

## FINAL INSPECTION REPORT & CERTIFICATE OF CONFORMANCE

UNEW's capital part refurbishment operations are governed by proprietary engineering technologies, precision standards, and rigorous QA/QC procedures developed for aviation grade manufacturing. While refurbishment work is normally conducted at UNEW's U.S. facility, certain components from restricted regions are not eligible for import under U.S. national security and export control regulations.

To maintain uninterrupted service and consistent product quality, UNEW has partnered with EthosEnergy (United Kingdom)—a world-class turbine repair and overhaul organization operating one of the most advanced facilities in the industry. The EthosEnergy shop is equipped with fully automated precision systems, vacuum furnaces, electron beam welders, and advanced HVOF/TBC coating cells. Its quality system is certified to ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, and ISO 17025:2017, ensuring full traceability, environmental stewardship, and occupational safety compliance.

All repair activities performed at EthosEnergy strictly follow UNEW's proprietary refurbishment procedures, material specifications, and inspection standards. The physical repair processes are executed by EthosEnergy, while UNEW retains full technical authority over repair methodology, metallurgical control, quality benchmarks, and final acceptance. This partnership guarantees that every refurbished component meets UNEW's aviation grade quality and reliability standards for power generation service.

**Customer Name: Nghi Son Refinery & Petrochemical, LLC.**

**Component type: MS6001FA 1st STAGE NOZZLE**

**Date of Report: October 30, 2025**

Responsible Product Engineer:  \_\_\_\_\_

Mr. Komkrit Rattanawong  
Engineer

Report prepared by:  \_\_\_\_\_

Ms. Chamaiporn Butsabong  
Report writer

Report reviewed and approved by:  \_\_\_\_\_

Mr. Pheerayawat Muadna  
(Engineering Manager)

## FINAL INSPECTION REPORT

### 1. INTRODUCTION

24 pcs. of MS6001FA 1<sup>st</sup> stage Nozzle have been fully refurbished based on the requirements of the incoming inspection report findings.

<b>Order Information</b>	
EE Work Order no.	824028
Date of report	16 October 2025
Customer P.O. no.	PO04102025-HGP
<b>Component Details</b>	
Engine type	MS6001FA
Component type	1 <sup>st</sup> Stage Nozzle
Component part number	Retaining ring P/N :143E5711 G002 Nozzle segment P/N :119E3894G007 REV C Casting segment P/N :129E9734 P002
Qty. received	24
Material type	FSX414
As received coating type (s)	HVOF MCrAlY coating and partial TBC top coat
Additional items received with main set (if any)	-
<b>Customer supplied component history</b>	
Total fired hours	24,000
Total starts	( No information supplied)
Total factor fired hours	( No information supplied)
# of previous repairs	( No information supplied)
Hours of operation since last repair interval	( No information supplied)
Operational fuel type	( No information supplied)
Mode of operation (base load / peaking)	( No information supplied)
Maint.intervals combustion	( No information supplied)
Maint.intervals Hot gas path	( No information supplied)
<b>Unloaded condition</b>	
Incoming packing / container condition	Good
Signs of transit damage (if damaged upon receipt photos to be included within report)	-

**2. INSPECTION SUMMARY:**

Based on the findings of the incoming inspection process (results and details of inspection given further in the report) the following processes and refurbishments have been performed.

<b>Repair requirements</b>
----------------------------

Repair level required

DESCRIPTION		QTY	UNIT
Inspect	Incoming Inspections	1	Set
Heavy Repair	Repair	1	Set
Coating	HVOF MCrAlY coat & partial TBC(based on as received condition and work scope)	1	Set

Additional items

DESCRIPTION		QTY	UNIT
Required	Replace feather seal cloth seal and joint seal	1	Set

Scrap (If/any):	-
Additional recommendations (If/any) :	-

## FINAL INSPECTION REPORT

### 3. SPARE PART (Repair/Replace):

Item	Part description	Received/ Required	Condition	Quantity	Remark
1	Segment assy.seals (Cloth seal type), EETH4017-01 to 08	176/176 ea	Replaced	176 ea	Additional
2	Segment Joint seals (Joint seals), EETH4028-01 to 08	16/16 ea	Replaced	16 ea	Additional
3	Inner-Impingement Cover plate	24/24 ea	Repaired	24 ea	-
4	Outer-Impingement Cover plate	24/24 ea	Repaired	24 ea	-
5	Leading edge core plugs(inner side)	48/48 ea	Repaired	48 ea	-
6	Leading edge core plugs(outer side)	48/48 ea	Repaired	48 ea	-
7	Trailing edge core plugs,	48/48 ea	Repaired	48 ea	-
8	Internal retaining ring-13/16"	24/24 ea	Replaced	24 ea	Standard
9	Heli coil 3/4"-10UNC	4/4 ea	Replaced	4 ea	Standard
10	Heli coil 5/8"-11 UNC	18/18 ea	Replaced	18 ea	Standard

### 4. ENGINEERING SUMMARY:

All MS6001FA 1st Stage Nozzle components were confirmed within UNEW/EthosEnergy repair limits and refurbished in full compliance with the approved Work Scope of Repair. Each nozzle segment underwent comprehensive defect restoration according to the engineering defect table, including blend repair, GTAW weld and blend repair, high-temperature braze restoration, and dimensional recovery to OEM tolerances.

