

## QUALITY CONTROL FLOW CHART OF CAVITY-FG (SM980 &amp; PM980)

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**I. Purpose**

- To set up the manufacturing processes which are implemented in Fujikura Fiber Optics Vietnam.
- To determine Quality control items of each process

**II. Application**

- Apply for Cavity – FG (SM980 & PM980) products which is manufactured in Fujikura Fiber Optics Vietnam Ltd.p
- This document concern to Production (PRD), Production Engineering (PRE), Quality Assurance Engineering (QAE), Planning (PLN)

Table II.1. Product general information. 

FOV code	Product number	Part number	Type name	Spectrum type	MCS	Thermal aging (Heating after exposing)	Apply hot air at stripping process
CFS0002	GNK-01F-109B	21148884	DXV	Uniform	Red	Cartridge	Yes
CFS0006	GNK-01F-107B	21051449	DUV	Uniform	Red	Cartridge	Yes
CFS0054	GNK-03TCA-003	P6112555	HCV	Chirped	No	Hot Air	No
CFS0059	GNK-01F-303B	21051449	YUV	Uniform	Red	Cartridge	Yes
CFS0063	GNK-03PUN-001	P2102806	WAV	Uniform	No	No	No
CFS0064	GNK-01F-304B	21148884	YXV	Uniform	Red	Cartridge	Yes
CFS0071	GNK-03FCA-104C	P6114723	KEV	Chirped	Red	No	Yes
CFS0073	GNK-03FCA-103C	P6113705	KDV	Chirped	Red	No	Yes
CFS0074	GNK-03TCA-004	P6112556	HDV	Chirped	No	Hot Air	No
CFS0075	GNK-03FCA-102C	P6112700	KCV	Chirped	Red	No	Yes
CFS0077	GNK-03PUN-004	P6114320	WBV	Uniform	No	No	No
CFS0078	GNK-01F-305B	22099042-001	YAV	Uniform	Red	Cartridge	Yes
CFS0079	GNK-01F-302B	21047391	YEV	Uniform	Red	Cartridge	Yes
CFS0080	GNK-01F-301B	21047390	YDV	Uniform	Red	Cartridge	Yes
CFS0089	GNK-03TUA-101	P6114107	HEV	Uniform	No	Hot Air	No
CFS0090	GNK-03FCA-101C	P6112614	KBV	Chirped	Red	No	Yes
CFS0091	GNK-01-068	30065582-068	SAV	Uniform	Red	Cartridge	No
CFS0092	GNK-01-X03	22136024-002	SCV	Uniform	Red	Cartridge	No
CFS0093	GNK-05FUN-001C	B-22D3004-Type1	CAV	Uniform	No	No	Yes
CFS0097	GNK-03PUA-005	P6114550	XCV	Uniform	No	Cartridge	No

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

Approved by: Department/Division Manager  
Date: (Follow DMS)

Prepared by: VietTA Cross checked by: ChienPH  
Date: 09-Sep-2024

Originator: Le Minh Duy  
Date: 26-Jun-2013

Confidential

FOV 's property, do not take out without FOV BOM's approval

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CFS0098	GNK-03PUA-006	P6114551	XDV	Uniform	No	Cartridge	No
CFS0099	GNK-03PCA-007	P6117152	PAV	Chirped	Red	No	No
CFS0100	GNK-03TUA-104D	P6114107	HHV	Uniform	No	Hot Air	No
CFS0103	GNK-07FUN-001C	3CN51866JAAC	TAV	Uniform	Red Black	Cartridge	Yes
CFS0104	GNK-07FUN-002C	3CN51866LAAC	TBV	Uniform	Red Black	Cartridge	Yes
CFS0105	GNK-07PCA-001	3CN51857JFAC	UAV	Chirped	Red Black	Cartridge	No
CFS0106	GNK-07PCA-002	3CN51857LAAC	UBV	Chirped	Red Black	Cartridge	No
CFS0115	GNK-03PUA-009	1447709	XFV	Uniform	No	Cartridge	No
CFS0116	GNK-03PUA-008	1447708	XEV	Uniform	No	Cartridge	No
#N/A	GNK-03TCA-106	P6117010	HKV	Chirped	No	Hot Air	No
#N/A	GNK-03TUA-102	P6114108	HFV	Uniform	No	Hot Air	No
#N/A	GNK-03TCA-103D	P6117010	HGV	Chirped	No	Hot Air	No
#N/A	GNK-03TUA-105D	P6114108	HJV	Uniform	No	Hot Air	No
#N/A	GNK-01-X02	22136024-001	SBV	Uniform	Red	Cartridge	No

