

QUALITY CONTROL FLOW CHART OF CAVITY-FG (PM SUBMARINE)

QC FLOW CHART: 4-QC-0154

Version: 44

Page: 1/8



4-QC-0154/44

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 Submarine products which is manufactured in Fujikura Fiber Optics Vietnam Ltd.
- 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)
CFS0066	GNK-01SD-001	21106856-001	NAV	Uniform	Black	Cartridge
CFS0067	GNK-01SD-003	21106856-003	NBV	Uniform	Black	Cartridge
CFS0068	GNK-01SD-005	22166265-001	NCV	Uniform	Black	Cartridge
CFS0069	GNK-01SD-009	22136352-001	NWV	Uniform	Red	Cartridge
CFS0070	GNK-01SD-010	22136352-002	NUV	Uniform	Red	Cartridge
CFS0081	GNK-01SD-008	22166265-002	NXV	Uniform	Red	Cartridge
CFS0082	GNK-01SD-007	22166265-001	NYV	Uniform	Red	Cartridge
CFS0087	GNK-01SD-006	22166265-002	NDV	Uniform	Black	Cartridge

Noted:

- MCS: Marking color specification.
- #NA: Will be define when PLN require

III. Reference documents**- Specification No.:**

Specification	Product Name	Remark
AOP81-2122-27-01(20)	Cavity-FG (PM980 for Submarine)	
AOP81-2122-27-02(02)	Requirement for Submarine Cavity-FG manufacturing	
AOP82-4001-27-05(27)	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	

- Working Direction No.:

No	Working Direction	Product Name	Application process
1	PTE82-59-21-2010	Working direction about visual inspection for Submarine products	Recoat Inspection & Fiber Inspection

Checked by: Dao Ngoc Trung Date: (Follow DMS)	Approved by: Department/Division Manager Date: (Follow DMS)
Prepared by: VietTA + Cross checked by: ChienPH Date: 04-Oct-2024	Originator: Phan Huy Chien Date: 26-Oct-2015

QUALITY CONTROL FLOW CHART OF CAVITY-FG (PM SUBMARINE)

QC FLOW CHART: 4-QC-0154

Version: 44

Page: 2/8

- **FMEA No.:** 0-PR-012-0-FO-001-4-RC-0028 ver.20
- **Operation procedure No.:** 4-OP-378

IV. Term definition

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

QUALITY CONTROL FLOW CHART OF CAVITY-FG (PM SUBMARINE)

