I. Purpose

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

II. Application

- This operation procedure is applied for:

No.	Group
1	Normal MT ferrule assembly
2	Fuse MT ferrule assembly

This document concerns to Production function, Quality Assurance function.

III. Reference documents:

- 4-OP-500: Adhesive mixing

IV. Term definition:

- FOV: Fujikura Fiber Optics Vietnam Ltd.,

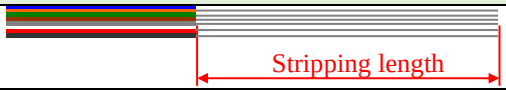
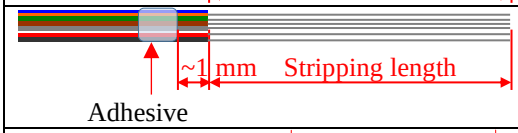
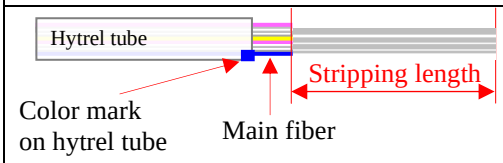
V. Content

1. Normal MT ferrule assembly

1.1 Process specifications

1.1.1 Fiber strip

- Stripping length
  Do not make fiber scratch or break fiber

Group	Stripping length (mm)	Photo
Normal MT	25 ~ 30	
Trillian		
Module		 - If spec requires Medome, insert hytrel tube to fiber firstly before stripping. - Marking color on hytrel tube same side with main fiber how to identify main fiber during insertion.

- Bare fiber life time: 1 hour

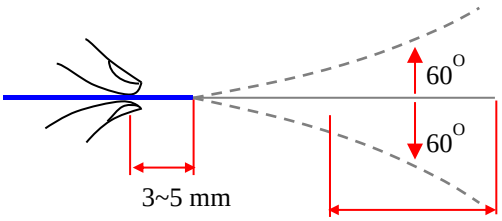
1.1.2 Cleaning

- Using dusper that was wet by alcohol >99.5% to clean.
- Cleaning time:

Group	Cleaning time	Dusper No.
Normal MT Trillian Module	1st cleaning: 1 keep fiber in 1 second then cleaning	1
	2nd cleaning: 3 ~ 5	2

1.1.3 Screening

- Keeping position: 3~5 from stripping point
- Screening time: 3 times in the 2 directions (up and down) at angle about 120^0
- Screening by finger

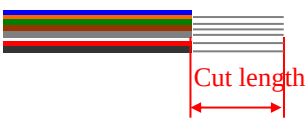


18~30 mm from stripping point
and out of using bare fiber

1.1.4 Cut bare fiber

- Cut length

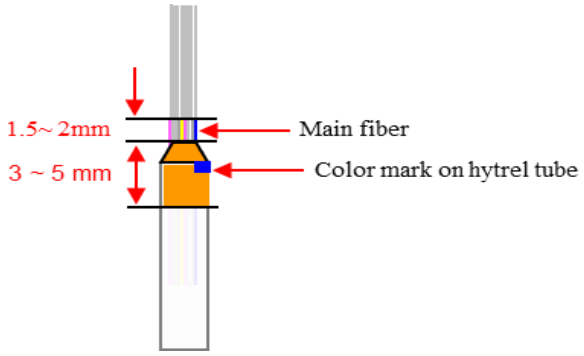
MT ferrule layer	Cut length (mm)	Group
1 layer	5 ± 1	Normal MT (MPO, Module)
2 layer	7 ± 1	
1 layer	7 ± 1	Trillian



- Clean bare fiber tip 1 times to remove fiber dusts
- Insert oval spring to fiber (for product has oval spring), do not touch oval spring to bare fiber

Oval spring

- After cut bare fiber, apply Medome for MT Module (if spec requires).
  + Apply Hi-super 5 length: 3 ~ 5 mm
  + UV fiber outside: 1.5 ~ 2mm
  + Main fiber must same side with blue mark on hytrel tube
  + Curing time for Medome: 10 mins in room temperature



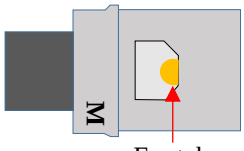
1.1.5 Insert MT boot (if spec require)

- MT boot is cleaned by air.

