OPERATION PROCEDURE FOR COMBINER UNIT

OPERATION PROCEDURE: 4-OP-0505	Version: 04	Page: 1/31

I. Purpose:

This operation procedure is used for setting up the manufacturing processes for Combiner Unit

II. Application:

The content of operation procedure is applied to Combiner Unit and its sub-parts in Fujikura Fiber Optics Vietnam Ltd.

No.	Process
1	Cutting
2	Marking
3	Fiber stripping
4	Cleaning & Etching
5	Reinforcement
6	Temperature & Transmittance inspection
7	CMS final inspection (End sub parts)
8*	Final inspection (For Sub part)
9*	Casing and Packing (Inner packing) (For Sub part)
10*	Carton packing (For Sub part)
11*	Shipping (For Sub part)
12	Assembly water cooling plate
13	Cooling inspection
14	Assembly CMS to cooling water plate
15	Final inspection
16	Carton packing (Inner and outer packing)
17	Test report & Shipping

04

Note: " * ": Applied to Sub part will be shipped.

This operation procedure concerns to Production (PRD), Production engineering (PRE), Quality Assurance (QA), Planning (PLN) and Logistic (LOG).

Checked by: Dao Ngoc Trung Date : *(follow DMS)*	Approved by: Division Manager Date: (*follow DMS)*
Prepared by: TungDD - 10745 Date: Oct 10th , 2024	Originator: TungDD - 10745 Date: Jan 17th, 2024

III. Reference Documents:

- 4-QC-0505: QC flow chart of Combiner Unit

Table III.1 Product application information

No.	Purchase specification	Product name	QC flow chart	Remarks
1	SPC3-10707	CUC-CMSU Assy(T100)	4-QC-0505	
2		CUC-CMSU Assy(T100)		
3		CUC-CMSU Assy(T50)		
4		CUC-CMSU Assy(D50)		
5	SPC3-10708	CMBU-CMS(T100)		
6	SPC3-10709	CMBU-CMS(D100)		
7	SPC3-10708	CMBU-CMS(T50)		
8	SPC3-10709	CMBU-CMS(D50)		

Table III.2 General specifications 04

No.	Purchase specification	Specification category	Product application	Remarks
1	SPC3-10714	Packing (CMBU)	CUC-CMSU Assy(T100) CUC-CMSU Assy(D100) CUC-CMSU Assy(T50) CUC-CMSU Assy(D50)	
2	SPC3-10717	Packing (CMS)	CMBU-CMS(T100) CMBU-CMS(D100) CMBU-CMS(T50) CMBU-CMS(D50)	
3	SPC3-10718	Visual inspection	CUC-CMSU Assy(T100) CUC-CMSU Assy(D100) CUC-CMSU Assy(T50) CUC-CMSU Assy(D50) CMBU-CMS(T100) CMBU-CMS(D100) CMBU-CMS(T50) CMBU-CMS(D50)	
4	SPC3-10719	Visual inspection	CUC-CMSU Assy(T100) CUC-CMSU Assy(D100) CUC-CMSU Assy(T50) CUC-CMSU Assy(D50) CMBU-CMS(T100) CMBU-CMS(D100) CMBU-CMS(T50) CMBU-CMS(D50)	
5	SPC3-10720	Deliverable data	CUC-CMSU Assy(T100) CUC-CMSU Assy(D100) CUC-CMSU Assy(T50) CUC-CMSU Assy(D50) CMBU-CMS(T100) CMBU-CMS(D100) CMBU-CMS(T50) CMBU-CMS(D50)	

6	SPC3-10690	Outsourcing Specifications_Appearance Inspection Standards (Mechanical Parts)	CUC-CMSU Assy(T100) CUC-CMSU Assy(D100) CUC-CMSU Assy(T50) CUC-CMSU Assy(D50) CMBU-CMS(T100) CMBU-CMS(D100) CMBU-CMS(T50) CMBU-CMS(D50)	
7	SPC3-10740	Guidelines for the Management of Chemical Substances Contained in Products For FOV	CUC-CMSU Assy(T100) CUC-CMSU Assy(D100) CUC-CMSU Assy(T50) CUC-CMSU Assy(D50) CMBU-CMS(T100) CMBU-CMS(D100) CMBU-CMS(T50) CMBU-CMS(D50)	

Table III.3 Working direction and Working instruction list

No.	Working direction/Working instruction	Application description	Process
1	PSB78-8013-31	CMBU-CMS Quartz Material Acceptance Inspection Standards	Incoming inspection

IV. Term definition:

FOV: Fujikura Fiber Optics Viet Nam
OCAP: Out of Control Action Plan
SIC: Section In Charge
FCU: Fiber Laser Combiner Unit
CMS: Clad Mode Stripper

V. Traceability control:

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

Type of record	Items	Record
Quality control items	Refer to: QC Flow chart of Combiner Unit 4-QC-0505	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:

1. Cutting

1.1 Process specification

Items	Specification
Fiber length	Triple type-CMS123 - L = 9000 mm. Acceptable tolerance: +/- 50mm Double type-CMS13 - L = 8000 mm. Acceptable tolerance: +/- 50mm

1.2 Process condition

Items	Conditions
Fiber length	Template
Fiber cutting	Manual

2.Marking

2.1 Process specification

Items	Specification
Marking color Marking position Marking order	- Marking UV coat stripping position: Red marking - Limited mark: Violet marking - See Fig 2.1 and 2.2 for position of each CMS type
Fiber winding diameter	≥ 100mm

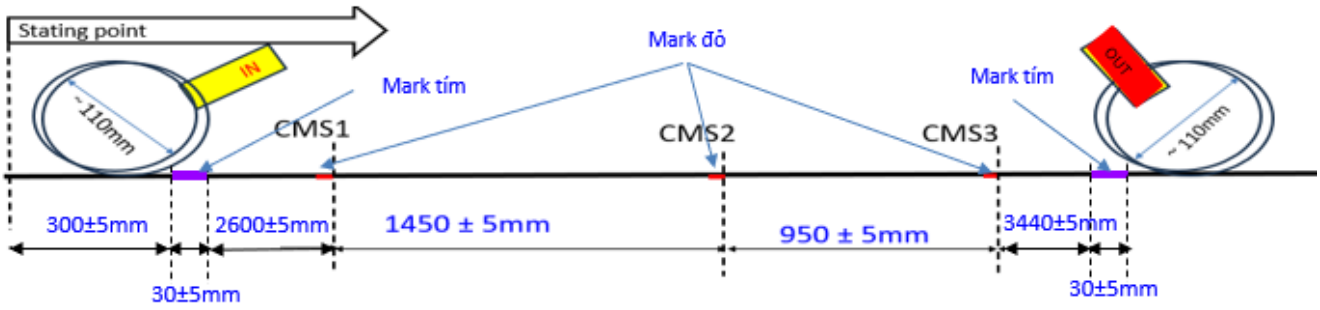


Figure 2.1 Marking for CMS123

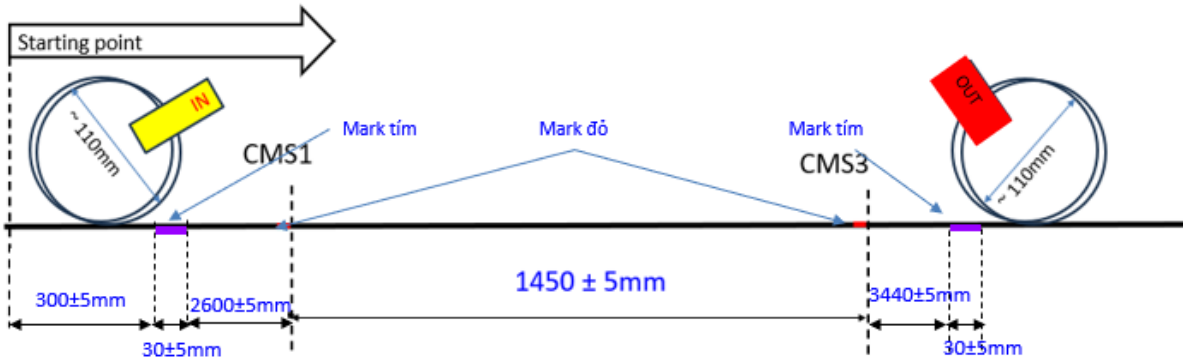


Figure 2.2 Marking for CMS13

2.2 Process condition

Items	Conditions
Marking	Art line Marking pen
Identify CMS	Write information on fushigi tape
Fiber winding	Winding tool

3. Fiber stripping

3.1 Process specification

Items	Specification
UV coat removing	Removing length: 170.0 +/- 5mm. Refer Fig 3.1 and 3.2 for detail

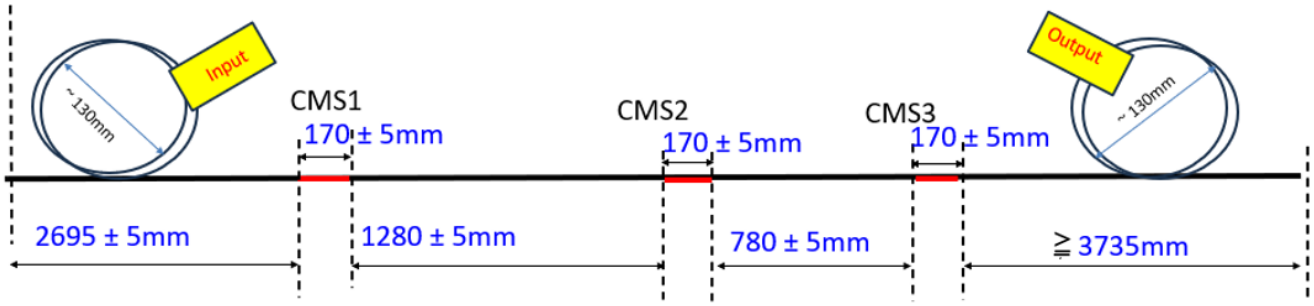


Figure 3.1 Stripping for CMS123

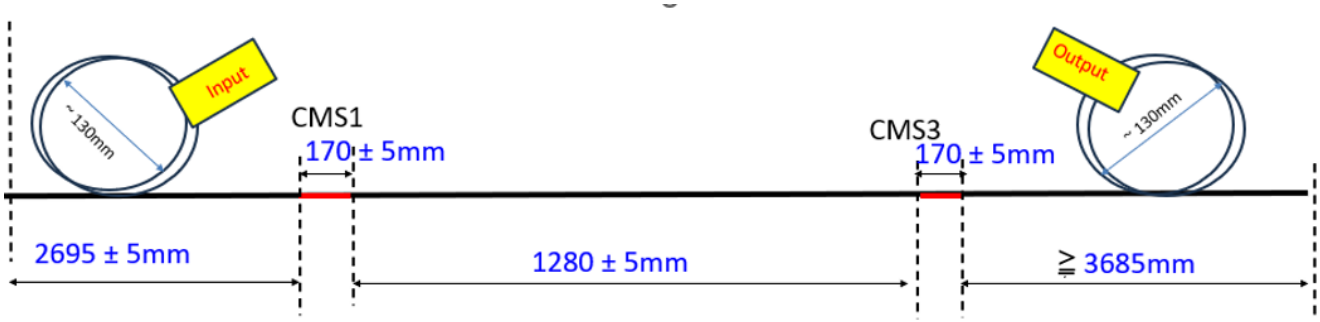


Figure 3.2 Stripping for CMS13

3.2 Process condition

Items	Conditions
Removing fiber coat	Polyimide Coating Stripper Customize(PCS-100) Stripping mode: CMS-FOV
Start position	Template
Fiber holder	FH100-600
Removing length	Ruler on PCS

