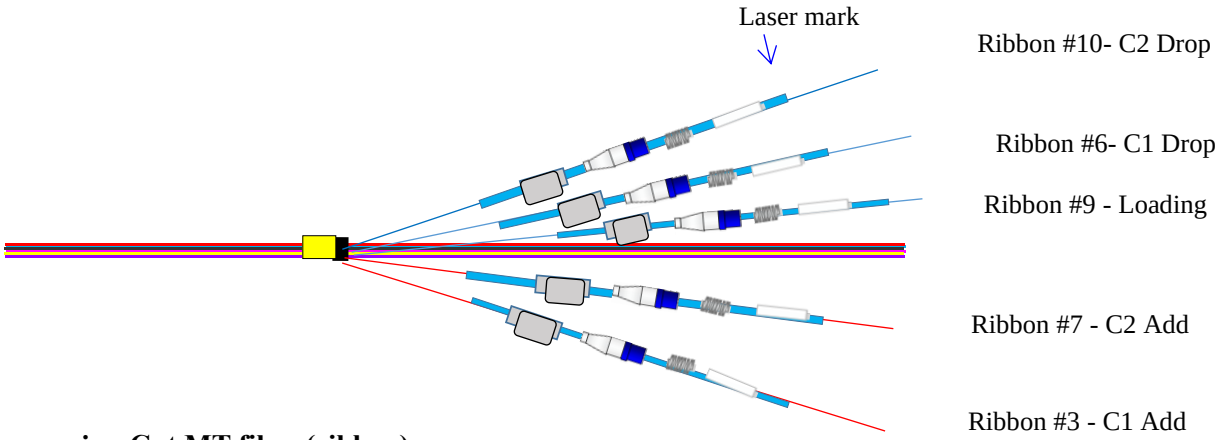
- Insert hytrel tubes with housing part into two fibers of ribbon 7 with label DM34, ribbon 10 with label AM34. Laser mark on hytrel tube toward to fiber end



❖ ***For Trillian Shuffle Assy:***

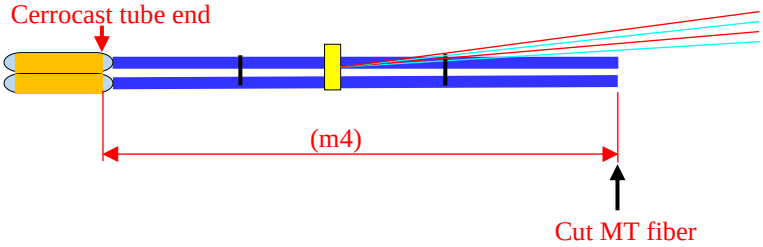
- Insert hytrel tubes with housing part into three fibers of ribbon 10 with label C2 Drop, ribbon 6 with label C1 Drop, ribbon 9 with label Loading .Laser mark on hytrel tube toward to fiber end

- Isert hytrel tubes with housing part into two fibers of ribbon 7 with label C2 Add, ribbon 3 with label C1 Add. Laser mark on hytrel tube toward to fiber end



i. Cut MT fiber (ribbon)

Position (mm)	Tolerant (mm)	HE-1321-004$004	HE-1321-001$005	HE-1321-023$003	HE-1321-024$005
Cut for MT fiber (m4)	± 2	900	820	820	-

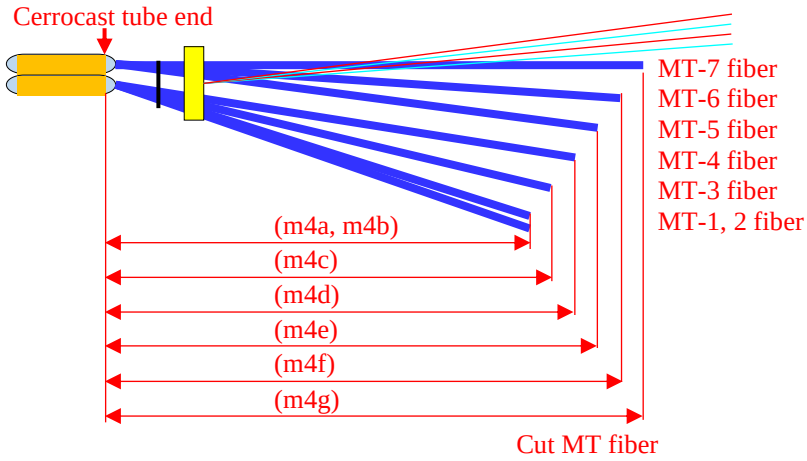


* Separate sing fiber, length ~ 150 mm which was cut from ribbon to use for mapping step

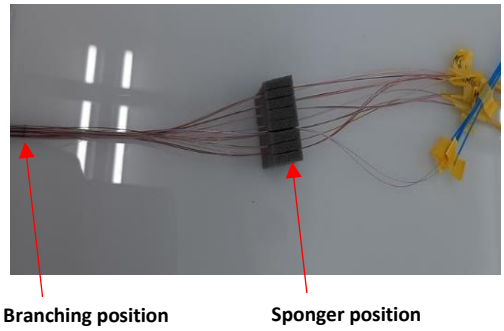
❖ ***For Trillian Shuffle Assy:***

Position (mm)	Tolerant (mm)	HE-1321-004$004
Cut for MT-1 fiber (m4a)	± 2	710
Cut for MT-2 fiber (m4b)		710
Cut for MT-3 fiber (m4c)		720