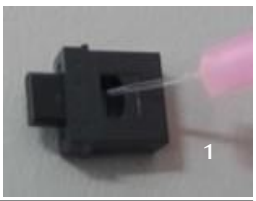
MT ferrule layer	Operation step	Photo
1	Insert boot to ferrule until it meets completely.	
2	Insert boot to fiber	

1.1.6 Epotek injection

- Prepare Epo-tek353ND: refer 4-OP-500
  Epotek pot life after mixing: 1.5 hour
- Apply a little Epotek into MT window (V- groove), amount of Epotek full fill all V-groove as figure 1 but not over flow window



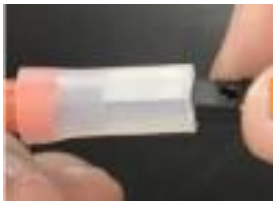
Epotek



OK: adhesive fulfill on v-groove

NG: Lack of adhesive on V-groove

- Vacuum up adhesive and fill it in hole. After fill up, confirm that adhesive is able to see end of MT ferrule's tip.



- Clean the ferrule surface if Epotek is present after applying the Epotek.
- Check epotek appearance

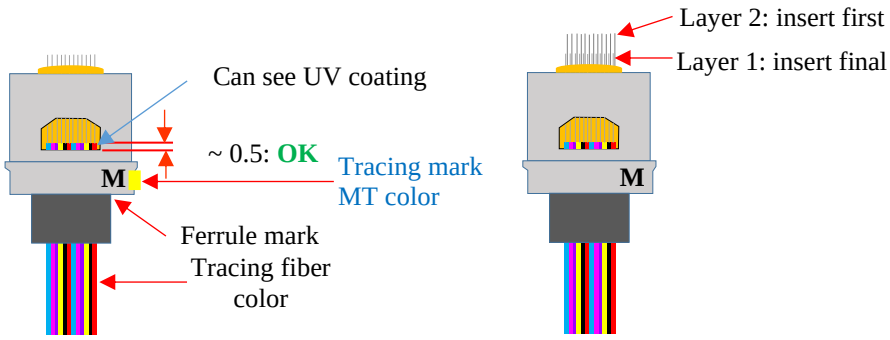
OK

NG: lack of adhesive

NG: Adhesive flow into pinhole

1.1.7 Insert fiber

- Depend on product specification; insert fiber direction follow tracing fiber color and ferrule mark and tracing mark MT color (green, yellow...)
- For MT ferrule multi-layer, insert ribbon group at the bottom layer first
  * Do not rotate ferrule and/or fiber. If feel hard, do not use that ferrule.
  * Don't make fiber bending.
  * Don't keep bare fiber in the air for more than 60 minutes.
- Check no bubble inside MT window
- Stripping point: protrude about 0.5 mm in MT window.

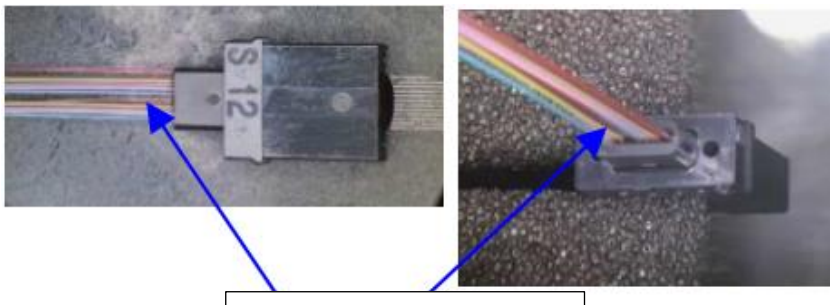


- After insertion, all fiber must come out the ferrule. If there is big difference in fiber length or no fiber comes out, fiber might broke inside ferrule. Stop using the ferrule.
- If fiber is broken during insertion, stop using the ferrule

