

## QUALITY CONTROL FLOW CHART OF COMBINER UNIT

QC FLOW CHART: 4-QC-0505

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**I. Purpose:**

This QC flow chart is used for setting up the manufacturing process for Combiner Unit

This QC flow chart concerns to Production (PRD), Production engineering (PRE), Quality assurance (QA), Logistic (LOG) and Planning (PLN).

**II. Application:**

This QC flow chart is applied to all kind of Combiner Unit and their sub parts manufactured in Fujikura Fiber Optics Vietnam Ltd as below:

Table II.1 List of Combiner Unit

No.	Product code (Main)	Product code (Sub)	Operation procedure	Product name	Product type	Purchase specification
1	FCU0001	FSC0002	4-OP-0505	CUC-CMSU Assy(T100)	CUC-CMSU Assy(T100)	SPC3-10707(4)
2	FCU0002	FSC0004	4-OP-0505	CUC-CMSU Assy(T100)	CUC-CMSU Assy(D100)	SPC3-10707(4)
3	FCU0003	FSC0006	4-OP-0505	CUC-CMSU Assy(T50)	CUC-CMSU Assy(T50)	SPC3-10707(4)
4	FCU0004	FSC0008	4-OP-0505	CUC-CMSU Assy(D50)	CUC-CMSU Assy(D50)	SPC3-10707(4)
5	FSC0001	FSC0002	4-OP-0505	CMBU-CMS(T100)	CMBU-CMS(T100)	SPC3-10708(3)
6	FSC0003	FSC0004	4-OP-0505	CMBU-CMS(D100)	CMBU-CMS(D100)	SPC3-10709(3)
7	FSC0005	FSC0006	4-OP-0505	CMBU-CMS(T50)	CMBU-CMS(T50)	SPC3-10708(3)
8	FSC0007	FSC0008	4-OP-0505	CMBU-CMS(D50)	CMBU-CMS(D50)	SPC3-10709(3)

Checked by: Dao Ngoc Trung  
Date : (follow DMS)

Approved by: Division Manager  
Date: (follow DMS)

Prepared by: TungDD 10745  
Date : 23<sup>rd</sup> Oct, 2024

Originator: TungDD -10745  
Date: 3<sup>rd</sup> Aug, 2023

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**III. Reference Documents:**

- Customer specification

**Table III.1 General specifications**

04

No.	Purchase specification	Specification category	Product application	Remarks
1	SPC3-10714(2)	Packing (CMBU)	CUC-CMSU Assy(T100) CUC-CMSU Assy(D100) CUC-CMSU Assy(T50) CUC-CMSU Assy(D50)	
2	SPC3-10717(2)	Packing (CMS)	CMBU-CMS(T100) CMBU-CMS(D100) CMBU-CMS(T50) CMBU-CMS(D50)	
3	SPC3-10718(2)	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(2)	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(4)	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(1)	Outsourcing Specifications Appearance Inspection Standards (Mechanical Parts)	CUC-CMSU Assy(T100) CUC-CMSU Assy(D100) CUC-CMSU Assy(T50) CUC-CMSU Assy(D50)	
7	SPC3-10740(1)	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.2 Working direction and Working instruction list**

No.	Working direction/Working instruction	Application description	Process
1	PSB78-8013-31-03	CMBU-CMS Quartz Material Acceptance Inspection Standards	Incoming inspection

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- FMEA: 0-PR-012-0-FO-001-4-RC-0184 version 02
- Other reference document:  
4-OP-0505: OPERATION PROCEDURE OF COMBINER UNIT