4. Cleaning and Etching

4.1 Process specification

Items	Specification
Fiber appearance	No damaged No contamination
Etching gel applying	No air bubble touch to fiber
Etching gel type	Triple CMS: Refer Fig 4.1 Double CMS: Refer Fig 4.2
Etching time	30 -0/+5 min
Etching removal time	≤ 20 min
Etching length	120+/-3 mm
Etching area	Uniform
Etching temperature	30+/-1 ºC

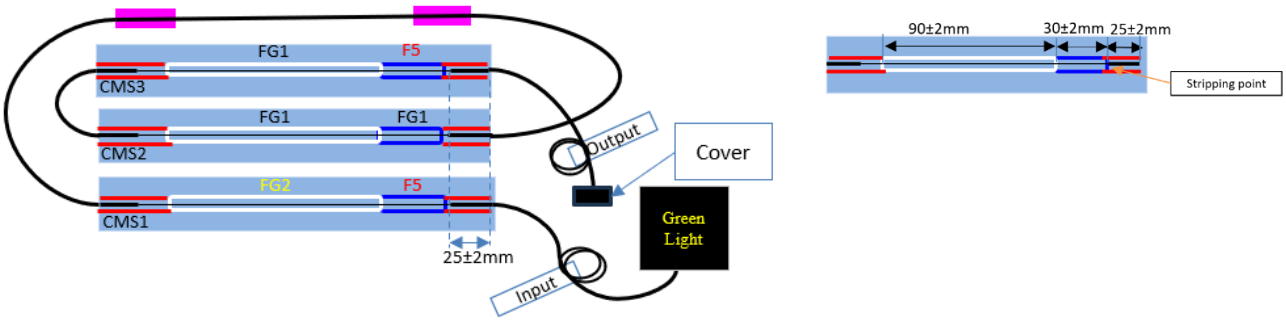


Figure 4.1 Etching for triple CMS

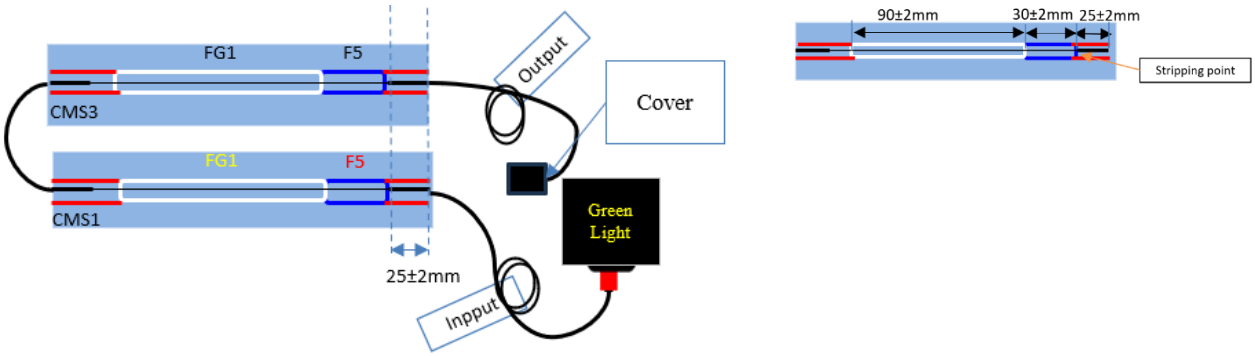


Figure 4.2 Etching for double CMS

4.2 Process condition

Items	Conditions
Fiber appearance	Visual by Loupe with LD light
Etching gel appearance	Led loupe
Etching time	Timer
Etching removal time	Timer
Etching length	Ruler
Etching temperature	Heater

Instruction for cleaning step before Etching:

- Use paper soak NOVEC/SOLBEL to clean UV coating remaining on bare fiber ~ 3 pcs paper
- Then, use cotton swap soak NOVEC/SOLBEL until there is no bright spot on bare fiber (Fig 4.3)

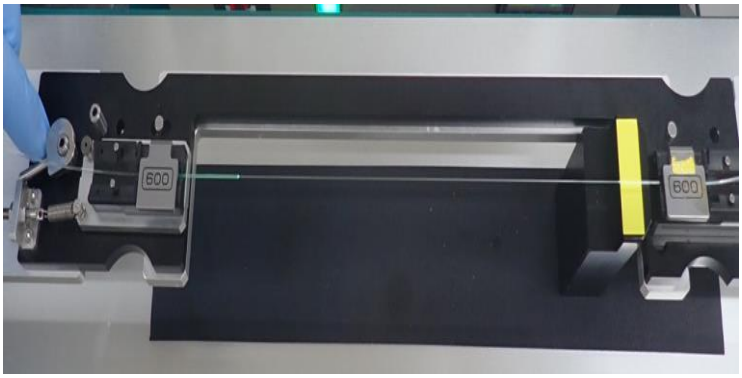


Figure 4.3: Fiber cleaning

Instruction for cleaning step after Etching:

- 1st cleaning step: Cotton swab (No soak any) and remove Etching gel on fiber as Fig 4.4

Figure 4.4: 1st cleaning step

- 2nd cleaning step: Clean by RO water as Fig 4.5

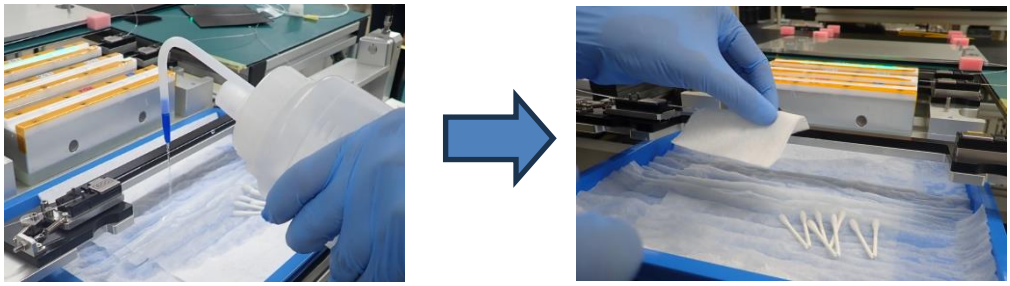


Figure 4.5: 2nd cleaning step

- 3rd cleaning step: Use Clean by alcohol and Bemcot soak alcohol as Fig 4.6

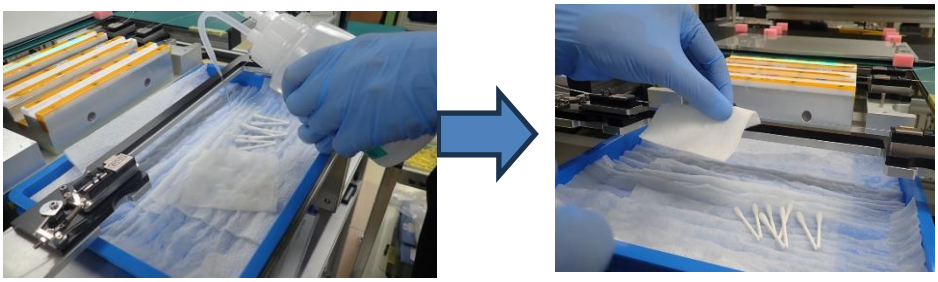


Figure 4.6: 3rd cleaning step

- 4th cleaning step: Paper bemcot with NOVEC/SOLBEL as Fig. 4.7

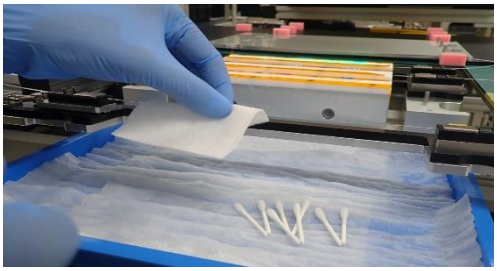


Figure 4.7: 4th cleaning step

If fiber still was dirty, can cleaning more by bemcot or cotton swab soaked in NOVEC/SOLBEL

5a. CMS enclosure assembly

5a.1 Process specification

Items	Specification
Material appearance	No dirty, dent, scratch
Resin SE-9186 Clear amount	Ensure quartz plate can adhesive to CMS bock
Quartz plate position	Center of CMS block. Refer Fig 5a.1
Resin KE-3466 amount	Cover fully bottom of quart side block
Quartz side block position	Refer Fig 5a.1 for quartz side block position onto quartz plate
Gap between position jig and CMS block	≤0.03±0.005mm
Waiting time for opening position fixing	2 hours at least
Waiting time after open position fixing jig	22 hours at least

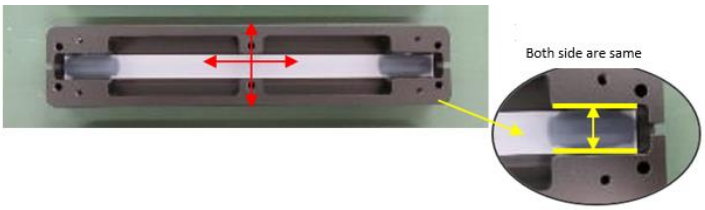


Figure 5a.1 Quartz plate position

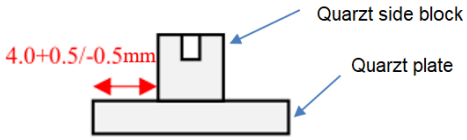


Figure 5a.2 Quartz side block position

5a.2 Process condition

Items	Conditions
Material appearance	Air gun
Resin SE-9186 Clear amount	Visual
Quartz plate position	Visual
Resin KE-3466 amount	Visual
Quartz side block position	Positioning jig
Gap between position jig and CMS block	Slim gauge
Waiting time for opening position fixing	Manual
Waiting time after open position fixing jig	Manual