Cut for MT-4 fiber (m4d)		740
Cut for MT-5 fiber (m4e)		760
Cut for MT-6 fiber (m4f)		770
Check for MT-7 fiber (m4g)		790

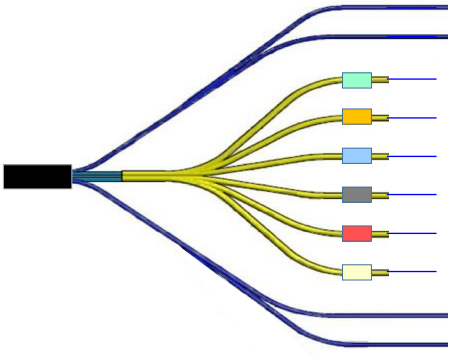


- Attach the Kapton tape:
- Insert fiber MT group into sponger



j. Insert Yellow tube

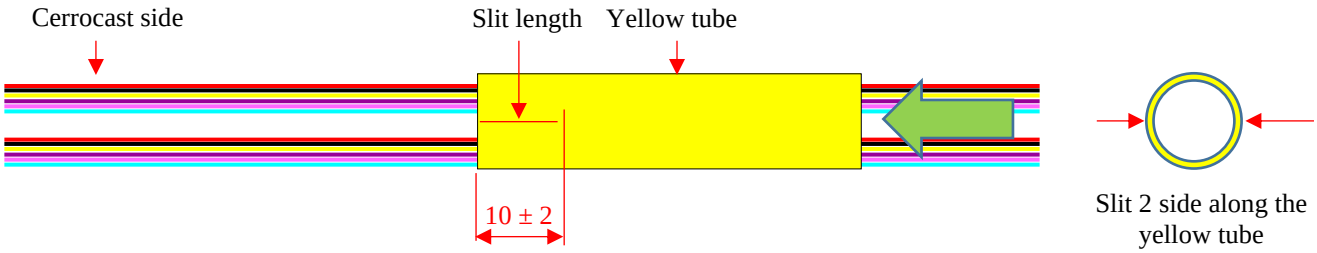
- Slit yellow tube ~ 10mm
- Attach identify tube on yellow tube
- Insert yellow tube with identify tube follow mark on ribbon
- Apply yellow tape follow mark position for branching.



MT group	Ribbon No.	Mark on ribbon	Identify tube
1	7, 10		Green
2	1, 4		Orange
3	8, 11		Blue
4	2, 5		Black
5	9, 12		Red
6	3, 6		Beige

❖ ***For Trillian Shuffle Assy:***

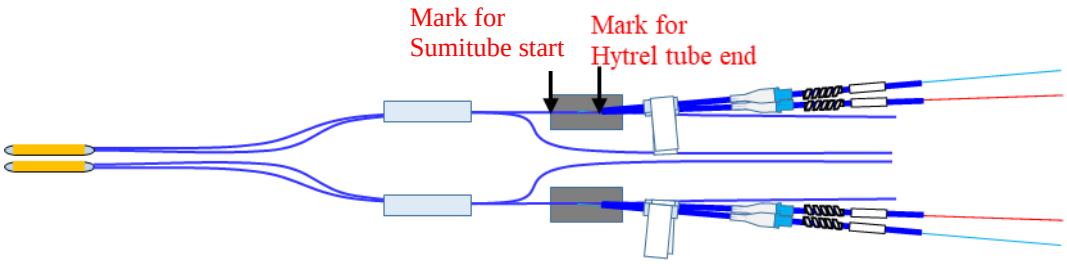
MT group	Ribbon No.	Identify tube	
1	3, 1, 4, 12		Green
2	9, 7, 10, 6		Orange
3	2, 1, 4, 5		Blue
4	9, 8, 7, 11		Black
5	2, 8, 11, 5		Red
6	9, 8, 5, 6		Grey
7	3, 2, 12		Aqua



k. Heat Sumi tube

❖ ***For all product (except Trillian Shuffle Assy):***

- Adjust sumitube and hytrel tube to mark
- Heat sumitube: condition depend on heater machine



- Check Sumitube and hytrel tube appearance after heating

+ Sumitube close to hytrel tube
+ Sumitube and hytrel tube not melting

10.2. Process condition

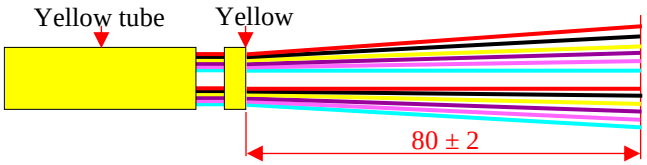
Items	Condition
O/E Cap insertion	Jig
Mark, branching	Ruler, Jig
Sumitube heating	Heater
Mapping	Jig, CCD camera, Template

11. Gathering

11.1. Process specification

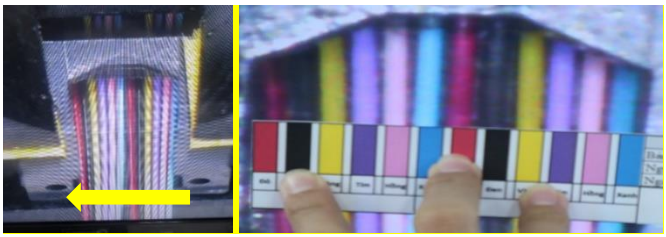
a. Branching MT fiber

- Separate Ribbon to fiber



b. Mapping MT fiber

- Arrange fiber into dummy MT follow product specification
- For MT group use dummy fiber, use single fiber with length ~ 150 mm
- Check fiber order on MT group