**Noted:** MCS: Marking color specification.

#NA: Will be define when PLN require

### III. Reference documents

- Specification No.:

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Specification	Product Name	Remark
AOP82-4001-27-04(18)	Cavity-FG (SM980 for Lumentum)	
AOP82-4001-27-09(21)	Cavity-FG (SM980 for Coherent)	
AOP82-4001-27-10(17)	Cavity-FG (PM980 for Coherent)	
AOP82-4001-27-11(17)	Cavity-FG (80 um PM980 for Coherent)	
AOP82-4001-27-13(05)	Cavity-FG (SM980 for Dogain Tech)	
AOP82-4001-27-14(05)	Cavity-FG (PM980 for Lumentum)	
AOP82-4001-27-05(26)	Visual inspection of Cavity-FG	
AOP82-4001-27-06(14)	Manufacturing condition of Cavity-FG	
AOP82-4001-27-07(09)	Requirement for quality assurance of Cavity-FG	
AOP82-4001-27-08(24)	Packing requirement of Cavity-FG	
AOP82-4001-27-12(04)	Requirement for Deliverable data and Environmental information of Cavity-FG	
AOP82-4001-27-15 (03)	Cavity-FG (SM980 for 3SP)	
AOP82-4001-27-16 (03)	Cavity-FG (PM980 for 3SP)	

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- **FMEA No.:** 0-PR-012-0-FO-001-4-RC-0186 (Version 4)
- **Operation procedure No.:** 4-OP-378

**IV. Term definition**

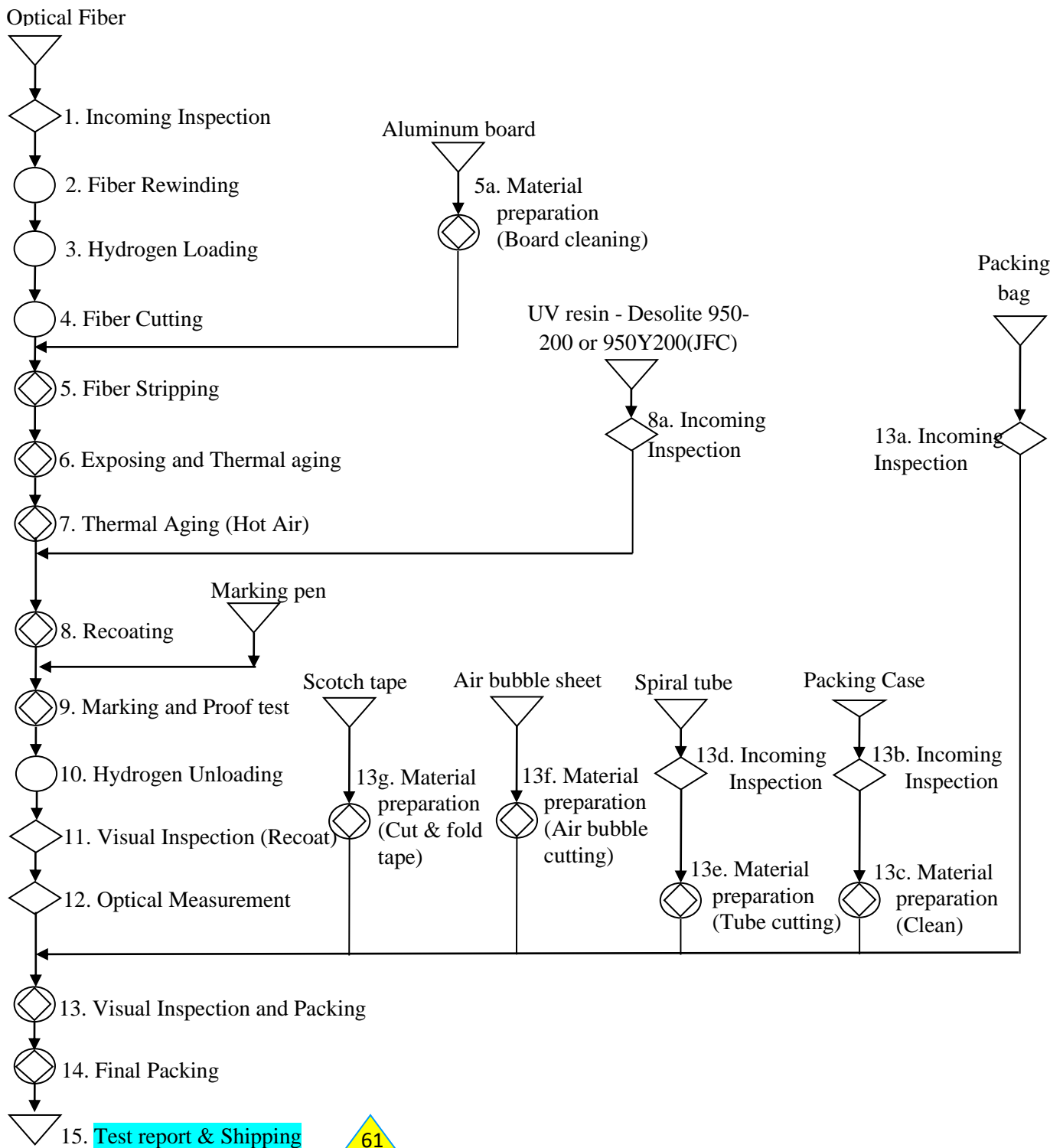
- FG: Fiber Grating
- Recoat: a layer of acrylate material
- OCAP: Out of Control Action Plan

