

QUALITY CONTROL FLOW CHART OF TRILLIAN FAU

Document No: 4-QC-0302

Version: 36

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**I. Purpose**

- Control the quality of **Trillian FAU** product which is made in FOV.

II. Application

- This document is applied to **Trillian FAU** product manufactured in FOV.
- This operation procedure has a connection with PRD, QAE, PRE and PLN.

III. References

No.	Specification	Product name	Fujikura Product No.	Customer Product No.
1	HE-1321- 023\$003	Trillian FAU-cap Assy_V5_No Loopback	HHE-1321-023-001	22201265REV002
2	HE-1321-001\$005	Trillian FAU-cap Assy_V4-MPOM	HHE-1321-001-001	AD22151504
3	HE-1321-004\$004	Trillian Shuffle Assy	HHE-1321-004-001	AD22166179REV012
4	HE-1321-024\$005	Assy FAU-cap_Trillian	HHE-1321-024-001	AD22151504

- FMEA: 0-PR-012-0-FO-001-5-RC-0028 Version 29

IV. Term and definition

FOV: Fujikura Fiber Optics Viet Nam

OCAP: Out of Control Action Plan

SIC: Section In Charge

Approved by: Manager
Date: (Follow DMS)

Approved by: Division Manager
Date: (Follow DMS)