5b. Resin mixing:

5b.1 Process specification

Items	Specification
Resin type	OF-600A and OF-600B
Resin mixing rate	~ 0.2g / resin / pcs, rate 1:1 (Coud be deviated 0.01g in mixing once)
Mixing time	10 -0/+1 minutes
Defoaming time	At least 5 minutes
Vacuum pressure	≤-0.1 Mpa
Vacuum time	At least 10 minutes
Expired after vacuum	Within 8 hours

5b.2 Process condition

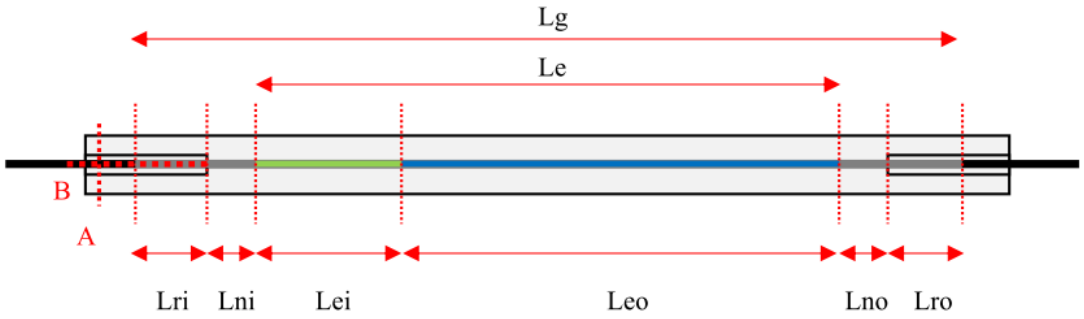
Items	Condition
Mixing rate	Weight scale
Mixing resin	AR-100 machine
Vacuum resin	Vacuum machine
Expired after vacuum	Visual

5. Reinforcement

5.1 Process specification:

Items	Specification
CMS lid appearance	No scratch that nail can feel, no peel-off, deform
Resin appearance	No contamination
Fiber position	Refer Fig 5.1 for CMS structure
Prooftest	2000+/-200g at least 3s
Fiber appearance	No broken, scratch
Tension before apply resin	300-330g
Resin volume	Refer Fig. 5.2 and 5.3 for resin applying
Resin appearance	No air bubble bigger than fiber
Resin application temperature	115-130°C on surface of CMS block
Resin curing status	Fiber does not jump out (or lift up) under bending check ** Refer Fig 5.4 for detail instruction of bending check method*
Screw type	UB-0305
Screw quantity	2 pcs/CMS and diagonal symmetry
Screw tighten	60-0+18cNm (With 3 sound and confirmation by black mark)
CMS lid appearance	No scratch that nail can feel

04



Item	unit	Dimension Specification	Description
Lg	mm	170+5/-5	Stripped glass length
Le	mm	120+3/-3	Etching length
Lri, Lro	mm	15+2/-2	Glass length in groove
Lni, Lno	mm	10+2/-2	Dimension between etched area and reinforced area
Lei	mm	Table. 9-A	Input side etching area length
Leo	mm	Table. 9-A	Output side etching area length

Table 9-A. Etch length per CMS

Item	unit	CMS1	CMS2	CMS3
Lei	mm	30+2/-2	0	90+2/-2
Leo	mm	90+2/-2	120+3/-3	30+2/-2

Fig 5.1 Dimension of CMS reinforcement structure

**** Instruction how to apply resin OF-600A/B mixture:** 04

- Resin Application: Apply resin for approximately 2/3 of the groove's length, directing it from the outside to the inside, as shown in Fig. 5.2. Wait for about 3 minutes after the initial application.
- Reapplication: Repeat the resin application 3 times, inspecting the volume. Ensure that no fibers are exposed and that the groove is completely filled. If the requirements are not met, add more resin as needed until adequate.
- Final Application: For the last application of resin, allow it to cure for about 10 minutes.
  Note: Contamination, air bubble should be removed during wait curing resin each time by empty syringe.

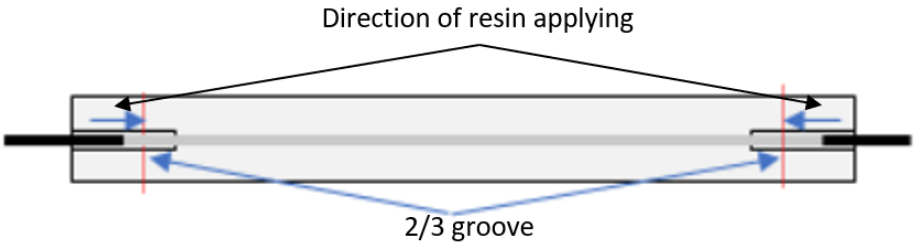


Fig 5.2 Detail of resin application

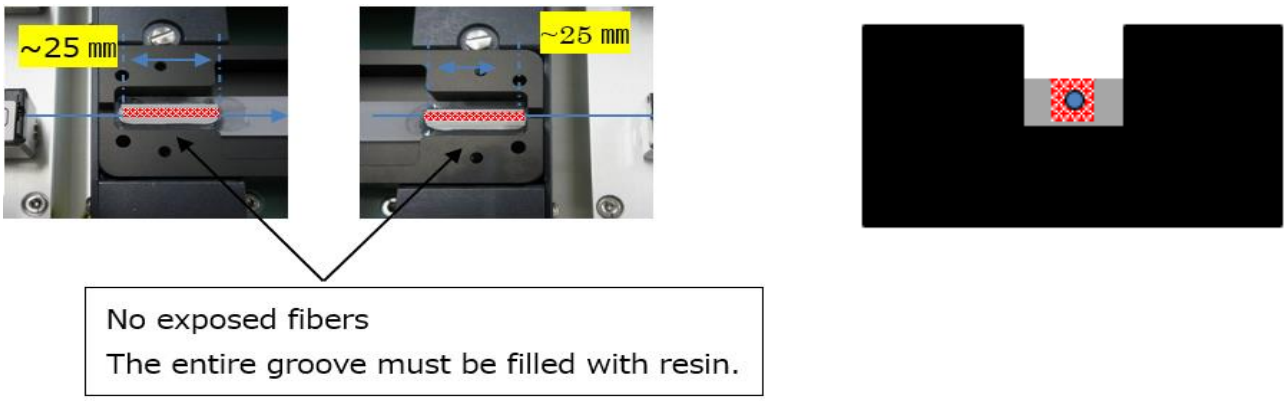


Fig 5.3 Resin (OF-600A,B) application

**** Inspection resin was cured:** 04

- After heating, make sure temperature was down below 55ºC before open the cover
- Insert cotton swab from outside to stopper of fiber holder (*distance around 30mm*) and lift fiber up (*height around 4mm*) to check fiber do not move or take out of the groove

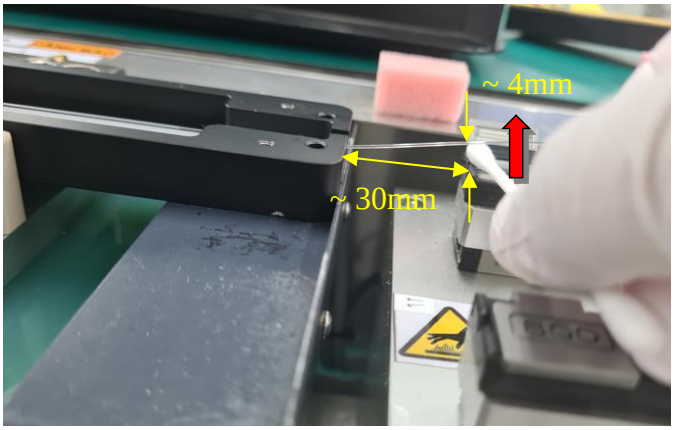


Fig 5.4 Inspection cured resin method

5.2 Process condition

Items	Conditions
UV resin expired date	Program
CMS lid appearance	Visual
Resin appearance	Led Loupe
Fiber position	Reinforcement jig
Prooftest	Reinforcement jig
Proof time	Manual
Fiber appearance (No broken, scratch)	Light
Tension before apply resin	Weight
Resin volume	Syringe
Resin appearance (No air bubble bigger than fiber)	Led flash loupe (X10)
Resin application temperature	Heater
Resin curing status	Visual, Tool (Jig)
CMS lid direction	Visual
Screw type	Visual
Screw quantity	Visual
Screw tighten	Torque driver
CMS lid appearance	Visual

04

After tighten screw, fold the starting of tape and attach onto CMS (~6mm type) both sides to prevent movement of fiber in groove as Figure 5.5.

04

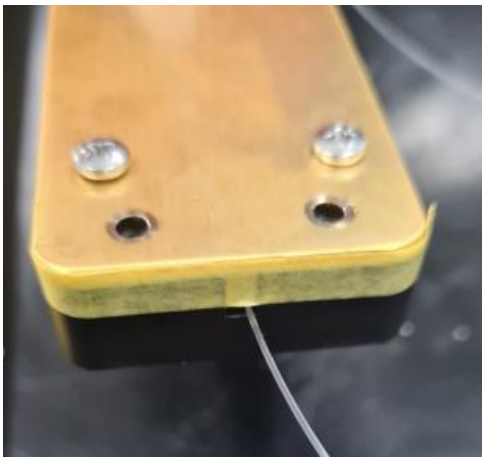


Fig 5.5 Additional tape on CMS

6. Transmittance inspection

6.1 Process specification

Items	Specification
Transmittance	Triple type: <9% Double type: <5%
Stability time	At least 1 minute

6.2 Process condition

Item	Conditions
Splicing	Splicer 100M/M+ Splicer mode: CezanneCMBU Bare fiber cutting length: 13+/-2 mm 04 Cut angel: ≤ 1°
Pcore	CMBU-CMS inspection system
P0	CMBU-CMS inspection system
P1	CMBU-CMS inspection system
Judgement	Template

Clad Light Transmittance calculation method:

・Definition

Value = (P1 - P_{Core}) / (P0 – P_{Core}) * 100 [%]

P1: Optical power of transmitted light [W]
P0: Optical power of light source [W]
P_{Core}: Optical power of light source of fiber core [W]
Note: No need to consider Fresnel losses

・Definition of P0 and P1

P0 is defined as the direct power meter measurement of the light output from the light source fiber.
P1 is defined by connecting the light source fiber to the DUT and measuring the transmitted light with a power meter. Note that P0 and P1 do not account for Fresnel return losses.