During the heavy-repair process, all FSX-414 base materials were vacuum heat treated at controlled temperatures to rejuvenate microstructure and relieve welding stress. Metallurgical sampling and microscopic analysis confirmed correct  $\gamma'$  phase formation and carbide distribution after solution and stabilization treatments. All surfaces were subsequently re-coated with HVOF-applied MCrAlY bond coat and partial Thermal Barrier Coating (TBC) to restore oxidation and thermal-fatigue resistance.

Final inspections, including fluorescent penetrant, ultrasonic thickness, dimensional, and harmonic analysis, verified that all components conform to UNEW's proprietary refurbishment standards and are certified serviceable for reinstallation.

## **5. CERTIFICATE OF CONFORMANCE**

Component: MS6001FA 1st Stage Nozzle Assembly  
Quantity: 24 Pieces  
Material: FSX-414  
Work Order No.: 824028  
Customer: Nghi Son Refinery & Petrochemical LLC  
Repair Facility: EthosEnergy (Thailand) Ltd.  
Technical Authority: UNEW, Inc. (USA)

EthosEnergy (Thailand) Ltd., operating under the technical authorization of UNEW, Inc., hereby certifies that all components identified above have been inspected, repaired, heat-treated, and coated in full accordance with the approved EthosEnergy Work Scope of Repair and UNEW proprietary refurbishment standards.

Each nozzle segment underwent a heavy-repair process that included:

- Full disassembly, stripping, and non-destructive inspection (FPI, UT, dimensional, harmonic)
- Removal of oxidation, corrosion, and structural defects by GTAW welding, blending, and localized high-temperature brazing
- Vacuum solution heat treatment and transient-phase restoration (TPR) to re-establish proper  $\gamma'$  phase distribution and mechanical integrity of FSX-414 base material
- Dimensional recovery and EDM restoration of cooling holes and seal slots
- Application of HVOF MCrAlY bond coat and partial Thermal Barrier Coating (TBC) on gas-path surfaces

All processes were executed under ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, and ISO 17025:2017-certified quality systems.

Final inspections verified complete conformance with dimensional, metallurgical, and coating requirements. Accordingly, EthosEnergy (Thailand) Ltd. and UNEW, Inc. jointly certify that the subject components meet all applicable contractual and technical specifications and are released in serviceable condition for reinstallation.



**6. COMPONENT CORRELATION:**

CORRELATION SHEET			
Retaining ring partnumber		P/N: 143E5711 G002	S/N : SNH4234533
Item	Part Number	Serial Number	Material
1	119E3894G007 REV C	A1FC 07293	FSX414
2	119E3894G008 REV C	G1FC 00796	FSX414
3	119E3894G007 REV C	A1FC 07299	FSX414
4	119E3894G007 REV C	A1FC 07296	FSX414
5	119E3894G007 REV C	G1FC 00813	FSX414
6	119E3894G007 REV C	G1FC 00807	FSX414
7	119E3894G008 REV C	G1FC 00260	FSX414
8	119E3894G007 REV C	G1FC 00797	FSX414
9	119E3894G007 REV C	G1FC 00814	FSX414
10	119E3894G007 REV C	G1FC 00808	FSX414
11	119E3894G007 REV C	A1FC 07263	FSX414
12	119E3894G007 REV C	A1FC 07264	FSX414
13	119E3894G007 REV C	A1FC 07277	FSX414
14	119E3894G008 REV C	G1FC 00798	FSX414
15	119E3894G007 REV C	A1FC 07294	FSX414
16	119E3894G007 REV C	A1FC 07278	FSX414
17	119E3894G007 REV C	A1FC 07196	FSX414
18	119E3894G007 REV C	A1FC 07297	FSX414
19	119E3894G007 REV C	A1FC 07291	FSX414
20	119E3894G007 REV C	G1FC 00801	FSX414
21	119E3894G007 REV C	G1FC 00657	FSX414
22	119E3894G007 REV C	G1FC 00597	FSX414
23	119E3894G007 REV C	A1FC 07288	FSX414
24	119E3894G007 REV C	A1FC 07295	FSX414