1.1.8 Apply adhesive or matching gel

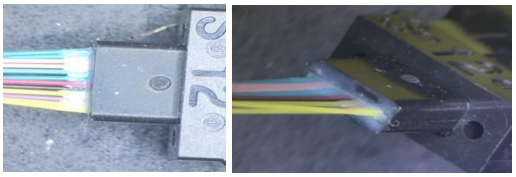
**** Apply super X at MT boot end (for Trillian product)***

- *Check UV adhesive no expose out MT boot before apply super X to let fiber move freely at the of MT boot*

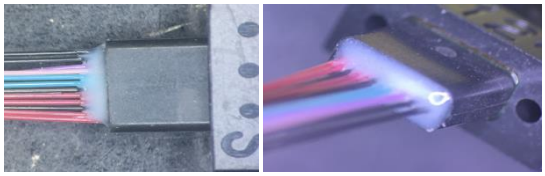


UV adhesive no expose out of MT boot

- Apply a thin layer of super X on MT boot end to prevent epotek flow out at boot end
- Do not apply too much super X. Do not have surplus super X on MT boot



OK



NG: thick adhesive

**** Apply matching gel (for 02 layers of MT Module product- others product not apply)***

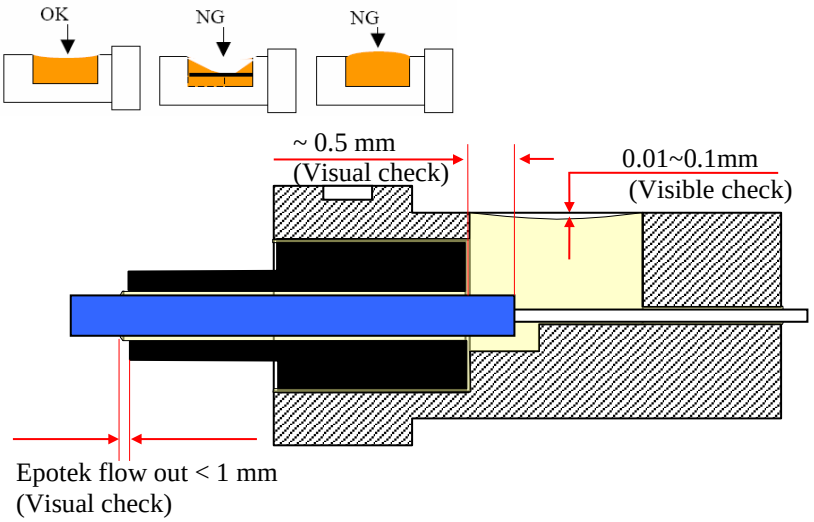
- Apply matching gel on fiber at boot end & between 2 layers of fiber ribbon8. It helps to prevent epotek overflow at boot end during heating.
- After curing time, cleaning matching gel by dusper wet with alcohol.

Apply SC107 to prevent epotek overflow

Cleaning matching gel

1.1.9 Epotek curing

- Put the ferrule into hot plate of heater (center of hot plate)
- Apply more epotek into MT window until full (but not over windows) and MT endface if lack of DO NOT touch toothpick on bare fiber during attach epotek



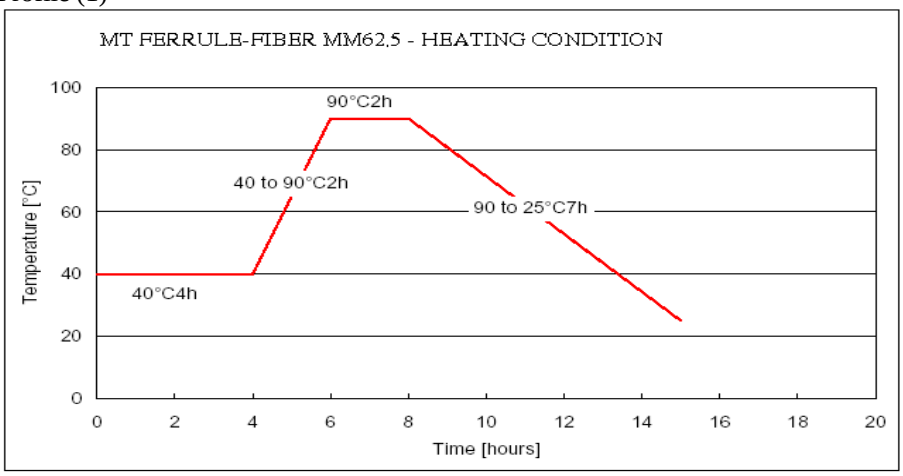
**** MPO, Trillian***

- 1st curing: 15 min @ $85^0C \pm 5^0C$.
- After 2-3min, check amount of epotek in window. If it is still full, then it is OK. If amount of epotek is reduced, re-apply epotek until full (but not over window)