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**V. Contents:****1. QC Flow chart**

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## 2. Quality control items for each process

Process		Quality Control Items	Equipment/ Instrument	Sampling size	Doc. No	Function incharge
No	Name					
1	Incoming Inspection (Optical Fiber)	Follow 9-PR-012				QAE PRD
13g	Material preparation (*) (Cut & fold tape)	- Cutting length	- Machine setting	All	4-OP- 378	QAE PRD
		- Quantity	- Jig			
		- Length of the fold	- Visual			
		- Appearance after cut & fold				
2	Fiber Rewinding	- Fiber Type	- Manufacturing program	All	4-OP- 378	PRD PRE
		- Appearance	- Visual	All		
		- Reel color	- Visual	All		
		- Rewinding length of fiber	- Machine setting	All		
3	Hydrogen Loading	- Reel color	- Visual	All	4-OP- 378	PRD PRE
		- Pot life of fiber	- Visual (expiration date on reel)	All		
		- Loading time	- Clock, Checksheet	All		
		- Pressure	- Hydrogen loading machine	All		
		- Temperature				
	- Storage time @RT	- Clock, Checksheet - Visual (expiration date on reel)	All			
4	Fiber Cutting	- Pot life of fiber	- Program	All	4-OP- 378	PRD PRE
		- Length of cutting	- Jig	All		
		- Appearance	- Visual	All		
		- Position of yellow & red port	- Visual, jig	All		
		- Fiber type	- Visual reel color	All		
5a	Material preparation (Board cleaning)	- Appearance after cleaning	- Visual	All	4-OP- 378	PRD PRE
5	Fiber Stripping	- WIP control	- Visual	All	4-OP- 378	PRD PRE
		- Appearance (UV remain, contamination)	- Microscope	All		
		- Stripping length.	- Program	All		
		- Stripping position	- Visual	All		
		- Product quantity of reel	- Program	All		
		- Hot air temperature (**)	- Machine setting, Visual	All		
		- Hot air strip movement (**)	- Machine setting	All		
6	Exposing and Thermal aging  <i>Noted: Thermal aging has been applied base on requirement of product code (see the Table II. 1 Products general information).</i>	- WIP control	- Visual	All	4-OP- 378	PRD PRE
		- Heating Temperature	- Exposing system (and program)	All		
		- Heating time		All		
		- Position of bare fiber	- Template	All		
		- Exposing result: + Center wavelength + Reflectivity + Full Width Half Max + Side Lobe Suppression Ratio	- Manufacturing program - Measuring system - Machine setting visual	All		
		+ Spectrum type	- Template	All (when		