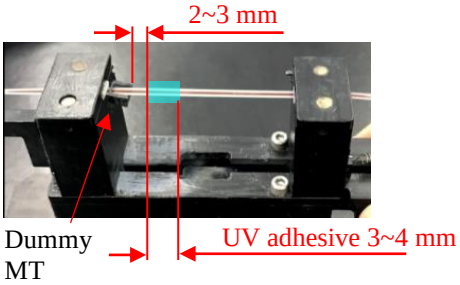


c. Apply adhesive to fiber

Set ribbon on jig: ribbon end at same level A

Ribbon end at top of jig as picture

- Keep fiber straight and close both clamp
- Apply Threebond UV adhesive



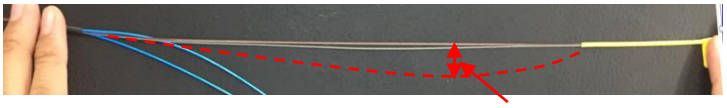
d. **Curing adhesive on fiber**

+ Power: 60±10 mW/cm2
+ Time: 150 s

- Check appearance:

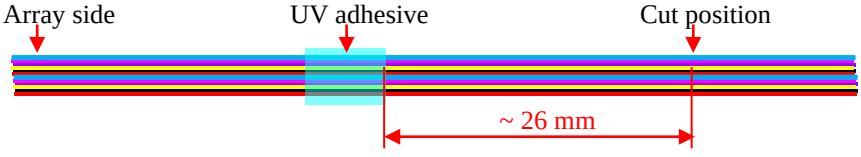
+ Adhesive dry completely (by visual)
+ No fiber damage around adhesive area

- Check fiber bend



Fiber bent width ≤ 5mm: OK

- Cut fiber from adhesive



11.2. Process condition

Items	Condition
Gathering	MT dummy, jig, template, CCD camera
Three-bond adhesive curing	UV curing machine
Appearance check	Visual

12. Ferrule assembly

12.1. Process specification

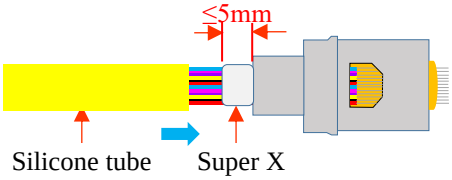
a. MT ferrule assembly

- MT ferrule assembly Refer 4-OP-0398

+ Insert direction of fiber and MT follow product spec

- Fix silicone yellow tube before Epotek curing 2nd time

+ Super X apply at both ribbon side



+ Amount enough to prevent flow out when push tube touch MT boot

Super X lower than boot body: OK

Super X flow over boot body: NG

+ Check tube appearance after Epotek curing

13. LC ferrule assembly

- Refer to 4-OP-524

14. Housing LC

- Refer to 4-OP-523

15. Polishing LC

- Refer to: 4-OP-0397 for LC End face
- Refer to: 4-OP-526 for LC Polishing
- Interferometer spec: refer to PNJHA-0038-25-05C

16. Polishing MT

- Refer to 4-OP-571: MPO/MPX Polishing Condition
- Refer to 4-OP-584: MT Length measuring method
- Refer to: PNJHA-0038-40-52C for Interferometer
- Refer to 4-OP-0397 for MT End face

17. Housing MPO

- Appearance MT check: Refer to PNJHA-0038-26-02 (latest version) for App MT
- Refer to 4-OP-0393 for MPO Housing Assembly
- Check laser mark on MT to choose the correct coupling color for Housing

❖ ***For all product (except Trillian Shuffle Assy):***

- Mark content

MPO No.	Coupling color	Mark Content on MT
1	Green	MT1
2	Orange	MT2
3	Blue	MT3
4	Black	MT4
5	Red	MT5
6	Beige	MT6

For Trillian Shuffle Assy:

- Check laser mark on MT to choose the correct coupling color for Housing

MPO No.	Coupling color	Mark Content on MT	Content on Coupling
1	Green	FS1	FS1
2	Orange	FS2	FS2
3	Dark Blue	FS3	FS3
4	Black	FS4	FS4
5	Red	FS5	FS5
6	Beige	FS6	FS6
7	Light Blue	FS7	FS7

18. Length check

Process specification

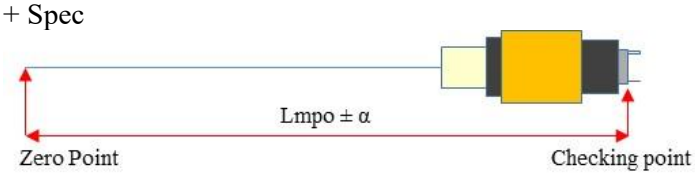
- Checking item and spec follow product spec

+ Length from end of cerrocast to MPO connector end, LC boot end
+ Length from tube to MPO connector end, LC boot end
+ Tube, tape position

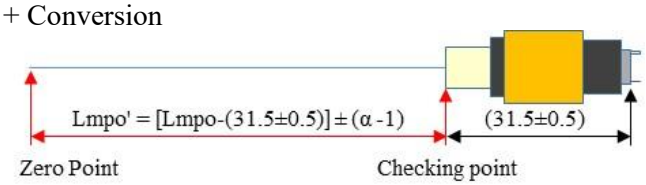
❖ Conversion method of change checking position from connector endface to connector end