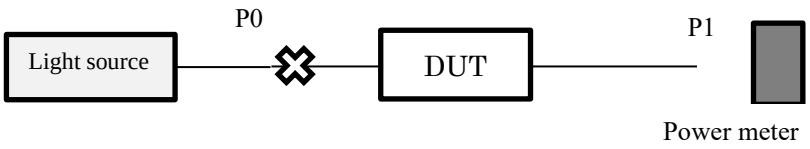


Fig 6.1. Definition of P0 and P1

・Definition of P_{Core}

Since this value cannot normally be measured, the following estimated value is used.
Connect two Dummy CMS in series to sufficiently remove clad light from the light source. Pcore is defined by the value of transmitted light measured by a thermal sensor at P0 output. Dummy CMS uses Triple CMS that matches each core diameter. Note that P_{Core} do not account for Fresnel return losses.

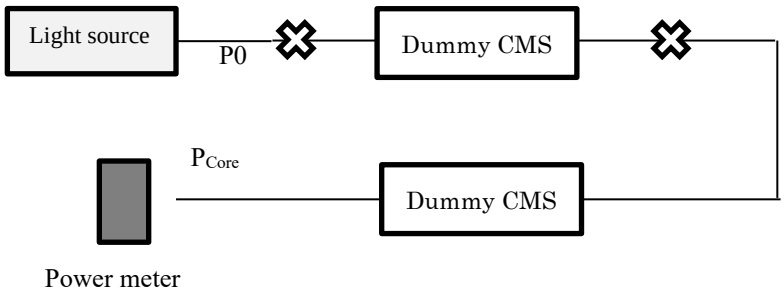
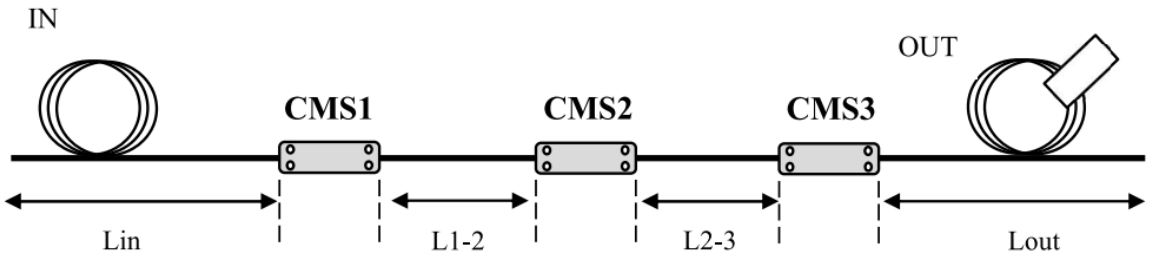


Fig 6.2. Definition of P_{Core}

7. CMS final inspection

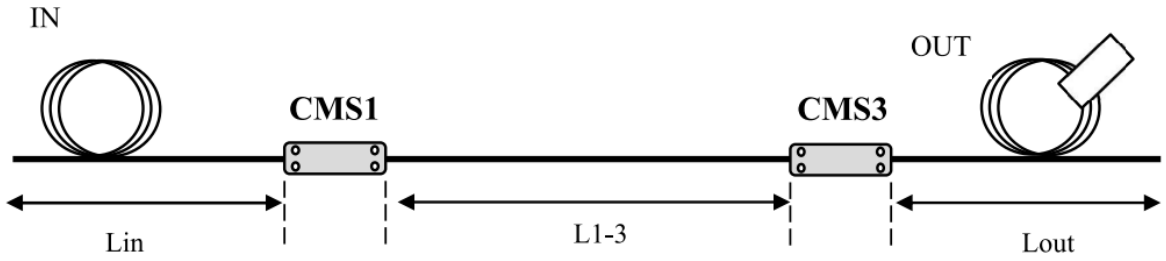
7.1 Process specification

Items	Specification
Appearance of CMS	No scratch that can feeling by nail No deformed, chip
Fiber appearance	No damage, scratch No ink(mark), dirty on UV coat
Fiber length	Refer to Fig 7.1 and 7.2 for each type



Item	Unit	Length
Lout	mm	>3400
L1-2		1250±10
L2-3		750±10
Lin		>2400

Fig 7.1 CMS123 structure



Item	Unit	Length
Lout	mm	>3400
L1-3		1250±10
Lin		>2400

Fig 7.2 CMS13 structure

7.2 Process condition

Items	Condition
Appearance of CMS	Visual
Fiber appearance	Visual Microscope (Confirm NC)
Fiber length	Template and remove limited mark

8. Final inspection

8.1 Process specification

Items	Specification
Product Structure	Correct product structure (Fig 8.1 and Fig 8.2)
Screw quantity of CMS	Correct quantity (10pcs/CMS)
Appearance of CMS	No scratch that can be felt by nail No deformation, chip
Fiber length (in/out)	Table 8.1 and Table 8.2
Fiber appearance	Table 8.3, Table 8.4, Table 8.5 Fig 8.3 No ink(mark), dirty on UV coat 02
Winding diameter	100 – 150 mm

8.1.1 Product Structure

Fig 8.1 CMS1-3 (Double)

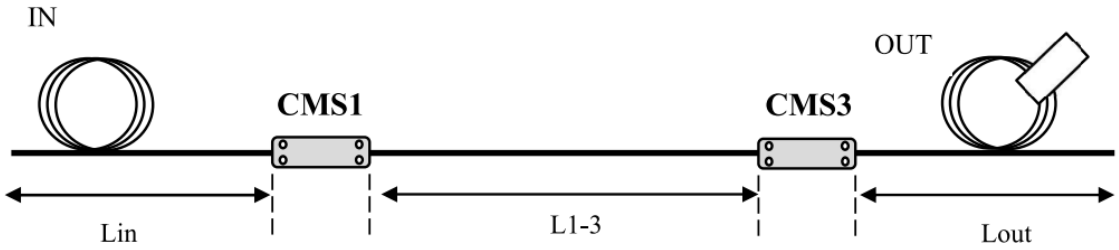
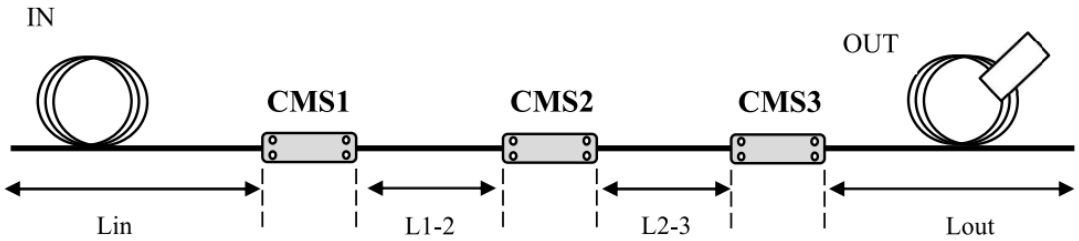


Fig 8.2 CMS1-2-3 (Triple)



8.1.2 Product Length

Table 8.1 Length of CMS1-3 (Double)

Item	Unit	Length
Lout	mm	>3400
L1-3		1250±10
Lin		>2400

Table 8.2 Length of CMS1-2-3 (Triple)

Item	Unit	Length
Lout	mm	>3400
L1-2		1250±10
L2-3		750±10
Lin		>2400

8.1.3 Fiber Appearance Criteria

Table 8.3 Fiber Judgement Group

Product type	Fiber type	Fiber group
CMBU-CMS	All fiber	A

Fig 8.3 Appearance abnormality Diagram

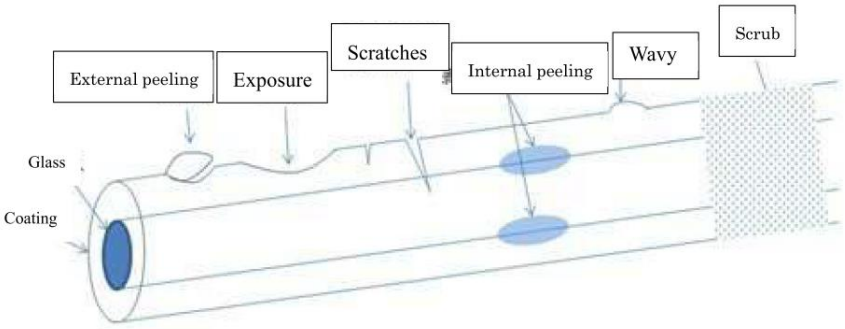
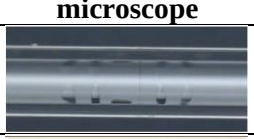
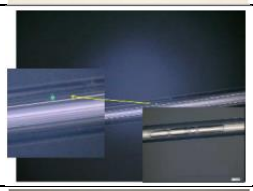


Table 8.4 Fiber Appearance Criteria

Definition of Appearance Abnormality	Description	Pass / Fail		
		Fiber Group		
		A	B	C
Scrub	There is damage only to the protective coating layer (not peeled off)	Pass	Pass	Pass
External peeling	The outermost coating has fallen off	Fail	< 1mm: Pass ≥ 1mm: Fail	Pass
Internal peeling	Delamination between glass/coating. Internal damage that is not a scratch	Pass	Pass	Pass
Scratches	There are deep scratches that reach the second layer	Fail	Fail	Fail
Exposure	The coating has fallen off, exposing the glass or thin inner coating layer	Fail	Fail	Fail
Bubbles	Air bubbles in coating	Pass	Pass	Pass
Wavy coating	There are undulations in the coating	Pass	Pass	Pass
Bright spot	Does not fall under the above classification, and there is no abnormality in appearance. But dots shine when exposed to visible light.	Pass	Pass	- (Unable to judge)

Table 8.5 Limit sample of Fiber Appearance Criteria

Visual image under microscope	Classification	Description	Judgement
	Internal peeling	There is an abnormality inside	Pass
	Internal peeling	There is an abnormality inside	Pass
	Bubbles	There is an abnormality inside	Pass
	Scrub	Only the outermost layer has scratches	Pass
	Scrub	Only the outermost layer has scratches	Pass
	Scrub	Only the outermost layer has scratches	Pass
	Scratches	There are scratches inside	Fail
	Scratches	There are scratches inside	Fail
	Scratches	There are scratches inside	Fail
	Exposure	Exposed interior or glass	Fail
	External peeling	The outermost coating has fallen off	Fiber A: Fail Fiber B: Fail Fiber C: Pass

8.2 Process condition

Items	Condition
Product Structure	Visual
Screw quantity of CMS	Visual/Template
Appearance of CMS	Visual
Fiber length (in/out)	Template
Fiber appearance	Visual Microscope (Confirm NC)
Winding diameter	Winding Jig