- 2nd curing:

Group	Temperature (^0C)	Time (min)	Equipment
SM and MM50 fiber	$100^0C \pm 5$	At least 15	Heater
MM62.5 fiber	Profile (1)	Profile (1)	Chamber

Profile (1)



- After curing completed, take the ferrule out from heater and wait for 2-3min for the ferrule to cool down.

*** Module**

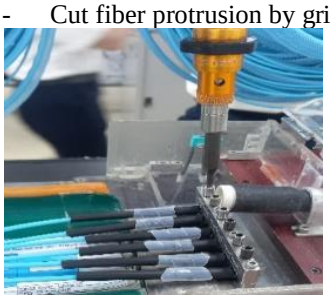
- For MT Module apply temperature at 100 ± 5°C during curing.

Group	Temperature (^{0}C)	Time (min)	Equipment
SM fiber	100^{0}C±5	At least 15	Heater

1.1.10 Cut surplus fiber

- Cut fiber protrusion by bar cutter. 

- Cut fiber protrusion by grinding machine.



Put MT into the holder and tighten by screw

Close the cover and cut fiber by drill machine.

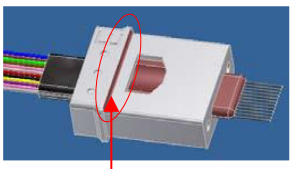
1.1.11 Appearance check

- Fiber bend

≤ 3^o: OK

- MT Windows: No epotek protruding from windows
- All MT surface: No epotek stick on
  Note: Epotek can be removed by razor

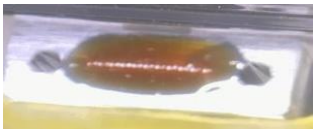
NG



NG

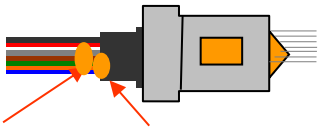
- Pin hole: no adhesive flow in

OK: no adhesive inside pinhole



NG: adhesive flow in pinhole

- Boot: No remain adhesive
- Fiber: adhesive < 1mm
- Air bubble inside MT window: > 1mm: NG

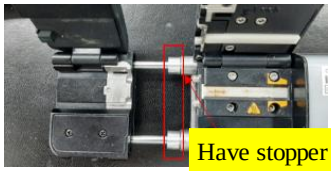


NG: Adhesive on fiber >1mm

NG: adhesive on boot

1.2 Process condition

- Stripper type

UV coat OD	Cladding OD (mm)	Stripper	Remark
250	125	HJS-02, RS-03 	MPO, Module
160	80	RS03-80  Have stopper	Trillian product

Apply suitable fiber holder to keep fiber firmly and not damage during strip

- Cleaver type

Cladding OD (mm)	Cleaver	Cleaning solution
125	CT-30, CT-100, CT-50	Alcohol > 99.5%
80	CT-38	Alcohol > 99.5%

Items	Condition
Epotek injection	Vacuum pump
Epotek Heating	Heater
Cut fiber protrusion	Bar cutter or grinding machine
Adhesive check	Microscope