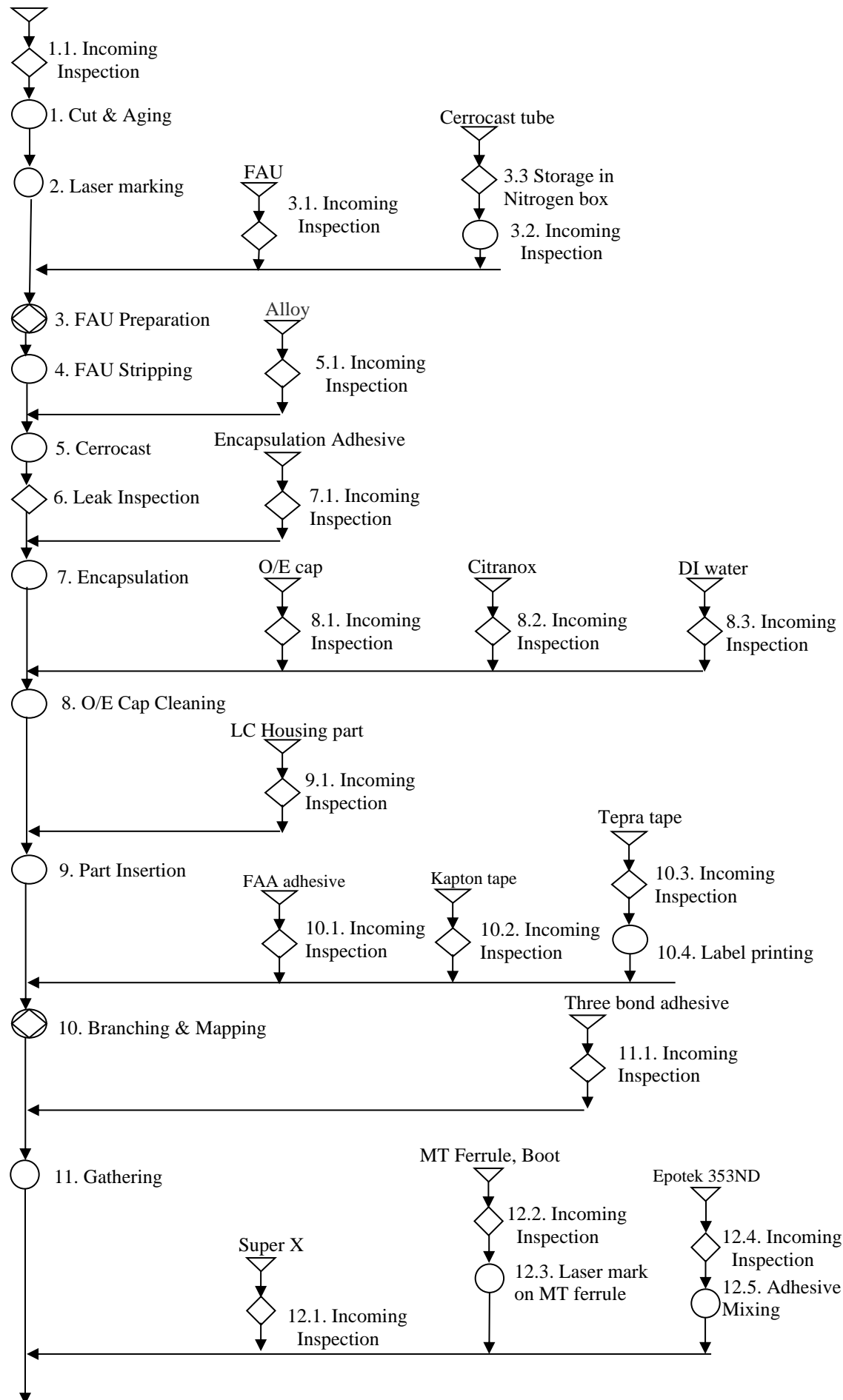
Prepared by: HangVT
Date: 27-Sep-24

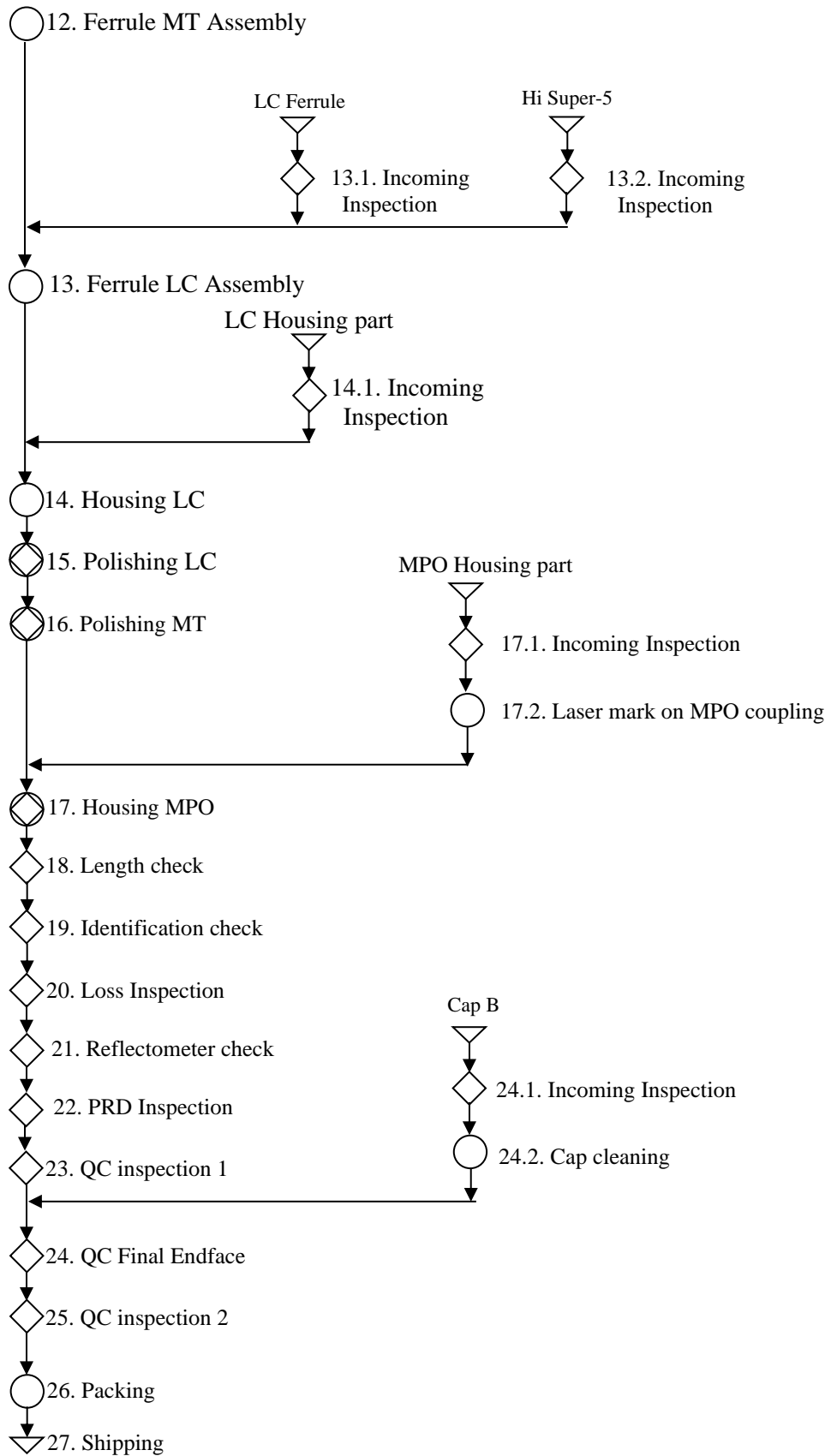
Cross check by: DucTNM
Date: 27-Sep-24

Originator: Le Duy Song Toan
Date: 14-Sep-2017

V. Contents**1. QC Flow chart for all Processes**

Hytrel tube , Sumitube,
Silicone tube, IRRAX tube, Yellow silicon tube





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2. Process condition and control items

Process		Quality Control Items	Instrument	Sampling size	Related document	SIC
No.	Name					
1.1	Incoming Inspection Hytrel tube, Sumitube, Silicone tube, IRRAX tube, Yellow silicon tube	Refer to 9-Pr-012				QAE, PRD
1	Cut & Aging	All tube: Type, Quantity	Manual	All	4-OP-0302	PRE, PRD
		Cutting length for hytrel tube	Ruler	3pcs/ID		
		Appearance hytrel tube	Visual	5pcs/ID		
		Spiral cut direction and pitch	Jig	All		
		Aging condition: temperature, time-hytrel tube	Oven, Recorder	All		
2	Laser marking	- Laser marking position on hytrel tube	-Jig, laser machine	(3pcs/ laser jig)	4-OP-0302 9-PR-008- 5-WI-0012	PRE, PRD
		- Laser depth, quantity and size on hytrel tube	- Template & CCD camera			
		- Laser marking position, - Direction	-Jig	All		
		- Content on MT, coupling, frame	Visual			
		- Laser condition	- Laser machine and program			
3.1	Incoming Inspection FAU	Refer to 9-Pr-012				QAE, PRD