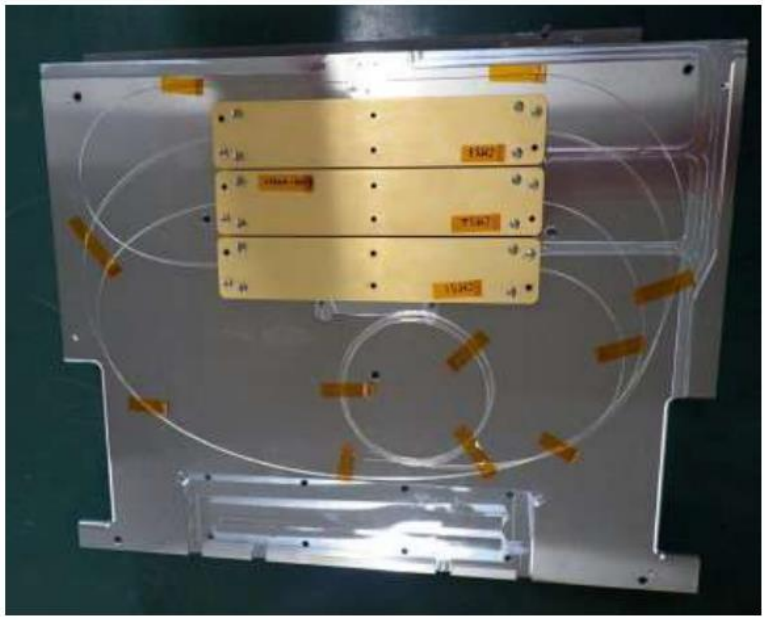
9. Casing and Packing (Inner packing)

9.1 Process specification

Items	Specification
Screw type	UB-0318
Screw quantity	10pcs/CMS
Screw tighten	60-0/+18 cNm
Cooling plate-1 appearance	No damage, scratch that can be felt by nail
Packing position	Correct fiber routing (Fig 9.1)
Tape length	Correct length of tape (~ 30mm/piece)
Tape quantity	Follow details of each product type
Tape position	Follow details of each product type
Cardboard appearance	No damage, contamination
Cardboard type	Correct type
Cushion appearance	No damage, deformation, contamination
Cushion type	Correct type
Cushion quantity	5 inner cushion for each product
Packing quantity	1 product in 1 inner cartonbox
Label format	Table 9.1 and Table 9.2 Fig 9.3
Label content	Correct content
Label appearance	No torn, deformation Can read content clearly
Label position	Fig 9.4

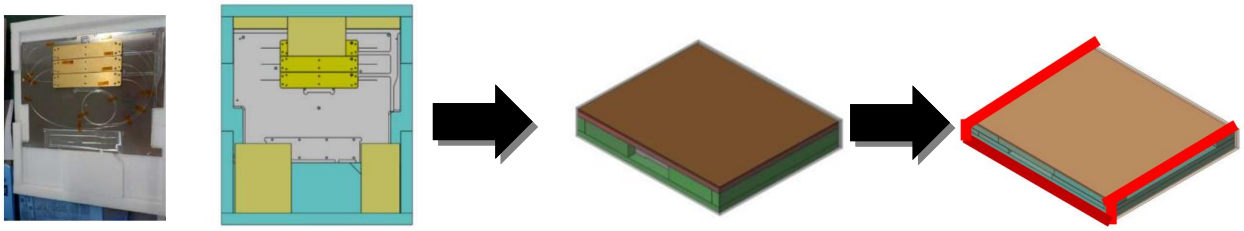
9.1.1 Fiber routing

Fig 9.1 Fiber fixing on cooling plate



9.1.2 Inner packing

Fig 9.2 Inner packing method



9.1.3 Label format

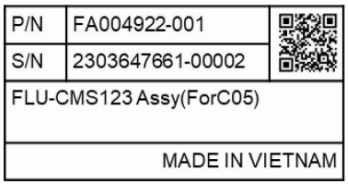
Table 9.1 Example of Product label format

Item	Information
Product name	FUC-CMS Unit Sub-Assy(ForC05)
FA number (P/N)	FA004922-001
Serial number	xxxxxxxxxx-xxxxx
QR Code	Table 9.2
Country of origin	Made in Vietnam

Table 9.2 QR Code of Label Specifications

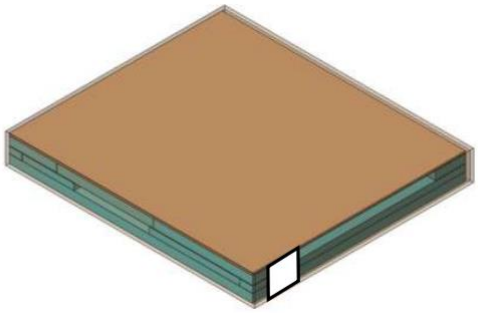
Item	Specification
Text format	{FA number}|{Serial number}
Text example	FA004922-001| xxxxxxxxxx-xxxxx

Fig 9.3 Label format example



9.1.4 Label position

Fig 9.4 Product label position on inner cartonbox



9.2 Process condition

Items	Condition
Screw type	Visual
Screw quantity	Visual/Jig
Screw tighten	Torque
Cooling plate-1 appearance	Visual
Packing position	Visual
Tape length	Ruler
Tape quantity	Jig
Tape position	Visual/Template
Cardboard appearance	Visual
Cardboard type	Program
Cushion appearance	Visual
Cushion type	Visual
Cushion quantity	Visual
Packing quantity	Visual and Program
Label format	Program and Visual
Label content	Visual
Label appearance	Visual
Label position	Visual

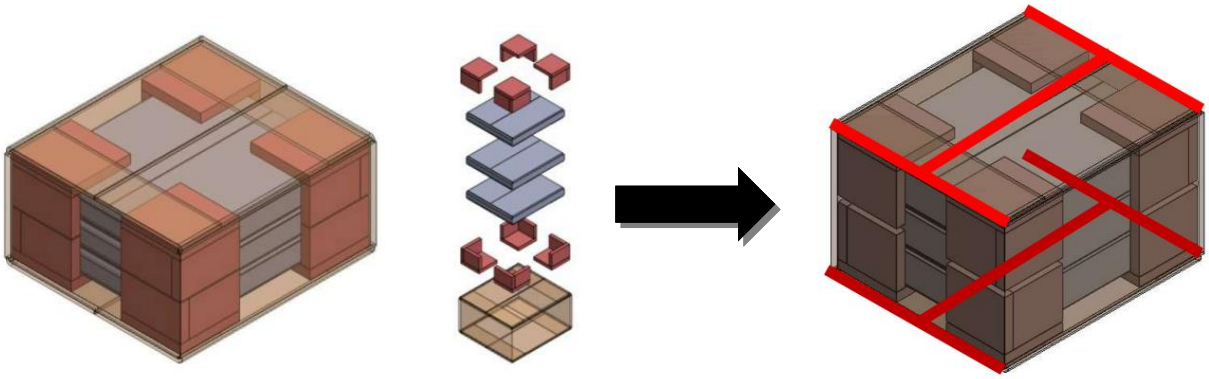
10. Carton packing

10.1 Process specification

Items	Specification
Cardboard appearance	No damage, contamination, misprint Correct logo
Cardboard type	Correct type
Cushion appearance	No damage, deformation, contamination
Cushion type	Correct type
Cushion quantity	8 outer cushion for each outerbox
Packing quantity	Maximum 3 inner cartonboxes per outer cartonbox
Label format	Table 10.1 Fig 10.2
Label content	Correct content
Label appearance	No torn, deformation Can read content clearly
Storage condition	Temperature (ºC): 5 – 55 Absolute humidity (g/m^3): ≤ 29 Humidity (%): ≤ 90, No condensation Period (months): Maximum 12

10.1.1 Outer packing

Fig 10.1 Outer packing method



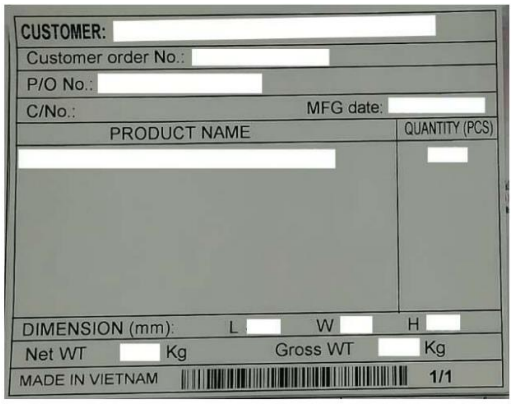
10.1.2 Label format

Table 10.1 Example of Required information for Outerbox label

Item	Information
Customer	Customer name
Customer order no.	Customer order no.
PO no.	PO
FA number (P/N)	FA number (P/N)
Manufacturing date	DD-Mmm-YYYY (Example: 18-Dec-2023)
Product name	FUC-CMS Unit Sub-Assy(ForC05)
Quantity (pcs)	20
Dimension (mm)	L x W x H of Outer cardboard
Weight (kg)	Net and Gross weight
Country of origin	MADE IN VIETNAM
Order of Outerbox in the PO	Outerbox/Total outerbox of the PO

*Note: Add 3-digit revision no. to the end of FA number.

Fig 10.2 Example of Outerbox label



10.2 Process condition

Items	Conditions
Cardboard appearance	Visual
Cardboard type	Visual/Program
Cushion appearance	Visual
Cushion type	Visual
Cushion quantity	Visual
Packing quantity	Visual and Program
Label format	Program and Visual
Label content	Visual
Label appearance	Visual
Storage condition	Monitor alarm

11. Shipping (For Sub part)

- Shipping quantity and product name must be confirmed correct with P/O from Customer.
- Attach label outside carton box to indicate: Specification of product type, Specification Number and serial No.
- Update Data (test report and shipping data) to FTP server IP: 10.16.248.14
- Detailed requirements for each type: Refer to Spec No. SPC3-10720

12a. Joint part assembly

12a.1 Process specification

Items	Specification
One-touch coupling appearance	No scratches, chips or adhesive on surface
Tube Fitting appearance	No scratches, chips or adhesive on surface
Bond volume	1:1 (accepted deviated 0.01g)
Mixing time	30s to 60s
Joint torque	13Nm-0/+1

12a.2 Process condition

Items	Condition
One-touch coupling appearance	Visual
Tube Fitting appearance	Visual
Bond volume	Weight scale
Mixing time	Timer
Joint torque	Torque wrench