- MPO side

+ Spec

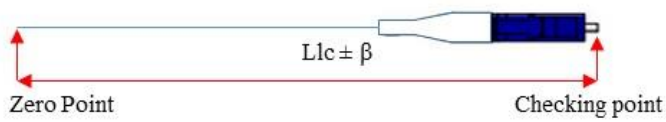


+ Conversion

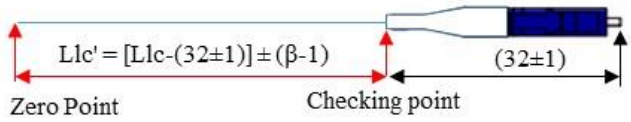


- LC side

+ Spec



+ Conversion



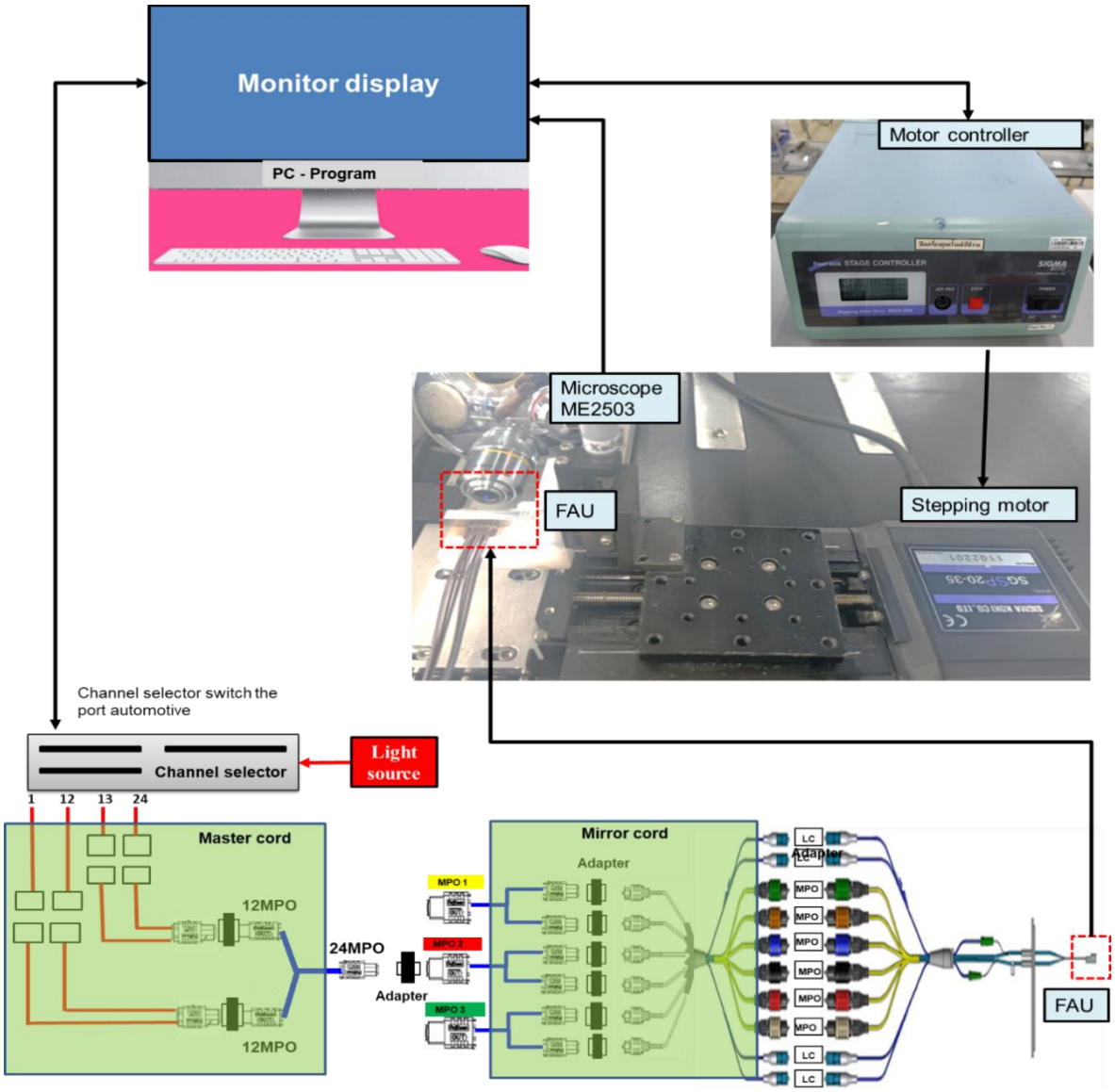
18.1. Process condition

Items	Condition
Length check	Ruler/ Jig
Tube, tape position	Jig

19. Identification check

19.1. Process specification

- Setup ident system and connector product with master cord to check fiber swap follow product specification
- Identification system configuration:



19.2. Process condition

Items	Condition
Fiber position	ID System & Mirror ID cord

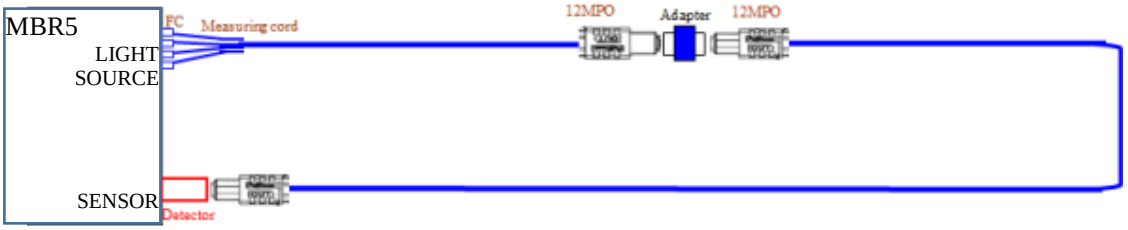
20. Loss inspection

20.1. Process specification

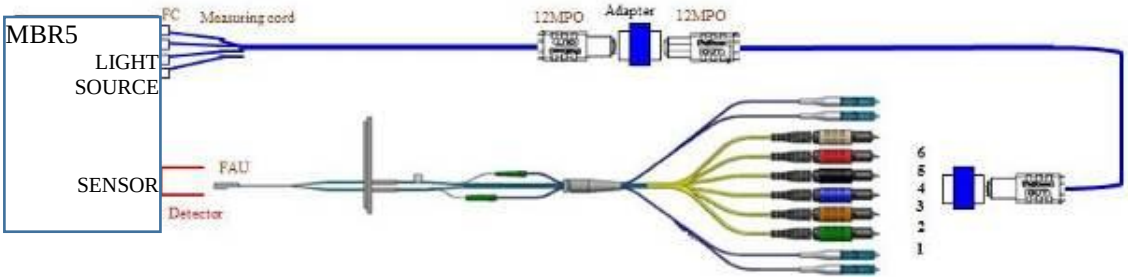
- Refer 4-OP-506 for Insertion Loss measurement.
- Judgement criteria refer to customer spec
- Before loss measurement, check fiber end face of:
  + MT product: refer 4-OP-0397
  + Master Connector
- Connecting diagram:

+ Loss MPO

* Set P0

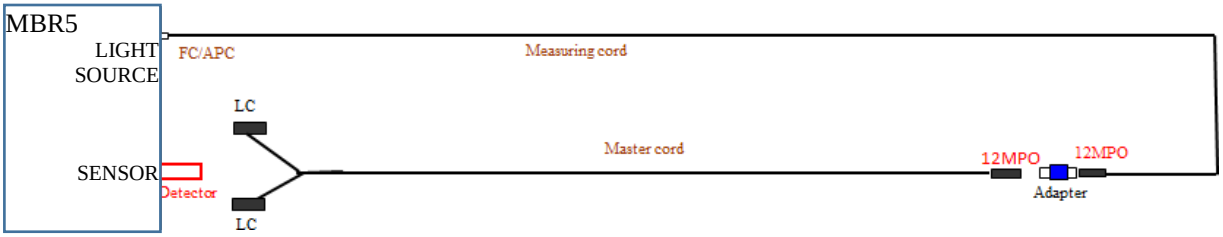


* Loss measurement

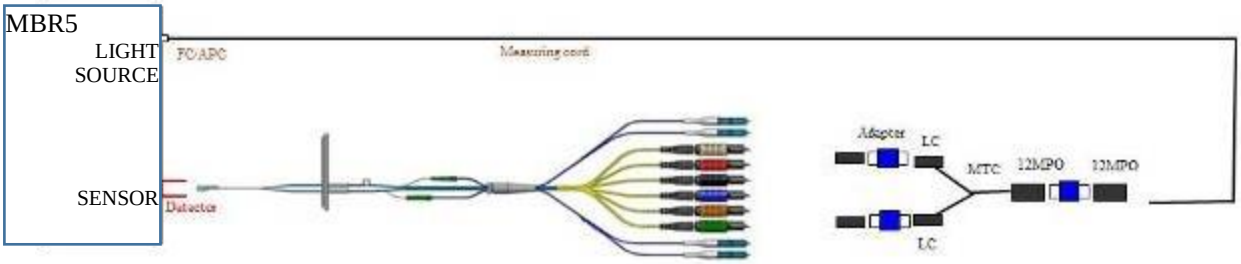


+ Loss LC

* Set P0



* Loss measurement:

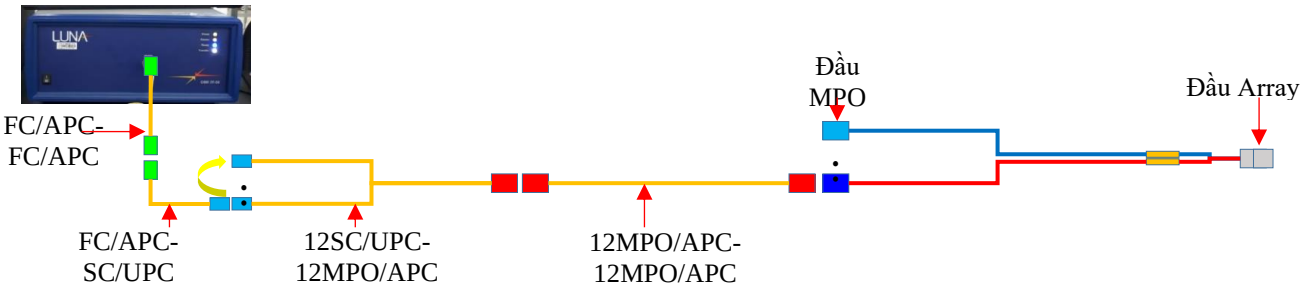


21. Reflectometer

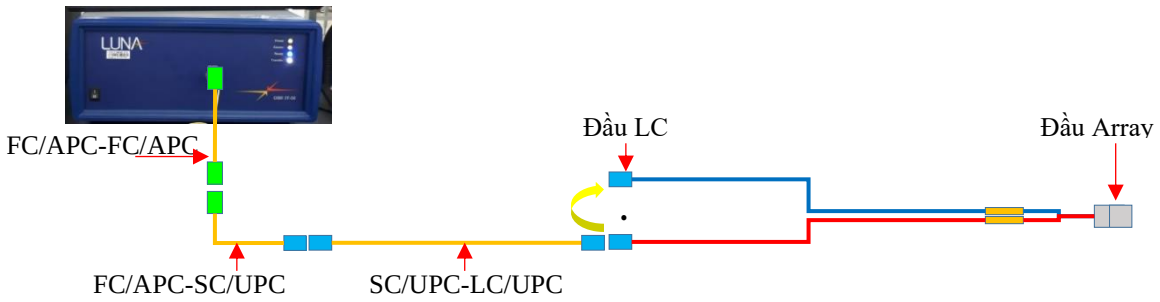
- Refer 4-OP-511

21.1. Process specification

- Check fiber break inside ferrule MT, LC, Cerrocast, Array and fiber outside ferrule
- Connection diagram



+ Checking from MPO to Array
+ Checking from LC to Array



22. PRD inspection

22.1 Process specification

- Fiber: No damage. No peel off, no abnormality
- Fiber thickness for rework product

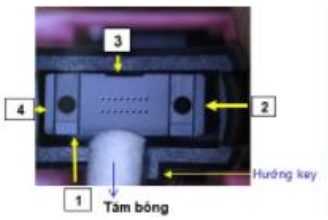
22.2 Process condition

Items	Condition
Appearance check	Microscope

23. QC Inspection 1

23.1 Process specification

- MT, LC ferrule appearance: PNJHA-0038-40-25 (Latest version)
- Pin MT appearance: have pin, no broken, no damage
- MT ferrule movement: use cotton swab gently push off the four side of the ferrule



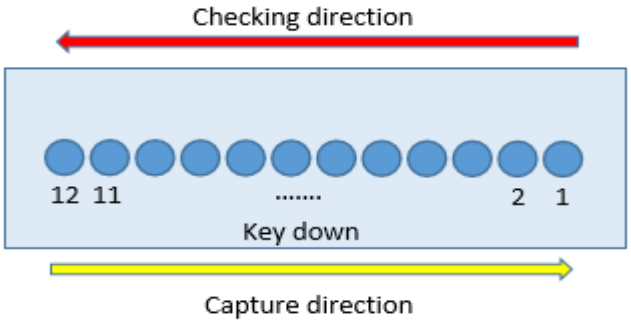
- Check quality of spring: MPO coupling must be hit by the magnet jig both left and right side and without failing down

23.2 Process condition

Items	Condition
MT, LC ferrule appearance	Microscope, Visual
Pin MT appearance	Visual
Check quality of spring	Magnet jig

24. QC Final endface

- Final end face LC refer: PNJHA-0038-40-63 (Latest version)
- Final and face MT refer: PNJHA-0038-40-64 (Latest version)
- The order checking and taking pictures of MT is as follows: Checking end face MT form core 1-> core 12,



after finish checking -> take a picture follow opposite direction core 12-> core 1

- Use cap after cleaning

25. QC Inspection 2

25.1. Process specification

- Length check 1pc/ID: follow product spec
- Checking item and criteria follow product spec:

+ Fiber: No damage. No peel off, no abnormality
+ FAU: PNJHE-1321-22-03(Latest version)
+ O/E Cap: PNJHE-1321-22-01(Latest version)
+ Check fiber direction with O/E cap: no swap
+ Outside connector appearance: color, content label (only HE-1321-004$***) and appearance stick on connector side

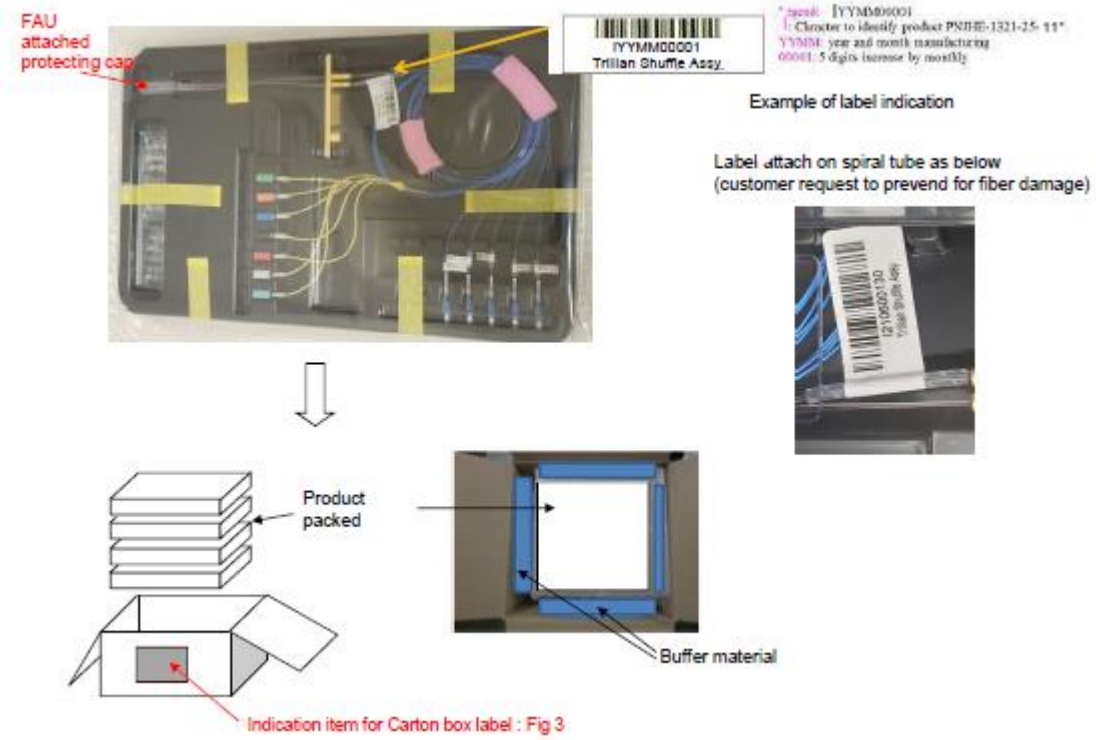
25.2. Process condition

Items	Condition
Length check	Ruler
Appearance check	Microscope, Visual
Fiber direction with O/E cap	Jig
Environment	Clean booth