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				setting condition)		
7	Thermal Aging (Hot Air)	- Hot Air Temperature - Fiber position - Appearance	- Machine Setting - Template - Microscope	All 3pcs/OP/day	4-OP-378	PRD PRE
8a	Incoming Inspection UV resin - Desolite 950-200 or 950Y200(JFC)	Follow 9-PR-012				QAE PRD
8	Recoating	- Appearance (Recoating zone) - Lot adhesive, expiry date - Appearance (shape, dry of UV resin)	- Microscope - Program - Program, visual	Sample All	4-OP-378	PRD PRE
9	Marking (See the Table II. 1 Products general information).	- Appearance - Marking position - Marking length - Recoating length - Marking Color.	- Visual - Template - Art-line pen	All	4-OP-378	PRD PRE
	Proof test	- Proof level. - Fiber pull strain rate	- Proof tester			
10	Hydrogen Unloading	- Unloading time - Unloading temperature	- Oven & Thermal recorder	All	4-OP-378 OCAP 000-4-WI-0170	PRD PRE
11	Visual Inspection (Recoating zone)	- Appearance recoating zone	- Microscope	All	4-OP-378	PRD PRE
12	Optical Measurement	- Splice Loss - Optical Measurement result: + Center wavelength + Reflectivity + Full Width Half Max + Side Lobe Suppression Ratio - Environment temperature	- Manufacturing program - Measuring system - Thermometer (Monitoring system)	All Online monitoring	4-OP-378	PRD PRE
13a	Incoming Inspection Packing Bag (*)	Follow 9-PR-012				QAE PRD
13b	Incoming Inspection Packing Case (*)	Follow 9-PR-012				QAE PRD
13c	Material preparation (Packing case cleaning) (*)	Appearance after cleaning	- Visual	All	4-OP-378	QAE PRD
13d	Incoming Inspection (*) Spiral tube	Follow 9-PR-012				QAE PRD
13e	Material preparation (*) (Tube cutting)	- Cutting length - Quantity - Appearance after cutting	- Cutting jig - Ruler - Visual	3pcs/ Cutting time All 3pcs/ Cutting time	4-OP-378 4-OP-378	QAE PRD QAE PRD

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13f	Material preparation (*) (Air bubble cutting)	- Cutting length	- Ruler	All	4-OP-378	QAE PRD
		- Quantity	- Visual			
		- Appearance after cutting				
13g	Material preparation (*) (Cut & fold tape)	- Cutting length	- Machine setting	All	4-OP-378	QAE PRD
		- Quantity	- Jig			
		- Length of the fold	- Visual			
		- Appearance after cut & fold				
13	Visual Inspection and Packing	- Port layout	- Visual	All	4-OP-378	QAE PRD
			- Visual	All		
		- Appearance of product	- Microscope	NC item (Define NC)		
		- Recoat length	- Template	All		
		- Marking length, position (some product type)	- Ruler	NC item (Define NC)		
		- Port length				
		- Marking: quantity and color (some product type)	- Template	All		
		- Diameter of bundle (some product type)	- Tool/Jig	All		
		- Fiber protrusion length (some product type)	- Template	All		
		- Contamination	- Ionizer Fan	All		
		- Appearance of packing material	- Visual	All		
		- Quantity of packing material	- Tool/Jig	All		
			- Tool/Jig	All		
		- Spiral tube length	- Ruler	3pcs/ cutting time		
		- Spiral tube position on product	- Template	All		
		- Content of label Product and case	- Visual	1pc/roll		
		- Appearance of label Product and case	- Visual	All		
		- Product label: Side, direction and position	- Template	All		
		- Case label: Direction and position (some product type)	- Visual	All		
		- Quantity of product in a packing unit (case/tray/box)	- Program - Jig	All		
		- Order of product in a packing unit (case/tray/box)	- Program	All		
		- Arrangement of product in a packing unit (case/tray/box)	- Visual	All		
14	Final Packing	- Appearance of box	- Visual	All	4-OP-378	QAE PRD
		- Content of label (Innerbox, Outerbox)	- Visual	1pc/roll		
		- Appearance of label (Innerbox, Outerbox)	- Visual	All		
		- Quantity & order of packing tray/case in an innerbox	- Program	All		
		- Quantity & order of innerbox in an outerbox	- Program	All		