3.2	Incoming Inspection Cerrocast tube	Refer to 9-Pr-012				QAE, PRD
3.3	Storage in Nitrogen box (Cerrocast)	Control RH%	Humidity meter	All	4-OP-0302	PRE, PRD
		Expire date	Manual			
3	FAU Preparation	Mark type, position on fiber	Ruler, mark pen, jig	All	4-OP-0302 9-PR-008- 5-WI-0012	PRE, PRD
		Fiber cutting length	Ruler			
		Array direction in prepare jig	Jig			
		Fiber order	Jig			
		Array position, direction in holder	Visual			
		Amount adhesive (Rework)	Visual			
		Epoxy curing dryness (Rework)	Heater			
		Fiber appearance (Rework)	Microscope			
4	FAU Stripping	Fiber strength	Pull force tool	Daily		
		Array position on holder	Visual	All	4-OP-0302 9-PR-008- 5-WI-0012	PRE, PRD
		Array direction	Visual			
		Stripping length	Hot air stripper			
		Fiber order	Visual			
		Bare fiber appearance after stripping	Visual			
5.1	Incoming Inspection Alloy	Refer to 9-Pr-012				QAE, PLN
5	Cerrocast	Stripping point position	Template	All	4-OP-0302 9-PR-008- 5-WI-0012	
		Fiber order	Visual			
		Stripping length	Template			
		Direction and position of cerrocast tube on cerrocast machine	Visual			
		Fiber stretching on clamp	Manual			
		Cerrocast tube appearance after soldering	Visual			
6	Leak Inspection	Fiber appearance on 2 sides of cerrocast before apply adhesive	Microscope	All	4-OP-0302 9-PR-008- 5-WI-0012	PRE, PRD
		Helium pressure	Pressure meter			