## 7 SCOPE OF WORK

### MS6001FA STAGE 1 NOZZLE

Work scope	Inspect	Heavy
<b>Inspect</b>		
Perform receipt inspection and record serial numbers	X	
Mate halves, perform dimension checks and harmonic analysis	X	
Perform metallurgical evaluation of base material and report on condition	X	
Disassemble nozzle segments from carrier ring, bag and tag hardware	X	
Remove cover plates and core plugs, bag and tag hardware with segment serial number	X	
Abrasive blast	X	
Perform chemical strip of external gas path coatings	X	
Perform heat tint operation to ensure full coating removal	X	
Perform incoming solution heat treatment in full vacuum environment	X	
Cooling Hole check	X	
Perform visual inspection on all components and record all defects	X	
Perform fluorescent penetrant inspection on all components and record all defects	X	
Perform post-strip wall thickness inspect, report all non-conformities	X	
Compile and forward Incoming Inspection Report to customer.	X	
Hold points until Customer discussions and agreement on repair scopes have been held/reached.	X	
<b>Repair</b>		
Blend to remove oxidation and corrosion to nozzle segments		X
Cold straighten / Plannish trailing edge and airfoil sections as required.		X
Prep for weld all areas of major structural cracking		X
Perform local fluorescent penetrant inspection		X
Perform weld repairs using GTAW		X

## FINAL INSPECTION REPORT

Blending to restore component profile		X
Perform fluorescent penetrant inspection		X
Perform solution heat treatment in full vacuum environment		X
Perform fluorescent penetrant inspection		X
Perform HF and vacuum cleaning in preparation for TPR		X
Perform transient phase restoration of all areas of multi-cracking		X
Electro Discharge Machine (EDM) to restore cooling holes, seal slots		X
Perform ultrasonic wall thickness inspection		X
Perform solution heat treatment in full vacuum environment		X
Perform fluorescent penetrant inspection		X
Perform visual inspection		X
Cooling Hole check		X
Perform dimension inspection		X
<b>Coating</b>		
Apply HVOF MCrAlY & partial TBC to gas path surface		X
Perform visual inspection		X
Re install core plugs and cover plates. Visual inspect fabrication welds		X
Perform final assembly and inspection checks		X
Mate halves, perform final dimension and harmonic inspections, record results		X
Weld in place nozzle retaining pins		X
Perform final visual inspection		X
Compile Final Report, pack and ship components with all required documentation		X

Required:

- Replace feather seal cloth seal and joint seal, 1 set

## 8. ENGINEERING DETAIL REPAIR

### 8.1 Inspection phase

Task	Heavy-Repair Description
Perform receipt inspection and record serial numbers	Each nozzle segment was logged by serial number and correlated with part and casting numbers. Visual checks confirmed shipping integrity. The process established full traceability for all 24 components.
Mate halves, perform dimension checks and harmonic analysis	Engineers temporarily assembled nozzle halves to measure chord, throat, and alignment. Harmonic analysis verified that structural stiffness was within acceptance limits, ensuring no major resonance-inducing distortion.
Perform metallurgical evaluation of base material	Samples from representative segments were sectioned and microscopically examined for carbide distribution and $\gamma'$ phase degradation in FSX-414. Findings dictated the heat-treatment regime for rejuvenation.
Disassemble nozzle segments from carrier ring	Components were separated from the retaining ring and each sub-assembly labeled. Hardware was preserved to prevent mix-up. This step prepared the parts for deep cleaning and defect mapping.
Remove cover plates and core plugs	Engineers detached all impingement plates and cooling-air plugs to expose internal cavities for full inspection and wall-thickness measurement.
Abrasive blast	Surfaces were grit-blasted with controlled pressure to remove oxides and contaminants without altering dimensions. This also increased surface energy for coating removal.
Perform chemical strip of external gas-path coatings	All residual MCrAlY and TBC coatings were chemically stripped using alkaline and acid baths designed for FSX-414. This exposed the true condition of base metal for NDT.
Perform heat-tint operation	A controlled heat-tint cycle was run to visually confirm complete coating removal, highlighting remaining oxides or coatings for rework if necessary.
Perform incoming solution heat treatment in full vacuum	The entire set was heat-treated at solution temperature in a vacuum furnace to dissolve precipitates and relieve stress before defect repair.
Cooling-hole check	Each film-cooling hole was probed and flow-checked for blockage or erosion, using calibrated pin gauges and borescope imaging.
Perform visual inspection	Engineers mapped erosion, oxidation, and deformation areas on each segment, assigning defect codes for repair planning.
Perform fluorescent penetrant inspection (FPI)	A Type I, Method A penetrant was applied. Crack indications were photographed and documented on engineering sketches.
Perform post-strip wall-thickness inspection	Ultrasonic gauges measured critical wall sections; any areas below minimum thickness were scheduled for weld-build restoration.
Compile and forward Incoming Inspection Report	All data (visual, FPI, thickness) were compiled into a structured report sent to UNEW for scope approval.
Hold points until Customer discussions and agreement	Repair work paused until UNEW engineering confirmed scope and limits, ensuring all actions were contractually authorized.