**IV. Term definition:**

FOV: Fujikura Fiber Optics Viet Nam

OCAP: Out of Control Action Plan

SIC: Section In Charge

CMS: Clad Mode Stripper

CMBU: Combiner Unit

**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	

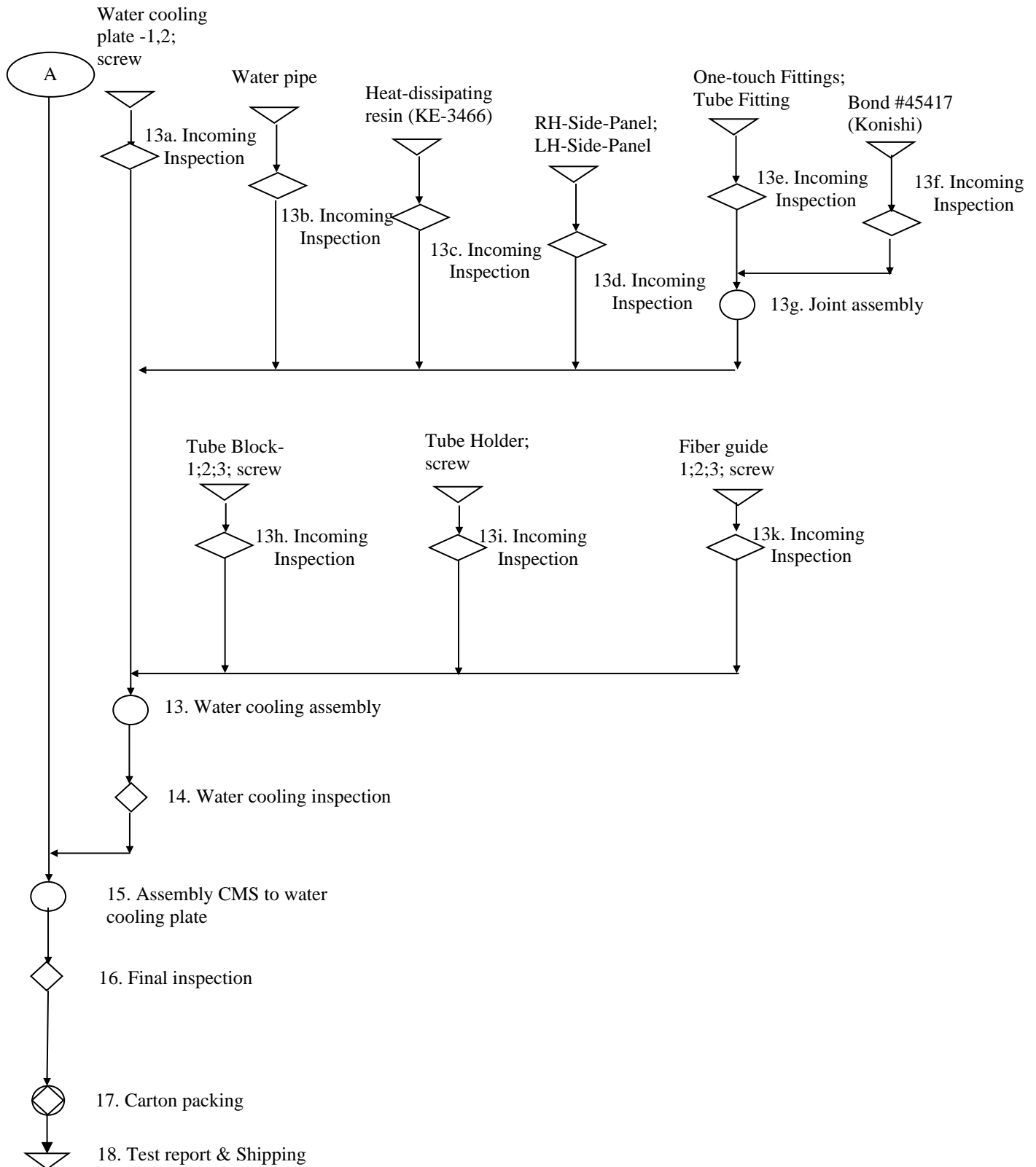


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## 2. Quality Control Items for each process:

Quality control items for detail of CMS as shown in the following table:

Process		Quality Control Items	Instrument	Sampling	Related Document	PIC
No.	Name					
1a	0.65NY-LDC fiber (100/140/360, NA0.153), 0.65NY-BDO fiber (50/70/360)	Refer to 9-PR-012				QAE PRD_INC
1	Cutting	Fiber type	Visual	All	4-OP-0505	PRD PRE
		Cutting length	Template			
2	Marking	Identify CMS	Label	All	4-OP-0505	PRD PRE
		Marking color	Marking pen			
		Marking order	Manual			
		Marking position	Tape measure			
		Marking length	Tape measure			
		Fiber winding diameter	Tape measure			
3	Fiber stripping	Stripping order	Visual	All	4-OP-0505	PRD PRE
		Stripping times	Visual			
		Stripping direction	Visual			
		Start position	Visual			
		Stripping appearance	Light			
		Stripping length	Template			
4a	Incoming inspection (QE-F5, QE-FG1, QE-FG2) QE-FG2: only use for CMBU-CMS double type	Refer to 9-PR-012				QAE PRD_INC
4	Cleaning & Etching	Bare fiber appearance (contamination, damaged)	Light	All	4-OP-0505	PRD PRE
		Etching gel type	Visual			
		Etching gel expired date	Program			
		Etching order	Etching jig			
		Etching temperature	Thermal control system & Etching jig			
		Etching time	Timer			
		Etching gel length	Etching jig			
		Etching removal time (after Etching)	Timer			
		Etching appearance	Led flash loupe			
		Etching length after cleaning	Ruler			
5a	Incoming inspection (CMS block)	Refer to 9-PR-012				QAE PRD_INC
5b	Incoming inspection (Quartz plate, quartz side block)	Refer to 9-PR-012				QAE PRD_INC
5c	Incoming inspection (Resin SE-9186)	Refer to 9-PR-012				QAE PRD_INC
5d	Incoming inspection (Resin KE-3466)	Refer to 9-PR-012				QAE PRD_INC
5	CMS enclosure assembly	Material appearance (No dirty, dent, scratch)	Visual	All	4-OP-0505	PRD PRE
		Resin expired date	Program			
		Resin SE-9186 Clear amount	Visual			
		Quartz plate position	Visual			
		Resin KE-3466 amount	Visual			
		Quartz plate block position	Position fixing jig			

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		Gap between position jig and CMS block	Slim gauge				
		Waiting time for opening position fixing	Timer				
		Waiting time after open position fixing jig	Timer				
6a	Incoming inspection (CMS cover)	Refer to 9-PR-012				QAE PRD_INC	
6b	Incoming inspection (UB-0305)	Refer to 9-PR-012				QAE PRD_INC	
6c	Incoming inspection (OF-600A,B)	Refer to 9-PR-012				QAE PRD_INC	
6d	Mixing resin	Resin type	Visual	All	4-OP-0505	PRD PRE	
		Resin mixing rate	Weight				
		Mixing time	Mixing machine				
		Defoaming time	Mixing machine				
		Vacuum pressure	Vacuum machine				
		Vacuum time	Vacuum machine				
		Expired after vacuum	Visual				
6	Reinforcement	UV resin expired date	Program	All	4-OP-0505	PRD PRE	
		CMS lid appearance	Visual				
		Resin appearance	Led flash 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/ curing temperature	Heater				
		Resin curing status	Visual, Tool (Jig)				
		CMS lid direction	Visual				
		Screw type	Visual				
		Screw position	Visual				
		Screw quantity	Visual				
		Screw tighten	Torque driver				
		CMS lid appearance	Visual				
7	Transmittance inspection	Inspection condition (Temperature and humidity)	Thermal & humidity recorder	All	4-PR-014	PRD PRE	
		Connection diagram	Visual	All	4-OP-0505 000-4-WI-0689		04
		P core value	Measurement system				
		P0 value	Measurement system				
		P1 value	Measurement system				
		Stability time	Timer				
		Transmittance judgment	Template				
8	CMS final inspection	Screw quantity	Visual	All	4-OP-0505	PRD_QC QAE	
		CMS appearance (metal part)	Visual				
		Winding diameter	Winding Tool				
9	Final inspection (For Sub part)	Product Structure	Visual	All	4-OP-0505	PRD_QC QAE	
		Screw quantity of CMS	Visual/Template				
		Appearance of CMS	Visual				
		Fiber length (in/out)	Template				
		Fiber appearance	Visual Microscope (Confirm NC)				