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		Leak rate	Machine and programs			
7.1	Incoming Inspection Encapsulation Adhesive	Refer to 9-Pr-012				QAE, PLN
7	Encapsulation	Soldering protrusion	Polishing tool/ Auto machine Visual	All	4-OP-0302 9-PR-008-5-WI-0012	PRE PRD
		Adhesive amount	Visual			
		Adhesive dryness	Oven			
		Adhesive appearance on 2 sides of cerrocast	Visual			
		Length check	Template			
8.1	Incoming Inspection O/E Cap	Refer to 9-Pr-012				QAE, PLN
8.2	Incoming inspection Citranox	Refer to 9-Pr-012				QAE, PLN
8.3	Incoming inspection DI water	Refer to 9-Pr-012				QAE, PLN
8	O/E Cap cleaning	O/E Cap cleanness, appearance	Visual	All	4-OP-0302 9-PR-008-5-WI-0012	PRE, PRD
		Storage in Nitrogen box (Control RH%)	Humidity meter			
9.1	Incoming inspection LC housing part	Refer to 9-Pr-012				QAE, PLN
9	Part Insertion	Part Type	Manual	All	4-OP-0302 9-PR-008-5-WI-0012	PRE, PRD
		Part order, direction, quantity	Part jig	All		
		Hytre tube appearance	Visual	3pcs/ID		
		Laser marking on hytre tube				
		Length of hytre tube	Ruler	3pcs/ID		
10.1	Incoming inspection FAA adhesive	Refer to 9-Pr-012				QAE, PLN
10.2	Incoming inspection Kapton tape (Apply for Trillian Shuffle Assy)	Refer to 9-Pr-012				QAE, PLN
10.3	Incoming inspection Teptra tape	Refer to 9-Pr-012				QAE, PLN
10.4	Label printing	Print content	Printer condition	All	4-OP-0302 9-PR-008-5-WI-0012	PRE, WH
		Label appearance after print	Visual			
10	Fiber Mapping & Branching	Array direction, cerrocast group position, O/E cap direction	Jig	All	4-OP-0302 9-PR-008-5-WI-0012	PRE, PRD
		O/E cap preservation (prevent oxidize)	Silica bag, zip lock bag			
		Cerrocast tube, fiber preservation (prevent fiber damage)	Spiral tube, transportation tray			
		Marking	Jig, marking pen			
		IRRAX tube length, Yellow silicon tube length, Silicone tube length	Ruler, jig			
		Sumitube quantity	Manual			
		Sumitube length	Ruler, jig			
		Hytre tube direction	Visual	All		
		Silicon tube direction (for Trillian Shuffle Assy)	Visual			
		Sequence ribbon of ribbon mapping	Visual			
		Hytre tube, sumitube position	Visual			
		Heat condition	Heater			
		Matching of final LC teptra labels with fiber color & fiber group	Jig			

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11.1	Incoming inspection Threebond adhesive	Refer to 9-Pr-012				QAE, PLN
11	Gathering	Matching fiber order and port No.	Template, dummy MT ferrule, jig, CCD camera	All	4-OP-0302 9-PR-008- 5-WI-0012	PRE PRD
		Fiber cutting position	Visual			
		Adhesive amount	Visual			
		UV adhesive position and area	Jig			
		Adhesive curing dryness	UV heater			
		Adhesive appearance check after drying	Visual			
12.1	Incoming inspection Super X	Refer to 9-Pr-012				QAE, PLN
12.2	Incoming inspection MT Ferrule, boot	Refer to 9-Pr-012				QAE, PLN
12.3	Incoming inspection Epotek 353ND	Refer to 9-Pr-012				QAE, PLN
12.4	Adhesive mixing (Epotek 353ND)	Epotek type	Manual	All	4-OP-0302 9-PR-008- 5-WI-0012	PRE, PRD
		Mixing ratio	Scale			
		Mixing time	Timer			
		Air bubble removing	Centrifugal machine			
		Air bubble checking	Visual			
		Pot life control	Clock			
12	Ferrule MT Assembly	MT ferrule type	Manual	All	4-OP-0302 4-OP-0398 9-PR-008- 5-WI-0012	PRE, PRD
		Fiber stripping length	Stripper			
		Bare fiber quality (clean)	Dusper, alcohol			
		Fiber strength	Screening			
		Bare fiber cutting length	Cleaver			
		Epotek amount	Manual			
		Curing condition: temperature, time	Heater			
		Hardness of Epotek	Heater			
		Epotek on MT ferrule body	Microscope			
		Air bubble/ contamination/ adhesive amount inside MT window				
		Bare fiber protrusion after heating	Cutting machine			
		UV adhesive check at boot end	Visual			
13.1	Incoming inspection LC ferrule	Refer to 9-Pr-012				QAE, PLN
13.2	Incoming inspection Hi Super-5	Refer to 9-Pr-012				QAE, PLN
13	Ferrule LC Assembly	LC ferrule type	Manual	All	4-OP-0302 4-OP-524 9-PR-008- 5-WI0012	PRE, PRD
		Fiber stripping length	Stripper			
		Bare fiber quality (clean)	Dusper, alcohol			
		Fiber strength	Screening			
		Epoxy resin amount and shape	Manual, visual			
		Epoxy resin length inside tube	Template			
		Epoxy resin hardness	Timer, manual			
		Bare fiber cutting length	Bar cutter with template			
		Epotek amount	Dispenser machine, manual			
		Curing condition: temperature, time	Heater			
		Hardness of Epotek	Heater			
		Bare fiber protrusion after heating	Bar cutter			
		Insertion length	Mark/ Template			
14.1	Incoming inspection LC housing part	Refer to 9-Pr-012				