12. Assembly water cooling plate

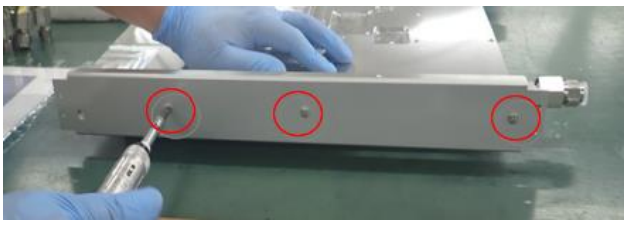
12.1 Process specification

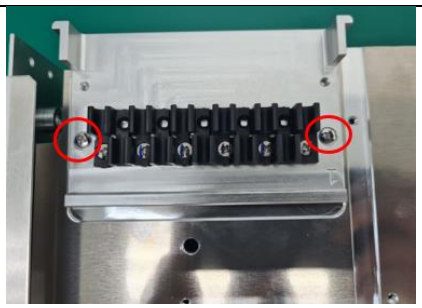
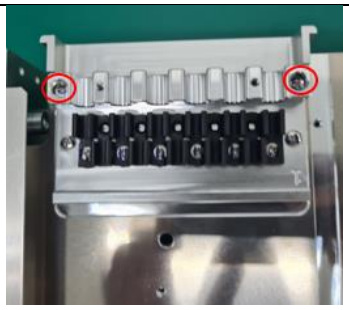
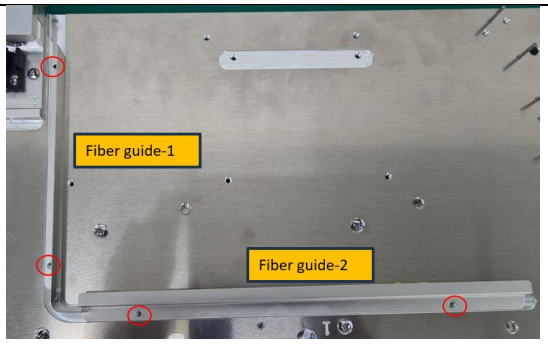
Items	Specification
Water cooling plate appearance	No scratch, deformation
Heat-dissipating resin volume	30g~40g
Resin application time	Within 7 minutes
Cooling plate gap	<0.15mm
Waiting time	At least 24 hours

Table 12.1: Specification for using screw

Item	Screw type	Quantity (pcs)	Torque driver (cNm)
Assembly water cooling plate 1,2	UB-0308	21	120-0+36cNm
RH/LH side panel	UB-0408	6	120-0+36cNm
Block1	UB-0305	2	60-0+/18cNm
Block2	UB-0308	2	60-0+/18cNm
Block3	UB-0308	2	60-0+/18cNm
Multi tube holder	UF-0306	6	60-0+/18cNm
Fiber guide 1	UB-0304	2	60-0+/18cNm
Fiber guide 2	UB-0304	2	60-0+/18cNm
Fiber guide 3	UB-0308	2	60-0+/18cNm

Table 12.2: Screw position on water cooling plate

Operation	Screw type	Remark	Position
Assembly water cooling plate 1,2	UB-0308	21 pcs follow position on cover tool	
RH/LH side panel	UB-0408	3 pcs for each panel	
Assembly Multi tube holder to block1	UF-0306	6 pcs. Add Resin 1401B a little in screw (~1/3 body from the bottom)	

Assembly Block1	UB-0305	2 pcs	
Assembly Block3	UB-0308	2 pcs	
Assembly Block2	UB-0308	2 pcs	
Fiber guide 1	UB-0304	2 pcs	
Fiber guide 2	UB-0304	2 pcs	
Fiber guide 3	UB-0308	2 pcs	

12.2 Process condition

Items	Condition
Water cooling plate appearance	Visual
Screw tighten	Refer Table 12.1 for detail
Heat-dissipating resin volume	Weight scale
Resin application time	Timmer
Cooling plate gap	Slim gauge 0.15+/-0.005mm
Water cooling plate 1,2 deviation	Assembly jig
Waiting time	Manual

13. Cooling inspection

13.1 Process specification

Items	Specification
Heater temperature	80+/-1 ºC
Temperature of input side	Thermal meter
In/Out connection	Cooling jig
Waiting time for temperature settle	3 minutes at least
Temperature characteristic	≤ 73.4 ºC
Air flow to dry pipe	0.4+/-0.05 Mpa
Time to drying	At least 6 minutes

13.2 Process condition

Items	Conditions
Water flow rate	Refer Fig 13.1 for detail
Temperature of input side	Thermal meter
Waiting time for temperature settle	Timmer
Testing position	Position jig at area 1 and area 2, refer Fig 13.2
Air flow	Flow meter
Time to drying	Timmer

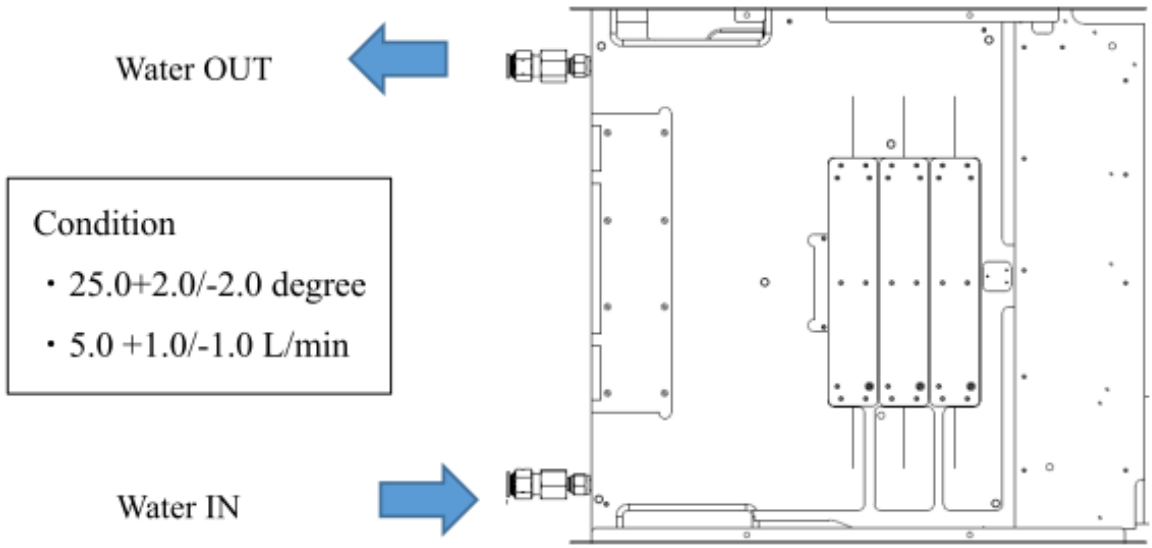


Fig 13.1 Water flow rate

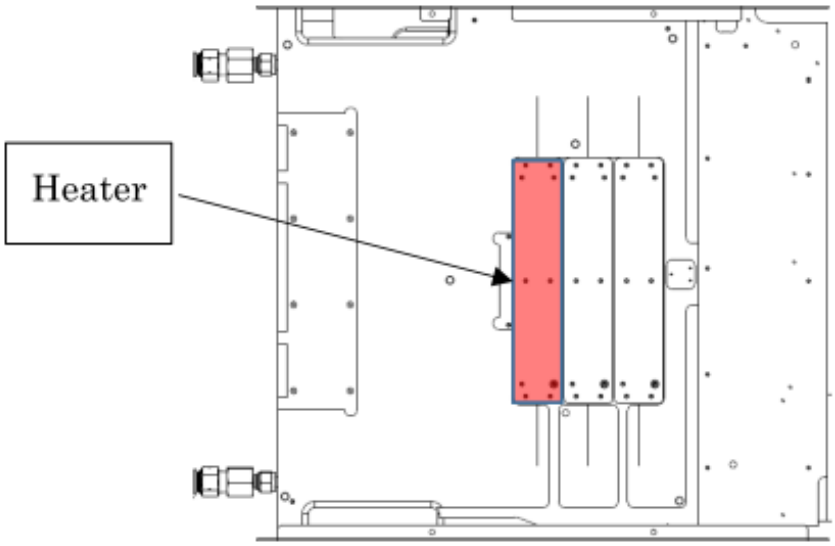


Fig 13.2 Temperature testing position

14. Assembly CMS to water cooling plate

14.1 Process specification

Items	Specification
CMS arrangement	Refer Fig 14.1 and 14.2 for assembly CMS to water cooling plate
Screw type	UB-0318
Screw position	Refer Fig 14.1 and 14.2 for assembly CMS to water cooling plate at red position
Screw quantity	6 pcs/CMS
Screw tighten	60-0/+18cNm

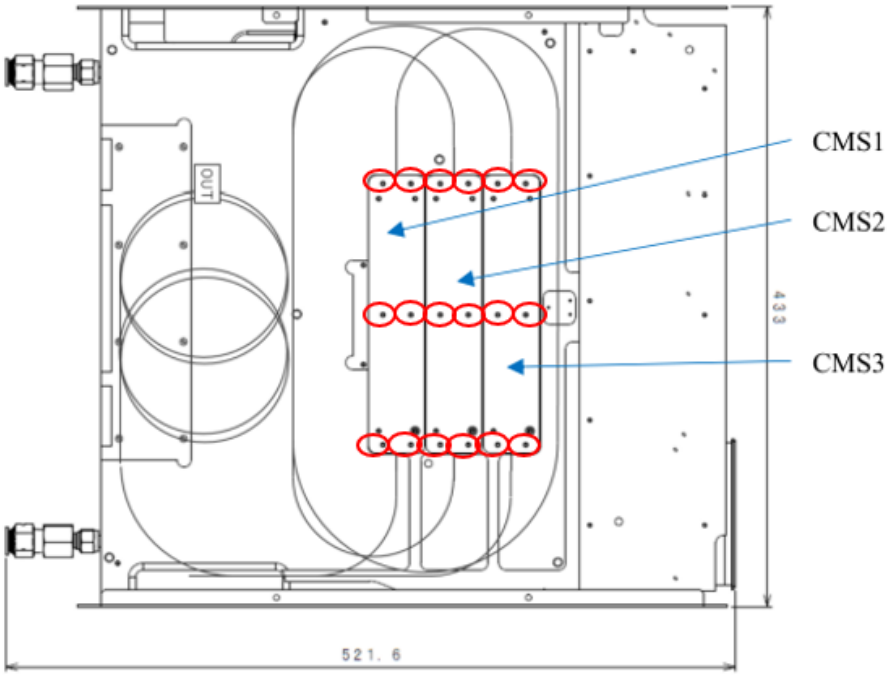


Fig 14.1 Sample for CMS triple

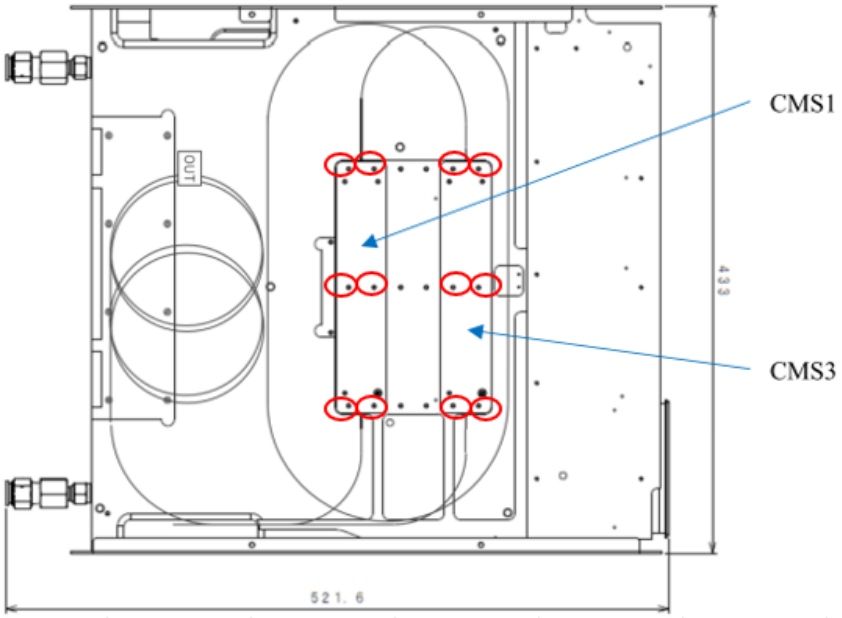


Fig 14.2 Sample for CMS double

14.2 Process condition

Items	Specification
CMS arrangement	Visual
Screw type	Visual
Screw quantity	Visual
Screw tighten	Torque driver