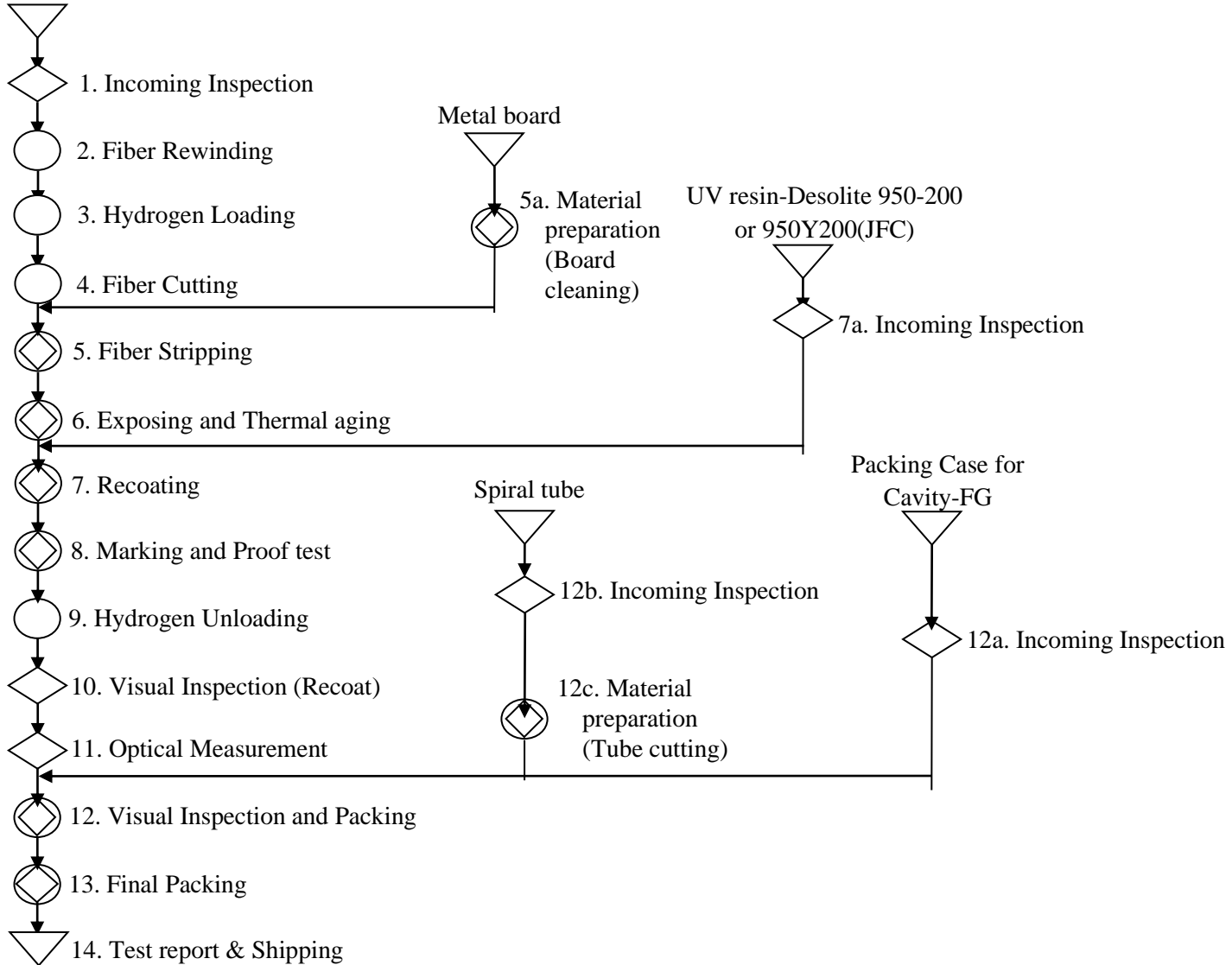
QC FLOW CHART: 4-QC-0154

Version: 44

Page: 3/8

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

Optical Fiber (SM98-PS-U25D-H (Fujikura) *1)



QUALITY CONTROL FLOW CHART OF CAVITY-FG (PM SUBMARINE)

QC FLOW CHART: 4-QC-0154

Version: 44

Page: 4/8

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 (SM98- PS-U25D-H (Fujikura) *1)	Follow 9-PR-012				QAE PRD
2	Fiber Rewinding	- Fiber Type	- Manufacturing program	All	4-OP- 378	PRD PRE
		- Appearance	- Visual	All		
		- Reel color	- Visual	All		
		- Re-winding length of fiber reel	- 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		
		- Pressure	- Hydrogen loading machine			
		- Temperature		All		
		- Loading time	- Clock, Checksheet	All		
		- 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		
		- Port yellow & red position	- Visual, jig	All		
		- Fiber type	- Visual Color reel	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		
6	Exposing and Thermal aging	- WIP control	- Visual	All	4-OP- 378	PRD PRE
		- Heating Temperature - Heating time	- Exposing system and program	All		
		- Position of bare fiber	- Template.	All		
		- Exposing result: + Center wavelength + Reflectivity + Full Width Half Max + Side Lobe Suppression Ratio	- Manufacturing program - Measuring system	All		
		+ Spectrum type	+ Template	All (when setting condition)		

QUALITY CONTROL FLOW CHART OF CAVITY-FG (PM SUBMARINE)