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14	Housing LC	Adhesive on ferrule appearance	Microscope, ring gauge	All	4-OP-0302	PRE, PRD
		Quantity of part	Manual		9-PR-008-5-WI-0012	
		Part type	Visual			
		Part oder and direction	Manual			
		Housing key direction	Manual, jig			
		Spring function check	Manual, jig			
15	Polishing LC	Ferrule setting position	Visual	All	4-OP-526	PRE, PRD
		Polishing condition	Polisher		4-OP-0397	
		Life time of polishing sheet	Manual		4-OP-0302	
		Ferrule endface diameter (length)	Template, endface system	2 con/jig or repol product	9-PR-008-5-WI-0012	
		Ferrule & fiber Endface	Microscope,template	All		
		System accuracy	Master samples	Daily		
		Endface geometry: offset, radius, fiber height	Interferometer machine	All		
16	Polishing MT	Position & direction of MT on chucking jig	Visual		4-OP-0302	PRE, PRD
		Polishing Condition	Polisher	All	9-PR-008-5-WI-0012	
		Fixing force	Torque driver	Daily		
		Life time of polishing sheet	Manual			
		Fiber End face and ferrule surface check	Microscope	All		
		Ferrule length check	Micrometer	1 con/jig		
		MT endface geometry	Interferometer machine	All		
17.1	Incoming inspection MPO housing part	Refer to 9-Pr-012				QAE, PLN
17.2	Laser mark on MPO Coupling (Apply for Trillian Shuffle Assy)	Laser content. Position, direction	Machine Jig	All	4-OP-0302	PRE, PRD
		Laser appearance	Visual		9-PR-008-5-WI-0012	
17	Housing MPO	MT Appearance: MT ferrule surface	Visual		4-OP-0302	PRE, PRD
		Housing: type, quantity	Manual		4-OP-0393	
		Housing: color	Visual		9-PR-008-5-WI-0012	
		MPO assembly	Manual			
		Matching laser content on MT and coupling color	Visual			
		Key direction and coupling color	Visual			
		Premier Pin check	Manual			
18	Length check	Length from end of cerrocast to MPO connector end, LC boot end	Ruler/ Jig	All	4-OP-0302	PRE, PRD
		Length from tube to MPO connector end, LC boot end			9-PR-008-5-WI-0012	
		Length of hytel tube inside sumi tube				
		Tube, tape position				
19	Identification check	Right fiber order	Identification system	All	4-OP-0302	PRE, PRD
		Right label connect	Camera		9-PR-008-5-WI-0012	
20	Loss Inspection	MT product end face	Microscope	All	4-OP-0302	PRE, PRD
		P0 & IL value	Loss system		9-PR-008-5-WI-0012	
		Master cord end face	Microscope			
21	Reflectometer check	Fiber broken inside LC, MPO, Cerrocast tube, Array and outside connector	Reflectometer system	All	4-OP-0302	PRE, PRD
22	PRD inspection	Fiber ribbon appearance	Microscope	All	4-OP-0302	PRE, PRD
		Fiber thickness for rework	Template, microscope		9-PR-008-5-WI-0012	