15. Final inspection

15.1 Process specification

Items	Specification
Product Structure	Correct product structure (Fig 15.1 and 15.2)
Screw quantity on CMS	10pcs/CMS
Mechanical appearance	Table 15.1, Table 15.2, Table 15.3 Fig 15.3, Fig 15.4, Fig 15.5
Product length	Table 15.4, Fig 15.6
Fiber appearance	Table 15.5, Table 8.4, Table 8.5 Fig 8.3
Fiber bending diameter	Minimum 50 mm
Fiber winding diameter	100 – 150 mm

15.1.1 Product Structure

Fig 15.1 Product Structure (Double)

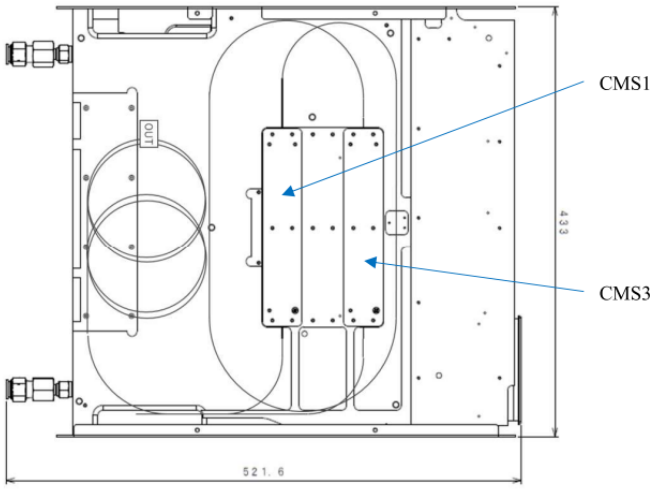
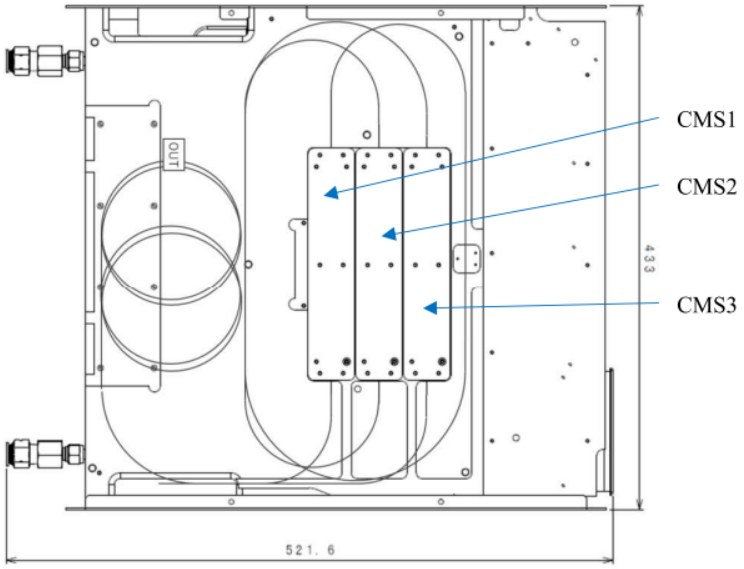


Fig 15.2 Product Structure (Triple)



15.1.2 Mechanical appearance criteria

Fig 15.3 Mechanical appearance area (Side A: Front side; Side B: Back side)

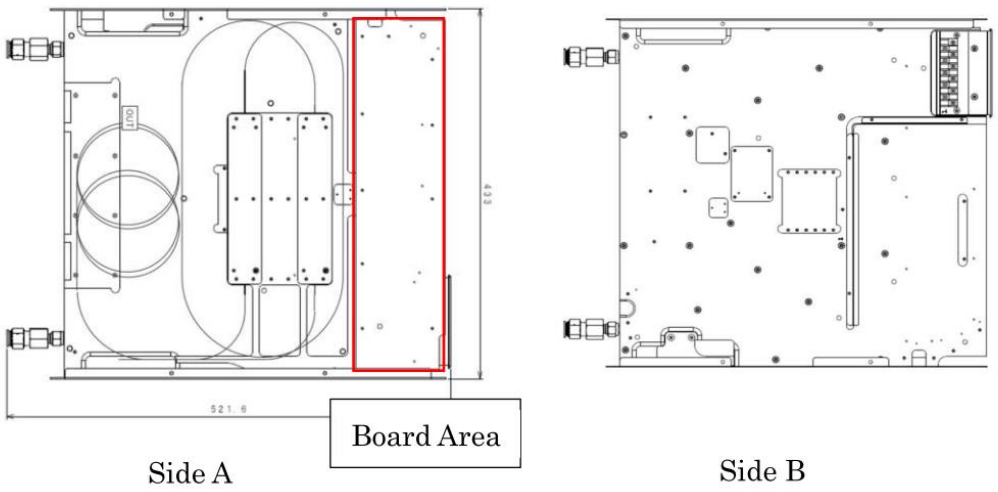


Table 15.1 Mechanical appearance criteria (for metal plate)

Item	Front side	Back side
Scratches	No scratch that can be felt by nails Board area: Not specified	No scratch that can be felt by nails
Dent	No dent Board area: Not specified	Other area: Accept < 2mm^2/dent
Burr	No burr	No burr
Discoloration	No darkening or rust on the aluminum surface	No darkening or rust on the aluminum surface

Fig 15.4 Mechanical appearance criteria (Connectors)

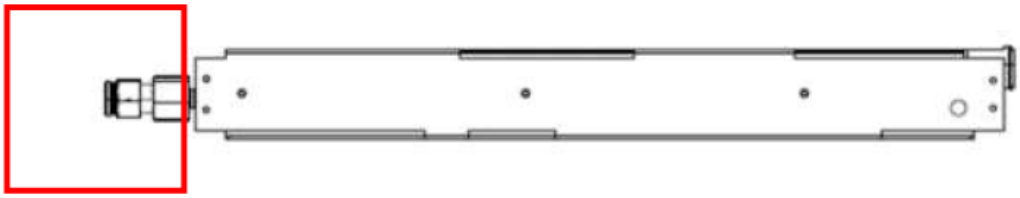


Table 15.2 Mechanical appearance criteria (for Connectors)

Item	Specifications
Cracking	No cracking

Fig 15.5 Mechanical appearance criteria (Side panels)

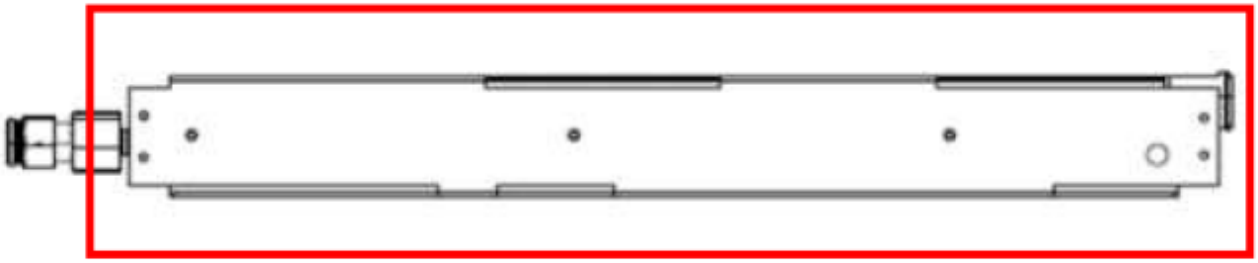


Table 15.3 Mechanical appearance criteria (for Side panels)

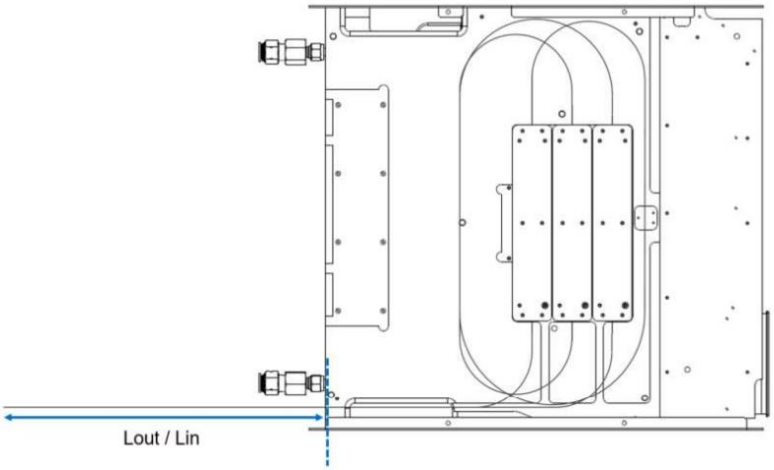
Item	Specifications
Scratches	No scratch that can be felt by nails
Dent	No dent
Burr	No burr
Paint peeling	No peeling or cracking of paint

15.1.3 Product Length

Table 15.4 Product length

Item	Unit	Length	Description
Lout	mm	>2950	CMS3 Output fiber
Lin		>2030	CMS1 Input fiber