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		Winding diameter	Winding Tool			
10	Casing and packing (Inner packing) (For Sub part)	Screw type	Visual	All	4-OP-0505	PRD_QC QAE
		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 content	Visual	1pc/roll		
		Label appearance	Visual	All		
		Label position	Visual			
11	Carton packing (For Sub part)	Cardboard appearance	Visual	All	4-OP-0505	PRD_QC QAE
		Cardboard type	Visual/Program			
		Cushion appearance	Visual			
		Cushion type	Visual			
		Cushion quantity	Visual			
		Packing quantity	Visual and Program			
		Label content	Visual	1pc/roll		
		Label appearance	Visual	All		
Storage condition (temperature and humidity)	Thermal & humidity recorder					
12	Shipping (For Sub part)	P/O No.	Visual	All	4-OP-0505	PLN
		Quantity of shipping box	Visual			
		Appearance of cargo when transferring to forwarder.	Visual			
13a	Incoming inspection (Water cooling plate-1,2, screw)	Refer to 9-PR-012				QAE PRD_INC
13b	Incoming inspection (Water pipe)	Refer to 9-PR-012				QAE PRD_INC
13c	Incoming inspection (Heat-dissipating resin (KE-3466))	Refer to 9-PR-012				QAE PRD_INC
13d	Incoming inspection (RH/LH side panel)	Refer to 9-PR-012				QAE PRD_INC
13e	Incoming inspection (One-touch Fittings; Tube Fitting)	Refer to 9-PR-012				QAE PRD_INC
13f	Incoming inspection (Bond#45417)	Refer to 9-PR-012				QAE PRD_INC
13g	Joint part assembly	One-touch coupling appearance	Visual	All	4-OP-0505	PRD PRE
		Tube Fitting appearance	Visual			
		Bond volume	Weight scale			
		Mixing time	Timmer			
		Joint torque	Wrench torque			
13h	Incoming inspection (Tube block-1;2;3; screw)	Refer to 9-PR-012				QAE PRD_INC



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
13i	Incoming inspection (Tube holder; screw)	Refer to 9-PR-012				QAE PRD_INC
13k	Incoming inspection (Fiber guide 1;2;3; screw)	Refer to 9-PR-012				QAE PRD_INC
13	water cooling plate Assembly	Heat-dissipating adhesive expired date	Program	All	4-OP-0505	PRD PRE
		Water cooling plate-1,2 appearance	Visual			
		Water pipe appearance	Visual			
		Panel appearance	Visual			
		Tube block-1;2;3 appearance	Visual			
		Tube holder appearance	Visual			
		Fiber guide appearance	Visual			
		Resin amount	Weight			
		Resin application time	Timer			
		Gap between cooling plate	Slim gauge			
		Wrench tighten	Torque wrench			
		Screw type	Visual			
		Screw position	Visual			
		Screw quantity	Template			
		Screw tighten	Torque driver			
		Water cooling plate 1,2 deviation	Assembly jig			
		Water cooling gap	Thickness gauge			
14	Cooling inspection	Heater temperature	Heater jig	All	4-OP-0505	PRD PRE
		Water flow	Cooling jig			
		Temperature of input side	Thermal meter			
		In/Out connection	Cooling jig			
		Testing position	Position jig			
		Temperature characteristic	Thermal meter			
		In/Out air connection	Connector			
		Air pressure	Pressure meter			
		Dry time	Timer			
15	Assembly CMS to cooling water	CMS arrangement	Visual	All	4-OP-0505	PRD PRE
		Screw type	Visual			
		Screw quantity	Visual			
		Screw tighten	Torque driver			
		CMS position	Visual			
		Fiber curve	Template			
16	Final inspection	Product Structure	Visual	All	4-OP-0505	PRD_QC QAE
		Mechanical appearance	Visual			
		Product length	Template			
		Fiber appearance	Visual Microscope (Confirm NC)			
		Fiber bending diameter	Template			
		Fiber winding diameter	Winding Tool			
17	Carton packing	Cardboard appearance	Visual	All	4-OP-0505	PRD_QC QAE
		Cardboard type	Visual/Program			
		Cushion appearance	Visual			
		Cushion type	Visual			
		Cushion quantity	Visual			
		Packing quantity	Visual and Program			
		Label content	Visual	1pc/roll		