QC FLOW CHART: 4-QC-0154

Version: 44

Page: 5/8

7a	Incoming Inspection UV resin - Desolite 950-200 or 950Y200(JFC)	Follow 9-PR-012				QAE PRD
7	Recoating	- Appearance (Recoating zone)	- Microscope	Sample	4-OP-378	PRD PRE
		- Lot adhesive, expiry date - Appearance (shape, dry of UV resin)	- Check sheet - Visual - Program	All		
8	Marking	- Appearance	- Visual	All	4-OP-378	PRD PRE
		- Marking position - Marking length - Recoating length	- Template			
		- Marking color	- Art-line pen			
		- Proof level	- Proof tester			
	Proof test	- Fiber pull train rate				
9	Hydrogen Unloading	- Unloading time	- Oven and Thermo recorder	All	4-OP-378 OCAP 000-4-WI-0170	PRD PRE
		- Unloading temperature				
10	Visual Inspection (Recoating zone)	- Appearance recoat zone.	- Microscope	All	4-OP-378	PRD PRE
11	Optical Measurement	- Splice Loss - Optical Measurement result: + Center wavelength + Reflectivity + Full Width Half Max + Side Lobe Suppression Ratio	- Manufacturing program - Measuring system	All	4-OP-378	PRD PRE
		- Environment temperature	- Thermometer (Monitoring system)	Online monitoring		
12a	Incoming Inspection Packing Case for Cavity-FG	Follow 9-PR-012				QAE PRD
12b	Incoming Inspection (*) Spiral tube	Follow 9-PR-012				QAE PRD
12.c	Material preparation (*) (Tube cutting)	- Cutting length	- Cutting jig - Ruler	3pcs/ Cutting time	4-OP-378	QAE PRD
		- Quantity	- Visual	All	4-OP-378	QAE PRD
		- Appearance after cutting		3pcs/ Cutting time		
12	Visual Inspection and Packing	- Port layout	- Visual	All	4-OP-378	QAE PRD
		- Appearance of product	- Visual	All		
			- Microscope	NC item (Define NC)		
		- Recoat length - Marking length, position (some product type) - Port length	- Template	All		
		- Marking: quantity and color (some product type)	- Ruler	NC item (Define NC)		
		- Marking: quantity and color (some product type)	- Template	All		
		- Diameter of bundle (some product type) - Fiber protrusion length (some product type)	- Tool/Jig - Template	All All		

QUALITY CONTROL FLOW CHART OF CAVITY-FG (PM SUBMARINE)

QC FLOW CHART: 4-QC-0154

Version: 44

Page: 6/8

		- Contamination	- Ionizer Fan	All		
		- Appearance of packing material	- Visual	All		
		- Quantity of packing material	- Tool/Jig	All		
		- Spiral tube length	- Tool/Jig	All		
			- 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		
13	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		
		- Arrangement of case/tray/innerbox in an innerbox/outerbox	- Visual	All		
		Storage condition	- Thermal recorder	All		
14	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.

VI. Data record:

No	Record	Responsibility for keeping	Retention time
1	Relative check sheet created by Production Section	Production	25 years
2	Relative check sheet created by Quality Assurance Section (QAE)	Production	25 years
3	Test Report	Quality Assurance Engineering (QAE)	25 years

REVISION HISTORY						
Date	PIC	Ver	Description		Reason	Change Requester
			Old description	New description		
04-Oct-2024	VietTA	44	III. Reference documents AOP81-2122-27-01(19) AOP82-4001-27-05(26)	III. Reference documents AOP81-2122-27-01(20) AOP82-4001-27-05(27)	Update new specification version	TrungDN
09-Sep-2024	VietTA	43	III. Reference documents AOP81-2122-27-01(18) AOP82-4001-27-05(25)	III. Reference documents AOP81-2122-27-01(19) AOP82-4001-27-05(26)	Update new specification version	TrungDN
	ThuyNTD		V. Content: N/A	V. Content: Add item “Test report” at item 14: Test report & Shipping.	Correction (as internal review from audit no QLA2404)	DucTNM
14-Aug-2024	VietTA	42	- FMEA No.: 0-PR-012-0-FO-001-4-RC-0028 ver.18	- FMEA No.: 0-PR-012-0-FO-001-4-RC-0028 ver.20	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		
01-Aug-2024	NguyenVT	41	III. Reference documents AOP81-2122-27-01(17) 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)	III. Reference documents AOP81-2122-27-01(18) 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)	Update new specification version	TrungDN
			V. <i>Contents</i> 2. Quality control items for each process 2. Material preparation (Board cleaning) 2a. Incoming Inspection 3a. Incoming Inspection 3b. Incoming Inspection 1. Material preparation (Tube cutting)	V. <i>Contents</i> 2. Quality control items for each process 5. Material preparation (Board cleaning) 7a. Incoming Inspection 12a. Incoming Inspection 12b. Incoming Inspection 12c. Material preparation (Tube cutting)	-Correction	
			Working Direction No.: PTE82-59-23-2023	Working Direction No.: Remove	Content in WD included new specification version	
	ThuyNTD	41	- 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 1. Material preparation (*) (Tube cutting) - Cutting length: + Equipment: Template + Sampling size: All - Appearance after cutting + Sampling size: All 14. Visual Inspection and Packing - N/A - N/A - N/A - N/A - N/A - N/A - N/A - N/A 15. Final Packing - N/A - N/A - Quantity & order of inner box and outer box in an outerbox: check by manual - N/A	V. Contents 1. Material preparation (*) (Tube cutting) - Cutting length: + Equipment: Ruler + Sampling size: 3pcs/Cutting time - Appearance after cutting + Sampling size: 3pcs/Cutting time 12. Visual Inspection and Packing -Port layout - Appearance of packing material - Quantity of packing material - Spiral tube length - Spiral tube position on product - Appearance content of label Product and case - Quantity of product in a packing unit (case/tray/box) - Order of product in a packing unit (case/tray/box) 13. Final Packing - Content of label (Innerbox, Outerbox) - Appearance of label (Innerbox, Outerbox) - Quantity & order of inner box and outer box in an outerbox: check by program - Add Storge condition Thermal.	-Correction - Add some item checking for correction.	DucTNM
					-Correction	