Apply adhesive to window of MT ferrule	Yarn tool

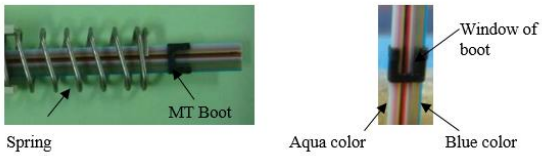
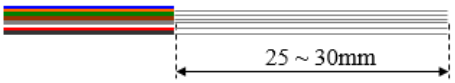
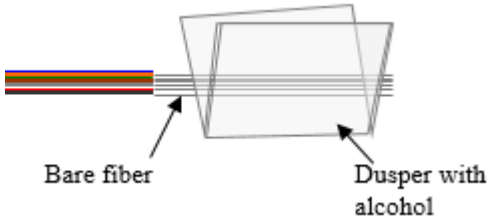
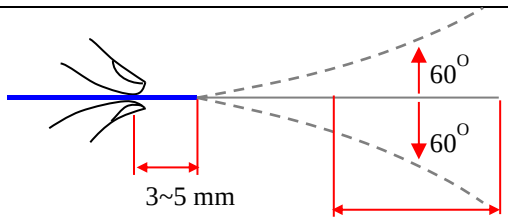
1.3 Checking Items:

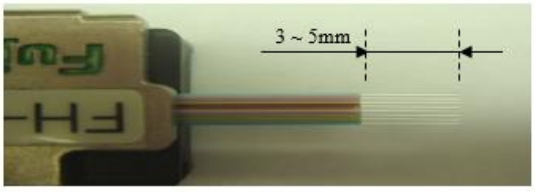
Type of record	Items	Record
Quality control items	Refer to relating QC Flow Chart	Check sheet: Related check sheet
Identification & trace ability record	Operator name, operation date Product number Ferrule lot No. Epotek 353ND mixing lot number Stripper registration number	

2. Fuse MT ferrule assembly:

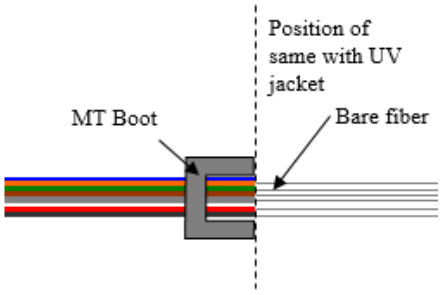
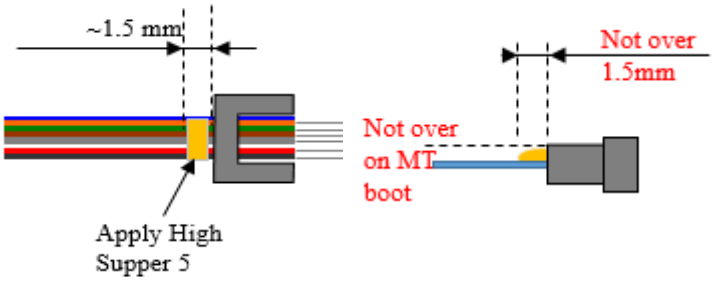
* Process condition:

2.1. Strip and cleaving fiber

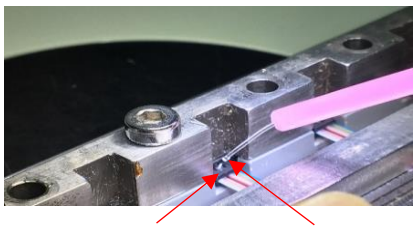
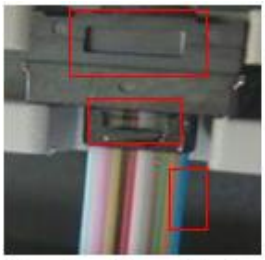
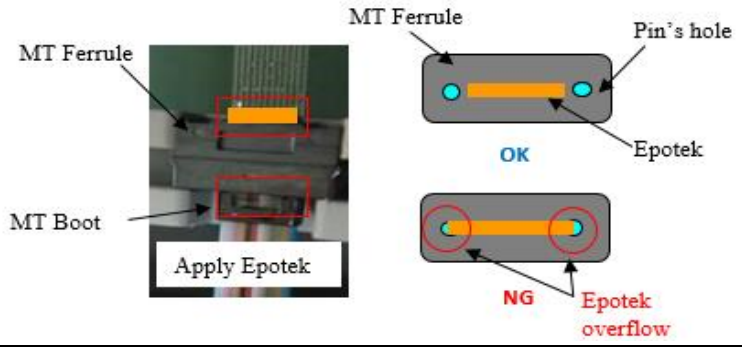
No	Operation Step	Process condition	Photo reference
2.1.1	Part preparation	+ Enough parts and correct direction + Blue fiber direction must be right side when boot window up.	
2.1.2	Stripping	+ Use fiber holder FH-50-12 to clamp ribbon fiber + Use hot stripper HJS-02 to strip fiber (Should be stripped immediately after green light of hot stripper is on) + Stripping length 25~30mm + Keep fiber clean before insert into ferrule + Hanging bare fiber carefully on hanger + Keep bare fiber less than 1 hour	
2.1.3	Cleaning	Wipe fiber by wet dusper with alcohol 3-5 times (Not to use dusper more than 1 ribbon)	
2.1.4	Screening	+ Screening : 60 degree x (up and down) in 3 times + Screening by finger.	 18~30 mm from stripping point and out of using bare fiber