26. Packing

26.1. Process specification

- Attach label on spiral tube
- Packing product into tray, put 10 silica gel bags per tray 30
- Keep fiber by sponge
- Fix cover and body tray by yellow tape
- Put tray into PE bag and seal the mouth of the bag
- Put product packed into inner box



26.2. Process condition

Items	Condition
Products Quantity/box	Label fixing java soft
Label content, label position, direction, appearance	Visual
Quantity of Label, Product Name, Carton box size	Visual
Quantity of silica gel bag	Jig
Packing product	Manual

30

27. Shipping

- Shall be provided (send with products) to customer by using Electronic test data in Excel format (send by Email) within shipping day.
- Product type & Specification number: the specific product type and Specification number will be recorded.
- Serial number and Optical Data: Serial number and Optical data of each product shall be recorded in test report.
- Refer to Purchase Specification of this product for more detail

REVISION HISTORY

Preparing date	Person	Version	Description		Reason	Requester
			Old content	New content		
27-Sep-24	HangVT	30	26. Packing 26.1 Process specification Packing product into tray. 26.2 Process condition -Item: Product Name, content label Carton box size -	26. Packing 26.1 Process specification Packing product into tray, put 10 silica gel bags per tray 26.2 Process condition -Label content, label position, direction, appearance Quantity of Label, Product Name, Carton box size Item: Quantity of silica gel bag, Control: Jig	Correction	DucTNM
12-Aug-2024	DienDC	29	6. Leak inspection a Leak check -None	6. Leak inspection a Leak check -Fiber appearance on 2 sides of cerrocast by microscope with magnification 40X	Correction internal audit finding	ChienPH
8-May-2024	Dien DC	28	II. Application -None VI.Content 1.Cutting 1.1 Process specification - Laser mark on hytrel tubes: condition depend on laser machine performance 1.2 Process condition -Laser mark 2. Laser marking - None 3.FAU preparation 3.1 Process specification a. Marking and cut fiber - Mark and cut position - Mark symbol one by one fiber tape based on label no b. Set product on jig - Set FAU holder into alignment jig + Screw to lock holder * Rework for Ribbon matrix peel off + Use cotton swab with alcohol to remove the ribbon matrix	II. Application -Process table VI.Content 1Cutting & Aging 1.1 Process specification - Remove 1.2 Process condition -Remove 2. Laser marking - Laser marking on MT ferrule, coupling 3.FAU preparation 3.1 Process specification a.Marking and cut fiber - Mark symbol one by one fiber tape based on label no - Mark and cut position b. Set product on jig - Set FAU holder into prepare jig + Clamp to lock holder * Rework for Ribbon matrix peel off + Use bamboo swab with alcohol to remove the ribbon matrix + Cover by adhesive over peel off area ~ 10 mm both side	Follow 0-PR-001-0-TEM-0008 Correction Correction Correction Correction Correction	ChienPH

			+ Cover by adhesive over ribbon matrix ~ 10 mm both side 3.2.Process condition + Appearance check + Mark and cut	3.2.Process condition + Mark + Cut + Fiber order + Epoxy curing dry (Rework) + Fiber appearance	Correction	
			4. FAU Stripping 4.2.Process condition + Ribbon setting + Fiber Stripping	4. FAU Stripping 4.2.Process condition + Fiber ribbon order + Array direction + Stripping point appearance + Fiber pull force	Correction	
			6. Leak inspection 6.1b Length check 6.2 Process condition 6.3 Checking items	6. Leak inspection - Remove - Remove - Remove	Correction	
			7. Encapsulation 7.1 Process specification - Apply adhesive - Remove solder -None	7. Encapsulation 7.1 Process specification - Remove solder - Apply adhesive - Length check	Correction	
			7.2 Process condition - Adhesive curing temperature - Curing time - Appearance - Solder remove - None	7.2 Process condition - Adhesive curing condition -Remove - Appearance checking - Solder remove - Length check	Correction	
			10. Branching and mapping 10.1 Process specification b. Insert IRRAXRTUBE and Sumi tube - Sumi tube (HE-1321-004$004): 25mm+-2mm	10. Branching and mapping 10.1 Process specification b. Insert IRRAXRTUBE and Sumi tube - Sumi tube (HE-1321-004$004): N/A	Correction	
			11. Gathering 11.3 Checking items	11. Gathering - Remove	Follow 0-PR-001-0-TEM-0008	
			12. Ferrule assembly 12.1 Process specification - Laser mark	12. Ferrule assembly 12.1 Process specification - Remove	Correction	
			20. Loss inspection 20.1 Process specification - Refer 4-OP-507 20.2 Process condition	20. Loss inspection 20.1 Process specification - Remove - Remove	Document obsolete	
			21. Reflectometer - None 21.2 Process condition	21. Reflectometer - Refer 4-OP-511 - Remove 22. PRD inspection	Correction	