Fig 15.6 Lin and Lout of CMBU product



15.1.4 Fiber Appearance Criteria

Table 15.5 Fiber Judgement Group

Product type	Fiber type	Fiber group
CMBU	All fiber	A

15.2 Process condition

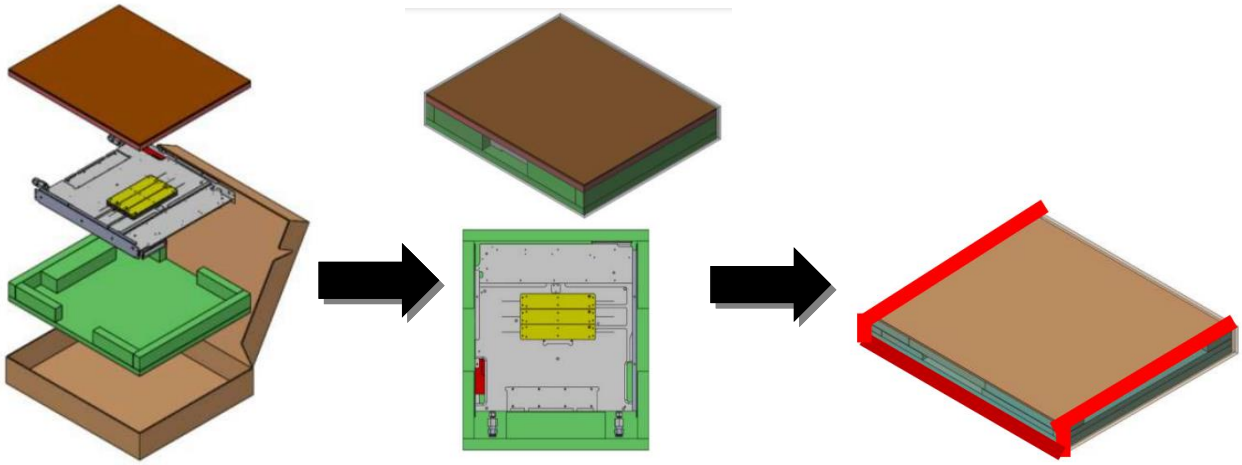
Items	Condition
Product Structure	Visual
Screw quantity	Template
Mechanical appearance	Visual
Product length	Template
Fiber appearance	Visual, Microscope (Confirm NC)
Fiber bending diameter	Ruler/Template
Fiber winding diameter	Winding Jig

16. Carton packing (Inner and outer packing)

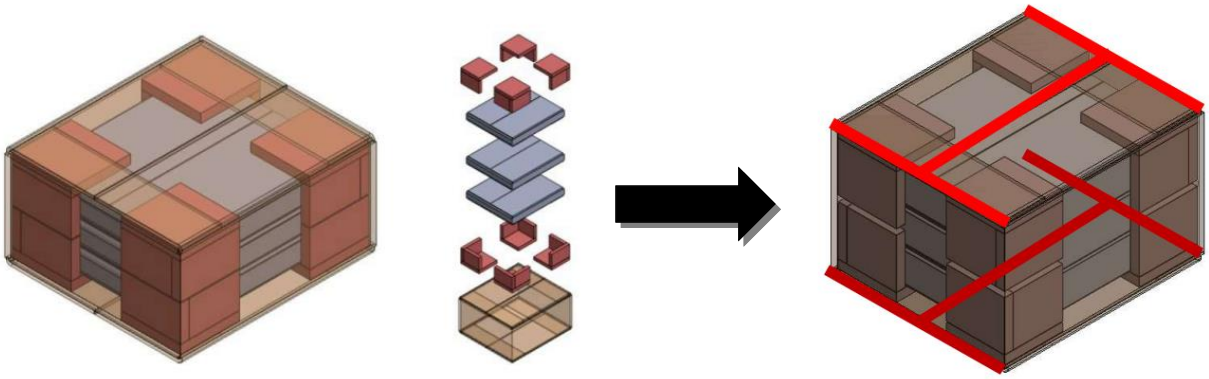
16.1 Process specification

Items	Specification
Cardboard appearance	No damage, contamination, misprint Correct logo (if any)
Cardboard type	Correct type
Cushion appearance	No damage, deformation, contamination
Cushion type	Correct type
Cushion quantity	2 inner cushion for each product 8 outer cushion for each outerbox
Packing quantity	1 product in 1 inner cartonbox Maximum 3 inner cartonboxes per outer cartonbox
Label format	Table 16.1, Table 16.2, Table 16.3 Fig 16.3, Fig 16.4
Label content	Correct content
Label appearance	No torn, deformation Can read content clearly
Label position	Fig 16.5
Storage condition	Temperature (ºC): 5 – 55 Absolute humidity (g/m^3): ≤ 29 Humidity (%): ≤ 90, No condensation Period (months): Maximum 12

16.1.1 Inner packing
Fig 16.1 Inner packing method



16.1.2 Outer packing
Fig 16.2 Outer packing method



16.1.3 Label format
Table 16.1 Example of Product label format

Item	Information
Product name	FUC-CMS Unit Sub-Assy(ForC05)
FA number (P/N)	FA004922-001
Serial number	xxxxxxxxxx-xxxxx
QR Code	Table 9.2
Country of origin	Made in Vietnam

Table 16.2 QR Code of Label Specifications

Item	Specification
Text format	{FA number}|{Serial number}
Text example	FA004922-001| xxxxxxxxxx-xxxxx

Fig 16.3 Label format example

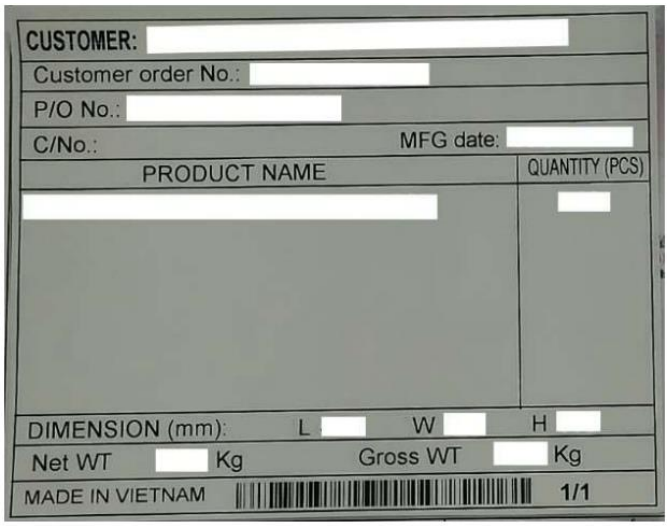
P/N	FA004922-001
S/N	2303647661-00002
FLU-CMS123 Assy(ForC05)	
MADE IN VIETNAM	

Table 16.3 Example of Required information for Outerbox label

Item	Information
Customer	Customer name
Customer order no.	Customer order no.
PO no.	PO
FA number (P/N)	FA number (P/N)
Manufacturing date	DD-Mmm-YYYY (Example: 18-Dec-2023)
Product name	FUC-CMS Unit Sub-Assy(ForC05)
Quantity (pcs)	20
Dimension (mm)	L x W x H of Outer cardboard
Weight (kg)	Net and Gross weight
Country of origin	MADE IN VIETNAM
Order of Outerbox in the PO	Outerbox/Total outerbox of the PO

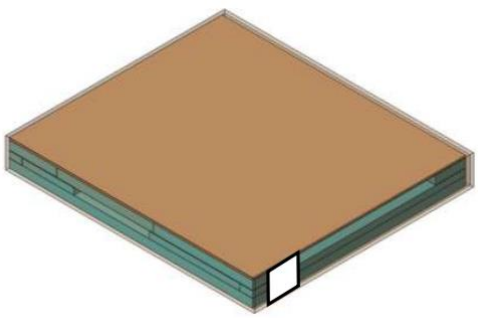
*Note: Add 3-digit revision no. to the end of FA number.

Fig 16.4 Example of Outerbox label



16.1.4 Label position

Fig 16.5 Product label position on inner carton box



16.2 Process condition

Items	Conditions
Cardboard appearance	Visual
Cardboard type	Visual/Program
Cushion appearance	Visual
Cushion type	Visual
Cushion quantity	Visual
Packing quantity	Visual and Program
Label format	Program and Visual
Label content	Visual
Label appearance	Visual
Label position	Visual
Storage condition	Monitor alarm

17. Test report & Shipping

- Shipping quantity and product name must be confirmed correct with P/O from Customer.
- Attach label outside carton box to indicate: Specification of product type, Specification Number and serial No.
- Update Data (test report and shipping data) to FTP server IP: 10.16.248.14
- Detailed requirements for each type: Refer to Spec No. SPC3-10720

REVISION HISTORY

Date	Person	Ver	Description		Reason of change	Change Requester
			Old contents	New contents		
25th Oct 2024	TungDD – 10745	4	-	Table III.2 Remove version of specification: SPC3-10714, SPC3-10717, SPC3-10718, SPC3-10719, SPC3-10720	No require declare version	PRE2 manager
			-	5. Reinforcement: Table 5.1 and 5.2: Add "Resin curing status" - Add instruction of resin application - Add instruction resin was cured - Add instruction attach tape to prevent movement of fiber in groove	Action for CAPA-FPL-24-003	
			6. Transmittance inspection - 6.2 Process condition: 15+/-2mm	6. Transmittance inspection - 6.2 Process condition: 13+/-2mm	Correction as internal review	
	ThuongHTH -10399		II. Application and other sections: process named: "Shipping"	II. Application and other sections: re-named "Test Report & Shipping"	Correction	Thuong HTH
3rd Aug 2024	TungDD – 10745	3	N/A	Table III.2: Add SPC3-10690 and SPC3-10740 Add Table III.3	Customer's requirement	PRE2 manager
			N/A	4. Cleaning and Etching Additional cleaning solution SOLBEL	Following CO 9-PR-0014-9-FO-0001-4-RC-0139	
3rd May 2024	Thuong HTH	2	15. Final inspection: screw quantity	15. Final inspection: remove screw quantity on plate. Only control screw on CMS	Following CO 9-PR-0014-9-FO-0001-9-RC-0031	Thuong HTH
	TungDD-10745		N/A 7. CMS final inspection: 7.2 Process condition +Fiber appearance: Visual +Fiber length: Tape measure	2. Marking: Add Marking color Update Figure 2.1, 2.2 7. CMS final inspection and 8. Final inspection + Fiber appearance: Add " No ink(mark), dirty on UV coat" 7. CMS final inspection: 7.2 Process condition +Finer appearance: Visual; Microscope (Confirm NC) +Fiber length: Template and remove limited mark	Following CO: 9-PR-0014-9-FO-0001-4-RC-0065 Correction	PRE2 manager
18th-Jan, 2024	TungDD-10745	1	-	Established	New product transferring	PRE3 manager