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		- Arrangement of case/tray/innerbox in an innerbox/outerbox	- Visual	All		
		Storage condition (Thermal)	- Thermal recorder	All		
15	Test report & Shipping 	- Quantity of product - Label - PO No.	- Visual	All	4-OP-378	PLN
		- Form of test report - Judgment of product	- Manual - Program	All	4-OP-378	QAE

(\*) These processes are applied for some product codes based on specification requirement.

(\*\*) Applied for some product types which define at Table II.1 Products general information, "Apply hot air at stripping process" column

**VI. Data record:**

No	Record	Responsibility for keeping	Retention time
1	Relative check sheet created by Production Section	Production	15 years
2	Relative check sheet created by Quality Assurance Section (QAE)	Production	15 years
3	Test Report	Quality Assurance Engineering (QAE)	15 years

**REVISION HISTORY**

Date	PIC	Ver	Content		Reason	Change Requester
			Old description	New description		
09-Sep-2024	VietTA	61	Table II.1. Product general information. N/A	Table II.1. Product general information. Add new products XFV, XEV product	-Update new specification version.	TrungDN
			III. Reference documents Specification No.: - AOP82-4001-27-04(17) - AOP82-4001-27-09(20) - AOP82-4001-27-10(16) - AOP82-4001-27-11(16) - AOP82-4001-27-13(04) - AOP82-4001-27-14(04) - AOP82-4001-27-05(25) - AOP82-4001-27-15 (02) - AOP82-4001-27-16 (02)	III. Reference documents Specification No.: - AOP82-4001-27-04(18) - AOP82-4001-27-09(21) - AOP82-4001-27-10(17) - AOP82-4001-27-11(17) - AOP82-4001-27-13(05) - AOP82-4001-27-14(05) - AOP82-4001-27-05(26) - AOP82-4001-27-15 (03) - AOP82-4001-27-16 (03)		
	ThuyNTD		V. Content: N/A	V. Content: Add item "Test report" at item 15: Test report & Shipping.	Correction (as internal review from audit no QLA2404)	DucTNM
14-Aug-2024	VietTA	60	- FMEA No.: 0-PR-012-0-FO-001-4-RC-0186 (Version 2)	- FMEA No.: 0-PR-012-0-FO-001-4-RC-0186 (Version 4)	Action for internal audit 8-8-2024	TrungDN
			2. Quality control items for each process - Fiber Rewinding N/A	2. Quality control items for each process - Fiber Rewinding Add Reel color		