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18	 Test report & Shipping	Label appearance	Visual	All		
		Label position	Visual			
		Storage condition (temperature and humidity)	Thermal & humidity recorder			
		P/O No., Product name	Visual	All	4-OP-0505	PLN
		Shipping quantity	Visual			
		Test report format	Manual			
		Data in test report	Manual			
		Storage time	Program			

**VI. Review:**

- Regularly review of Production engineering or quality engineer (the engineer(s) designated by PRE/QAE manager and manager as necessary).
- When anybody in FOV found unsuitable points of this QC flow chart & would like to suggest revising it. (Refer to 0-Pr-001: Control of document)

**VII. Record**

No.	Record	Responsibility for keeping	Retention time
1	Related check sheet of PRD	PRD	11 years
2	Related check sheet of QA	QAE	11 years

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.

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## REVISION HISTORY

Date	Person	Ver	Description		Reason of change	Change Requester
			Old contents	New contents		
23 <sup>rd</sup> Oct, 2024	TungDD-10745 Thuong HTH-10399	4	II. Application: Table: General specification	III. Reference Documents (Move) Table: General specification 7. Transmittance inspection: - Add “ 000-4-WI-0689” for Document reference	Make clear & re-arrange following QMS’s audit 2024	PRE2 manager
			-	6. Reinforcement: - Add “Resin curing status”	Action for CAPA-FPL-24-003	
			None	18. Test report and shipping: add test report format and data in test report, storage time	Following QMS’s audit finding 2024	Thuong HTH
20th Jul, 2024	TungDD – 10745	3	Table II.1: SPC3-10707(2)	Table II.1: SPC3-10707(4) Table III.2: SPC3-10720(4) Add SPC3-10690(1) Add SPC3-10740(1) Add Table III.1	Customer requirement	PRE2 manager
			N/A	7. Transmittance inspection: Add “Inspection condition (Temperature and humidity)” Add “Connection diagram” Transmittance judgment -> Template	Expand Internal audit FY2024	
			Section name - Incoming inspection: LOG, QAE - Shipping: LOG, PLN	Section name - Incoming inspection: PRD_INC, QAE - Shipping: PLN	Update FOV organization	
			16. Final inspection: - Fiber bending diameter Ruler/Template	16. - Fiber bending diameter remove Ruler	Correct as actual control	
	Thuong HTH					
3th May 2024	Thuong HTH	2	16. Final appearance inspection, control item: screw quantity	16. Rename: Final inspection; remove control item: screw quantity	Following CO 9-PR-0014-9-FO-0001-9-RC-0031	Thuong HTH
	TungDD-10745		N/A	2. Marking: Add Marking color	Following CO: 9-PR-0014-9-FO-0001-4-RC-0065	PRE2 manager
			III Reference document FMEA: 0-PR-012-0-FO-001-4-RC-0184 version 01	III Refer document FMEA: 0-PR-012-0-FO-001-4-RC-0184 version 02		
Aug 3rd, 2023	TungDD – 10745	1	-	New version	New product	PRE3 Manager