2.1.5	Cleaving	+ Using Cleaver CT-30 or CT-50 for cutting (bare fiber length 5±0.5 mm from stripping point)	

2.2. Apply hi-super 5 adhesive

No	Operation Step	Process condition	Photo reference
2.2.1	Assembly MT Boot	Correct position of MT boot	
2.2.2	Apply adhesive	Apply hi super 5 at the boot end, (over flow <=1.5mm) *Refer 4-OP-500 for method of mixing adhesive Hi-super 5.*	

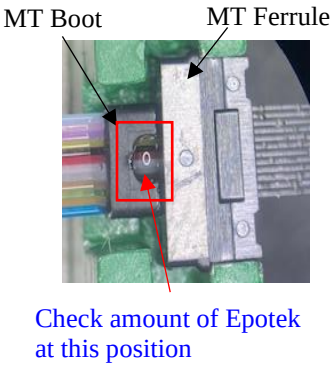
2.3. Insert fiber into MT ferrule

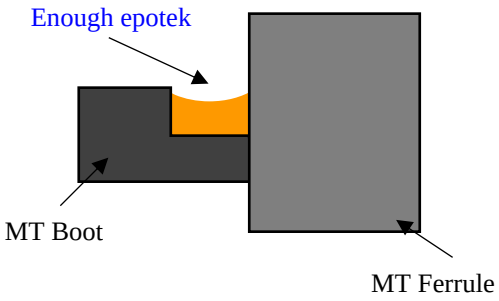
No	Operation Step	Process condition	Photo reference
2.3.1	Apply adhesive into MT ferrule	Apply Epotek into MT ferrule (under microscope) Checking amount of Epotek enough and fulfill V-groove and not over flow MT ferrule	
2.3.2	Insert fiber into MT ferrule	+ Wipe the fiber tip before insert fiber into MT + There is no damage on the fiber before insertion. + Tracer fiber (blue) must on the right side when MT window & MT boot up. + Check Gap between MT boot and ferrule: No gap is OK, gap is NG.	 Check position of boot and ferrule and color of fiber. Must be correct this position  Place ferrule onto heating Jig and tighten 5 screws Put the Lid on ribbon fiber
2.3.3	Apply adhesive	+ Fill epotek into MT window until see the epotek overflow on the ferrule tip Note: Not allow to overflow to the pin's hole.	