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01-Aug-2024	NguyenVT	59	III. Reference documents Specification No.: - AOP82-4001-27-04(16) - AOP82-4001-27-09(19) - AOP82-4001-27-10(15) - AOP82-4001-27-11(15) - AOP82-4001-27-13(03) - AOP82-4001-27-14(03) - AOP82-4001-27-05(24) - AOP82-4001-27-06(13) - AOP82-4001-27-07(08) - AOP82-4001-27-08(23) - AOP82-4001-27-12(03) - AOP82-4001-27-15 (01) - AOP82-4001-27-16 (01)	III. Reference documents Specification No.: - AOP82-4001-27-04(17) - AOP82-4001-27-09(20) - AOP82-4001-27-10(16) - AOP82-4001-27-11(16) - AOP82-4001-27-13(04) - AOP82-4001-27-14(04) - AOP82-4001-27-05(25) - AOP82-4001-27-06(14) - AOP82-4001-27-07(09) - AOP82-4001-27-08(24) - AOP82-4001-27-12(04) - AOP82-4001-27-15 (02) - AOP82-4001-27-16 (02)	-Update new specification version.	TrungDN
			V. Contents: 1b. Incoming Inspection 1c. Incoming Inspection 1d. Incoming Inspection 1e. Incoming Inspection 2a. Material preparation (Board cleaning) 2b. Material preparation (Clean) 2c. Material preparation (Tube cutting) 2d. Material preparation (Air bubble cutting) 2e. Material preparation (Cut & fold tape)	V. Contents: 5a. Material preparation (Board cleaning) 8a. Incoming Inspection 13a. Incoming Inspection 13b. Incoming Inspection 13c. Material preparation (Clean) 13d. Incoming Inspection 13e. Material preparation (Tube cutting) 13f. Material preparation (Air bubble cutting) 13g. Material preparation (Cut & fold tape)	Correct according to standards in the template	
			Working direction list: - PTE82-59-23-2023(01) - PTE82-59-24-2007 - PTE82-59-23-2010(01)	Working direction list: - Remove	Content of WD was updated to new specificationversi on	TrungDN
	ThuyNTD		- Incoming Inspection: "Function incharge" is section: Logistic (LOG) - Process has "Function incharge" is section: Logistic (LOG)	- Change to section: Production (PRD) - Change to section: Planing (PLN)	Change section incharge form organization chart.	DucTNM
			V. Contents 14. Visual Inspection and Packing - Label of Product and case: Content and appearance: + Sampling size: 2pcs/printing times 15. Final packing: - Content and Appearance of label (Innerbox, Outerbox) + Sampling size: 2pcs/printing times  - N/A	V. Contents 14. Visual Inspection and Packing - Content of label Product and case: + Sampling size 1pc/roll - Appearance of label Product and case: + Sampling size: all 15. Final packing: - Content of label (Innerbox, Outerbox) + Sampling size 1pc/roll - Appearance of label (Innerbox, Outerbox) + Sampling size: all - Add Storge condition Thermal.	-Standardize the frequency of checking label.  - Correction.	
8-Jun-2024	NguyenVT	58	III. Reference document - Working direction list + PTE82-59-21-2005 + FMEA No.: 0-PR-012-0-FO-001-4-RC-0186 (Version 1)	III. Reference document - Working direction list + remove + FMEA No.: 0-PR-012-0-FO-001-4-RC- 0186 (Version 2)	+ FOV didn't continue use resin 950Y200 + Following 9- PR-0014-9-FO- 0001-4-RC-0105	ChienPH
26-Mar-2024	VietTA	57	III. Reference document - N/A	III. Reference document - Add PTE82-59-24-2007	Folow WD: PTE82-59-24- 2007	PRE3 manager TrungDN
			2. Quality control items for each process - 8. Thermal Aging Sampling size: All	2. Quality control items for each process - 8. Thermal Aging Sampling size: 3 pcs/OP/day		
8-Mar-2024	VietTA	56	III. Reference document - PTE82-59-23-2029(01)	III. Reference document -Remove PTE82-59-23-2029(01)	Remove PTE82- 59-23-2029(01), apply WD by specific PO only	PRE3 manager TrungDN
			V. Content 7. Exposing and Thermal aging -Added FBG position (80um)	V. Content 7. Exposing and Thermal aging Remove FBG position (80um)		

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			FMEA No.: 0-PR-012-0-FO-001-4-RC-0028 (Version 17)	FMEA No.: 0-PR-012-0-FO-001-4-RC-0186 ( Version 1)	Separate the Submarine products from the general group	
20-Dec-2023	NguyenVT	55	III. Reference document - N/A	III. Reference document - Add PTE82-59-23-2029(01)	Add new WD	PRE3 manager TrungDN
			V. Content 7.Exposing and Thermal aging NA	V. Content 7. Exposing and Thermal aging -Added; FBG position (80um)	PTE82-59-23- 2029(01)	