QUALITY CONTROL FLOW CHART OF CAVITY-FG (PM SUBMARINE)

QC FLOW CHART: 4-QC-0154

Version: 44

Page: 8/8

08- Mar- 2024	NguyenVT	40	III. Reference documents AOP82-4001-27-05(23) AOP82-4001-27-08(22) AOP82-4001-27-12(02)	III. Reference documents AOP82-4001-27-05(24) AOP82-4001-27-08(23) AOP82-4001-27-12(03)	- Update specification	TrungDN
	ChauVNB		Working Direction No.: -	Working Direction No.: PTE82-59-23-2023	-Additional new criteria for fiber delamination	DucTNM
	NguyenVT		Working Direction No.: PTE82-59-21-2005	Remove Working Direction No.: PTE82-59-21-2005	OB ARS0133 for Submarine products	TrungDN
			FMEA No.: 0-PR-012-0-FO-001-4-RC-0028	FMEA No.: 0-PR-012-0-FO-001-4-RC-0028 ver.018	Additional version	
22- Dec- 2023	NguyenVT	39	2. Quality control items for each process - Process: Material preparation (*) (Tube cutting) + Lot No	2. Quality control items for each process - Process: Material preparation (*) (Tube cutting) + Remove	Standardize follow 0- Pr-001-0-TEM-003	TrungDN
			Process: Fiber rewinding - Fiber ID (Lot Fiber) - Reel ID	Process: Fiber rewinding - Remove		
			Process: Hydrogen Loading - Fiber ID (Lot Fiber) - Reel ID	Process: Hydrogen Loading - Remove		
			Process: Fiber Cutting - Reel ID	Process: Fiber Cutting - Remove		
			Process: Fiber Stripping - Product serial no. - Board ID - Reel ID	Process: Fiber Stripping - Remove		
			Process: Exposing and Thermal aging - Product serial no. - Board ID	Process: Exposing and Thermal aging - Remove		
			Process: Recoating - Board ID - Product serial no.	Process: Recoating - Remove		
			Process: Proof test - Board ID - Product serial no.	Process: Proof test - Remove		
			Process: Hydrogen Unloading - Board ID - Product serial no. Doc.No :N/A	Process: Hydrogen Unloading - Remove Add OCAP 000-4-WI-0170		
			Process: Visual Inspection (Recoating zone) - Board ID - Product serial no.	Process: Visual Inspection (Recoating zone) - Remove		
			Process: Optical measurement - Board ID - Product serial no.	Process: Optical measurement - Remove		
			3. Reference additional control items from FMEA	Remove		
			Process: Visual Inspection and Packing - Board ID - Product serial no.	Process: Visual Inspection and Packing - Remove		
			VI.Review	Remove VI.Review		
26- Jul-2023	HuyDM	38	Table II.1. Product general information - Spectrum type: N/A	Table II.1. Product general information Add new column: Spectrum type	Correction (as internal review for RCV issue)	TrungDN
			III. Reference documents - Specification no .: + AOP81-2122-27-01(16)	III. Reference documents - Specification no .: + AOP81-2122-27-01(17)	Update specification version	
			2. Quality control items for each process - Process: Exposing and thermal aging N/A	2. Quality control items for each process - Process: Exposing and thermal aging +Spectrum type	Correction (as internal review for RCV issue)	