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23	QC Inspection 1	MT, LC ferrule appearance	Visual	All	4-OP-0302 9-PR-008- 5-WI-0012	QAE, PRD
		Pin MT appearance				
		MT ferrule movement				
		Spring check	Jig			
24.1	Incoming inspection Cap B	Refer to 9-Pr-012				QAE, PLN
24.2	Cap Cleaning	Cleaning condition	Ultrasonic	All	000-4-WI- 013	PRE, PLN
24	QC Final endface	Ferrule & Fiber Endface Endface capture	Microscope, core counter, PC	All	4-OP-0302 9-PR-008- 5-WI-0012	QAE, PRD
25	QC Inspection 2	Length from cerrocast to array	Ruler	1pc/ID	4-OP-0302 9-PR-008- 5-WI-0012	QAE, PRD
		Length from cerrocast to MPO connector end, LC boot end				
		Length from tube to MPO connector end, LC boot end				
		Tube, tape position				
		Array, O/E cap appearance	Visual	All		
		Fiber appearance				
		Label content and appearance				
		Fiber direction with O/E cap	Jig			
		Outside connector appearance	Jig, visual			
26	Packing 	Quantity of silica gel bag	Jig	All	4-OP-0302	QAE, PRD
		Label content	Visual	2pcs/PO		
		Label position, direction, appearance	Visual	All		
		Products Quantity/box	Label fixing java soft			
		Quantity of Label Product Name Carton box size	Visual			
27	Shipping	Refer to shipping standard		All	4-OP-0302	PLN

VI. Record:

No.	Record	Retention time	Responsibility for keeping
-	-	-	-

- Identification, storage, protection, retrieval & disposition of these records refer to 0-PR-004 Control of record.

Note: Nonconforming product/material shall be identified & controlled according to relevant procedures: 9-PR-008.

REVISION HISTORY

Date	Person	Version	Description		Reason	Requester
			Old content	New content		
27-Sep-24	HangVT	36	26. Packing - - Process condition and control items: Label content, Instrument: Visual, Barcode reader, Sampling size: All	26. Packing - Process condition and control items Quantity of silica gel bag, Instrument: Jig, sampling size: All - Process condition and control items: Label content, Instrument: Visual, Barcode reader, Sampling size: 2pcs/ PO	Correction	DucTNM
12-Aug-24	DienDC	35	2.Process condition and control items 1.1 Incoming Inspection -QAE, PLN 3.1 Incoming Inspection FAU -QAE, PLN 3.2 Incoming Inspection Cerrocast tube - QAE, PLN	2.Process condition and control items 1.1 Incoming Inspection -QAE, PRD 3.1 Incoming Inspection FAU -QAE, PRD 3.2 Incoming Inspection Cerrocast tube -QAE, PRD	New organization chart	ChienPH
			2. Laser marking - NA - Depth	2. Laser marking -Direction - None	Correction	
			6. Leak Inspection -None	6. Leak Inspection - Fiber appearance on 2 sides of cerrocast	Correction	
			7. Encapsulation - Fiber appearance on 2 sides of cerrocast before apply adhesive	7. Encapsulation -None	Correction	
9-May-24	DienDC	34	V. Content 2.Process condition and control items 1. Cutting and aging - Cutting length: all 2.Laser marking - None 3.FAU preparation - FAU type - Fiber Appearance - Cerrocast tube appearance - Matching of label No. and marking -None -None 4.Fau stripping - Fiber clamp appearance -Stripping condition -Ribbon setting	V. Content 2.Process condition and control items 1. Cutting and aging - Cutting length for hytrel tube: 3pcs/ID 2.Laser marking - Laser marking position, depth, content on MT, coupling, frame 3.FAU preparation -Remove -Remove -Remove -Remove - Cerrocast direction - Fiber order 4.Fau stripping -Remove -Remove -Remove	Correction Correction Correction Correction	ChienPH