2.4. Heating

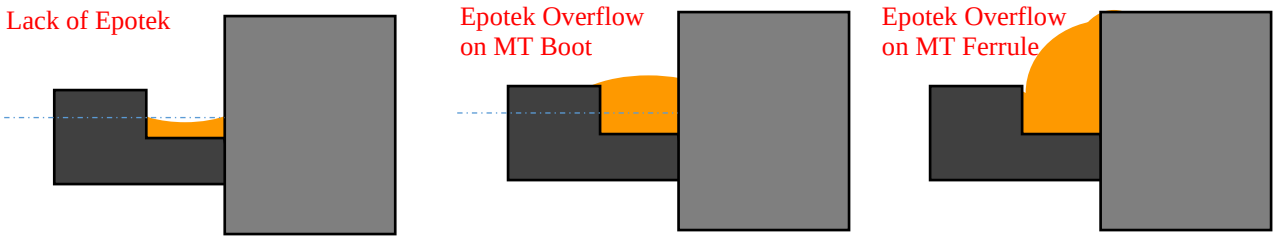
No	Product Type	Process condition	Remark
1	SM product	Heating condition for fiber ribbon SM: Apply 2 step on hotplate + Step 1: Temperature: 800C ± 5 & Heating time : 20 minutes + Step 2: Temperature: 1000C ± 5 & Heating time: 15 minutes	
2	MM product (GI50)	Heating condition for fiber ribbon GI50: Apply 2 step on hotplate + Step 1: Temperature: 600C ± 5 & Heating time : 60 minutes + Step 2: Temperature: 1000C ± 5 & Heating time : 30 minutes	
3	MM product (GI62.5)	Heating condition for fiber ribbon GI62.5: Apply 4 steps on Chamber machine + Step 1: Temperature: 400C & Heating time : 4 hours + Step 2: Temperature: 400C up to 900C & Heating time: 2 hours + Step 3: Temperature: 900C & Heating time : 2 hours + Step 4: Temperature: 900C down to room temperature & Heating time : 7 hours (Heating Jig: Should be used special heating jig for MPO ferrule)	

- Check adhesive overflow on window boot after heating





Note: Epotek must not lack of or overflow on MT boot and not overflow on the MT ferrule as bellow picture



2.5. Cut surplus fiber

Check MT Ferrule after cutting is not scratch

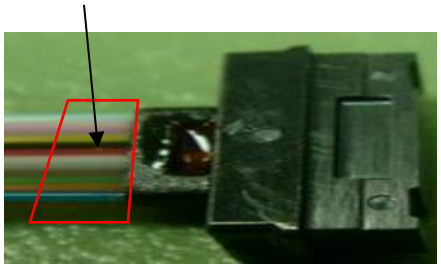
GOOD
MT Ferrule has not any damage after cutting fiber protrusion

NOGOOD
MT Ferrule has damage after cutting fiber protrusion

2.6. Check appearance

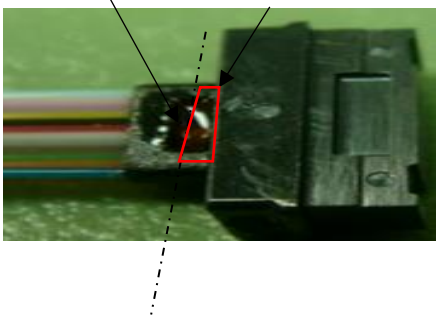
Check, UV fiber is not scratch; peel-off and app MT attach epotek.
If MT attached epotek, OP remove it by razor.

UV Fiber must not scratch



Allow air bubble at this area

Not allow air bubble at this area



* Quality control item

Quality control items	Record
-Material's name & Code -Lot no -Appearance -Manufacturing date -OP code	E-CS

VI. Record

- Identification, storage, protection, retrieval, retention time & disposition of these records refer to 0-Pr-004 (Control of Records).
- Note: Nonconforming product, material shall be identified & controlled according to relevant procedures 9-Pr-008 (Control of Nonconforming).

REVISION HISTORY

Date	Person	Ver	Description		Reason	Requester
			Old contents	New contents		
22 Aug-2024	TienCTC	7	Item 1.1.10 Cut surplus fiber	Item 1.1.10 Cut surplus fiber Add: Cut fiber protrusion by grinding machine	Update cut fiber protrusion by grinding machine	TienDT
25 Aug 23	Khiem B	6	-Ver 5	-Ver 6	-Correction document No.	BanNT
10 Aug 23	Khiem B	5	-N/A	-Ver 5	Mistake issue wrong document No.	BanNT
29 Dec-22	Ngan NLT	4	1.2. Process condition -N/A	1.2. Process condition -Apply adhesive to window of MT ferrule by yarn tool	Follow 4M change: 4-Pr-007-4-Fo-0007-4-RC-0063.	BanNT
10 Aug-22	Duong NLT	3	1. Normal MT ferrule assembly 1.2. Process condition -N/A	1. Normal MT ferrule assembly 1.2. Process condition -Add stopper for Stripper of Trillian product.	Reduce risk fiber miss alignment when Stripping.	BanNT