			22. PRD inspection 22.1 Process specification - None	22.1 Process specification - Fiber thickness for rework product	Correction	
21-Dec-23	PhuDT	27	III. Reference document Specification HE-1321-004$003 HE-1321-001$004 HE-1321-023$002 V. Content All Checking items V. Content Specification HE-1321-004$003 HE-1321-001$004 HE-1321-023$002 1. Cutting 1.1 Process specification - Cutting length HE-1321- 004$003 HE-1321-001$004 Hytrel tube 0.9 (blue): 567±2 (mm) HE-1321- 023$002 Hytrel tube 0.9 (blue): 615±2 (mm) 3.FAU preparation 3.1 Process specification a. Mark and cut fiber HE-1321- 004$003 HE-1321-001$004 HE-1321- 023$001 HE-1321- 024$004 10. Branching & Mapping 10.1 Process specification HE-1321-004$003 HE-1321-001$004 HE-1321- 023$002	III. Reference document Specification HE-1321-004$004 HE-1321-001$005 HE-1321-023$003 V. Traceability control VI. Content Specification HE-1321-004$004 HE-1321-001$005 HE-1321-023$003 1. Cutting 1.1 Process specification - Cutting length HE-1321- 004$004 HE-1321-001$005 Hytrel tube 0.9 (Natural): 570±2 (mm) HE-1321- 023$003 Hytrel tube 0.9 (Natural): 618±2 (mm) 3.FAU preparation 3.1 Process specification a. Mark and cut fiber HE-1321- 004$004 HE-1321-001$005 HE-1321- 023$003 HE-1321- 024$005 10. Branching & Mapping 10.1 Process specification HE-1321-004$004 HE-1321-001$005 HE-1321- 023$003	- Customer update specification Update new format : Follow 0-Pr-001-5-WI-0749-5-TEM-0001 Ver 4 - Customer update specification -Update cutting length for hytrel tube 0.9 and Customer update specification - Customer update specification	BanNT
21-Dec-23	PhuDT	27	a. O/E Cap insertion Define cerrocast group, then insert to OE cap: position of cerrocast 1, 2 follow direction of OE cap b. Insert IRRAXTUBE and Sumi tube Spec: HE-1321-004$003 HE-1321-001$004 HE-1321- 023$002	a. O/E Cap insertion Define cerrocast group, then insert to OE cap by using O/E anti reverse jig: position of cerrocast 1, 2 follow direction of OE cap b. Insert IRRAXTUBE and Sumi tube Spec: HE-1321-004$004 HE-1321-001$005 HE-1321- 023$003	- Update document and Apply combine Mapping jig and OE cap insertion jig u as 4M: 4-Pr-007-4-Fo-0007-4-RC-0018 - Customer update specification	BanNT

			c.Marking HE-1321-004$003 HE-1321-001$004 HE-1321- 023$002 d.Branching LC fiber HE-1321-004$003 HE-1321-001$004 HE-1321- 023$002 f. Cut LC fiber HE-1321-004$003 HE-1321-001$004 HE-1321- 023$002 i.Cut MT fiber (ribbon) HE-1321-004$003 HE-1321-001$004 HE-1321- 023$002 -For Trillian Shuffle Assy: HE-1321- 004$003 Cut	c.Marking HE-1321-004$004 HE-1321-001$005 HE-1321- 023$003 d.Branching LC fiber HE-1321-004$004 HE-1321-001$005 HE-1321- 023$003 f. Cut LC fiber HE-1321-004$004 HE-1321-001$005 HE-1321- 023$003 i.Cut MT fiber (ribbon) HE-1321-004$004 HE-1321-001$005 HE-1321- 023$003 -For Trillian Shuffle Assy: HE-1321- 004$004		
29-Sep-23	PhuDT	26	III. Reference document FMEA: 0-PR-012-0-FO-001-5-RC-0028 V. Content Item 7: Encapsulation -Remove solder Item 10:Branching & Mapping 10.1 Process specification a. O/E Cap insertion Put O/E Cap into Zip block bag with silica gel	III. Reference document - Remove V. Content Item 7: Encapsulation -Remove solder (can apply auto machine or manual method) Item 10:Branching & Mapping 10.1 Process specification a. O/E Cap insertion Put O/E Cap into O/E box with silica gel	Update Operation procedure follow new format Apply auto Cerrocast grinding machine as 4M: 4-Pr-007-4-Fo-0007-4-RC-0018 Document review	BanNT
07-Sep-23 13-Sep-23	PhuDT HangVT	25	V. Content Item 16: Polishing MT MT Endface: follow endface of product spec Item 20: Loss inspection 20.1 Process specification Before loss measurement, check fiber end face of Product and Master Connector 25. QC Inspection 2 Outside connector appearance: color, content label stick on connector side VI Record	V. Content Item 16: Polishing MT Refer to 4-OP-0397 for MT End face Item 20: Loss inspection 20.1 Process specification Before loss measurement, check fiber end face of : + MT product: refer 4-OP-0397 + Master Connector 25. QC Inspection 2 Outside connector appearance: color, content label (only HE-1321-004$***) and appearance stick on connector side Remove items VI	Document review Cancel check endface LC before Loss as 4M: 4-Pr-007-4-Fo-0007-4-RC-0041 Follow 4-Pr-0007-4-Fo-0007-9-RC-0068 Remove to QC Flow chart	BanNT DucTNM