			-Nozzle appearance - None - None - None - None	-Remove - Holder direction - Stripping length - Fiber order - Fiber pull force		
			5. Cerrocast - Soldering condition -NEST's clamps position - Ribbon alignment jig position - None - None	5. Cerrocast -Remove -Remove -Remove - Stripping length -Fiber order	Correction	
			6. Leak Inspection - Length from cerrocast to array	6. Leak Inspection - Remove	Correction	
			7.Encapsulation - Adhesive amount - Adhesive curing condition - Fiber appearance on 2 sides of cerrocast before apply adhesive -Adhesive appearance on 2 sides of cerrocast - Solder protrusion - None	7. Encapsulation - Fiber appearance on 2 sides of cerrocast - Solder protrusion - Adhesive amount - Adhesive dryness - Fiber appearance on 2 sides of cerrocast - Length check	Correction	
			11. Gathering -Adhesive amount -Matching fiber order and port No. -Fiber cutting position -UV adhesive position and area -Adhesive curing condition -Adhesive appearance check after drying	11. Gathering - Matching fiber order and port No. -Fiber cutting position -Adhesive amount -UV adhesive position and area -Adhesive curing dryness -Adhesive appearance check after drying	Correction	
			12. Ferrule MT Assembly -Stripping length -None -None - Fiber cutting length -None	12 Ferrule MT Assembly Fiber stripping length Bare fiber quality (clean) Fiber strength Bare fiber cutting length Epotek amount	Correction	
			12.3 Laser mark on MT ferrule	-Remove	Correction	
			13. Ferrule LC Assembly -None	13. Ferrule LC Assembly	Correction	

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			-None -None 14. Housing LC - None 15. Polishing LC -None -None 16. Polishing MT - Premier Pin check	-Epoxy resin amount and shape -Epoxy resin length inside tube -Epoxy resin hardness 14. Housing LC - Adhesive on ferrule appearance 15. Polishing LC -Ferrule endface diameter (length) -System accuracy 16. Polishing MT -Remove	Correction Correction Correction	
19-Feb-24	PhuDT	33	VI. Review	VI. Review -Remove	Update new format for QC flow chart: 0-Pr-001-0- TEM-003 Version 7	BanNT
21-Dec-23	PhuDT	32	III. References Specification HE-1321- 023\$002 HE-1321-001\$004 HE-1321-004\$003 FMEA: 0-PR-012-0-FO-001-5-RC-0028 Version 27 V. Content 2. Process condition and control items 1. Cut & Aging - All tube: Lot No., 3. FAU Preparation - Lot No., 5. Cerrocast - Lot No., Expiry date 7. Encapsulation - Lot No. Expiry date 9. Part Insertion - Lot No., 11. Gathering - Lot. No & expiry date 12.5 Adhesive mixing (Epotek 353ND) - Epotek 353ND Lot No. Expiry date 12. Ferrule MT Assembly - MT ferrule Lot No	III. References Specification HE-1321- 023\$003 HE-1321-001\$005 HE-1321-004\$004 FMEA: 0-PR-012-0-FO-001-5-RC-0028 Version 29 V. Content 2. Process condition and control items 1. Cut & Aging - Remove 3. FAU Preparation - Remove 5. Cerrocast - Remove 7. Encapsulation - Remove 9. Part Insertion - Remove 11. Gathering - Remove 12.5 Adhesive mixing (Epotek 353ND) - Epotek 353ND 12. Ferrule MT Assembly MT ferrule Lot No - MT ferrule	- Customer update specification Update FMEA version follow 4M cancel record data length: 4-Pr-007-4-Fo-0007-9-RC-0069 Update new format for QC flow chart: 0-Pr-001-0- TEM-003 Version 7 Update new format for QC flow chart: 0-Pr-001-0- TEM-003 Version 7	BanNT BanNT

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			- Stripper No, Jig No., Heater No. 13. Ferrule LC Assembly - LC ferrule Lot No. - Stripper No, Jig No., Heater No 15. Polishing LC - Polisher No. 16. Polishing MT - Polisher No. 17. Housing MPO - Lot No.,	- Remove 13. Ferrule LC Assembly - LC ferrule - Remove 15. Polishing LC - Remove 16. Polishing MT - Remove 17. Housing MPO - Remove		
29-Sep-23	PhuDT	31	V. Content 2.Process condition and control items Item 7 Encapsulation Soldering protrusion : Polishing tool Visual	V. Content 2.Process condition and control items Item 7 Encapsulation Soldering protrusion : Polishing tool/ Auto machine Visual	Follow 4-Pr-007-4-Fo-0007-4-RC-0018	BanNT