### 8.2. Repair Phase

Task	Heavy-Repair Description
Blend to remove oxidation and corrosion	Localized grinding and rotary blending eliminated corroded metal from airfoil and band surfaces, providing clean substrate for welding.
Cold straighten / planish	Engineers corrected warpage by controlled mechanical planishing and

<b>Task</b>	<b>Heavy-Repair Description</b>
<b>trailing edge &amp; airfoil</b>	localized heating to restore original aerodynamic geometry.
<b>Prep for weld all areas of major structural cracking</b>	Cracks were excavated using carbide tools to a clean V-groove. Pre-weld cleaning (acetone and vacuum) removed contaminants.
<b>Perform local fluorescent penetrant inspection</b>	After crack removal, FPI confirmed all defects were fully opened with no subsurface continuation.
<b>Perform GTAW weld repairs</b>	Multi-pass gas-tungsten-arc welds were applied using FSX-414 compatible filler. Inter-pass temperature and argon shielding were strictly controlled.
<b>Blend to restore component profile</b>	Post-weld, each segment was blended to original contour using profile templates and surface-finish gauges.
<b>Perform FPI</b>	Inspected weld zones to verify freedom from cracks or porosity.
<b>Perform solution heat treatment (vacuum)</b>	The entire nozzle group was vacuum heat-treated to homogenize the repaired areas and restore mechanical strength.
<b>Perform FPI (post-solution)</b>	Confirmed that heat treatment did not reopen cracks or cause new surface indications.
<b>Perform HF and vacuum cleaning for TPR</b>	Acid cleaning and vacuum bake-out removed oxides before transient-phase restoration.
<b>Perform Transient-Phase Restoration (TPR)</b>	A specialized thermal cycle re-established $\gamma'$ precipitate balance, restoring creep-resistant microstructure to FSX-414 after heavy welding.
<b>EDM to restore cooling holes &amp; seal slots</b>	Electrical-discharge machining re-cut blocked holes and resized seal slots to OEM geometry.
<b>Perform ultrasonic wall-thickness inspection</b>	UT verified repaired walls met minimum thickness and that blending had not removed excess material.
<b>Perform solution heat treatment (final vacuum)</b>	A final stress-relief and solution cycle stabilized microstructure for coating adhesion.
<b>Perform FPI &amp; visual inspection</b>	Comprehensive NDT ensured zero rejectable defects before coating.
<b>Cooling-hole check</b>	Airflow tested to verify hole integrity and open-area ratio within tolerance.
<b>Perform dimension inspection</b>	Final mechanical checks of chord, throat, and radial fit confirmed restored dimensions.

### 8.3. Coating & Final Assembly

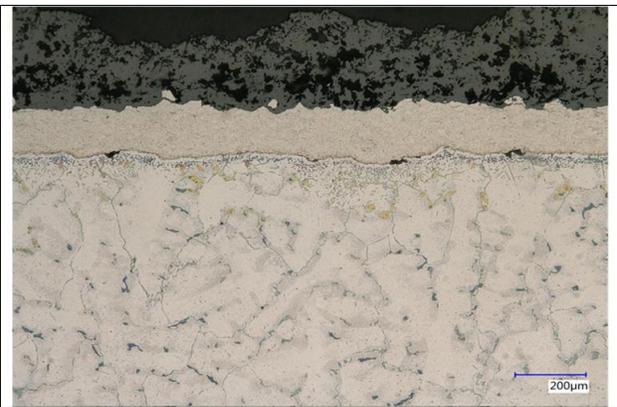
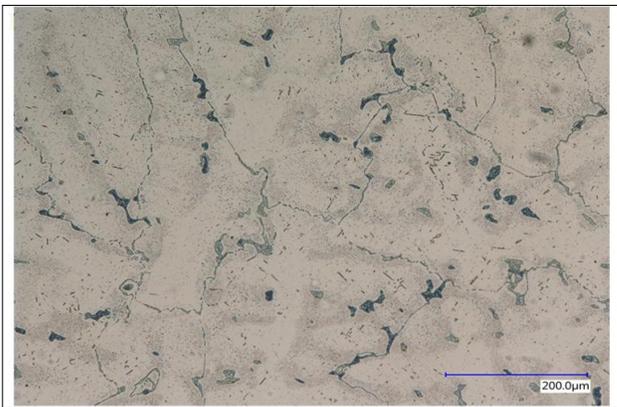
<b>Task</b>	<b>Heavy-Repair Description</b>
<b>Apply HVOF MCrAlY &amp; partial TBC</b>	Gas-path surfaces were grit-blasted, then coated with HVOF-sprayed MCrAlY bond coat followed by partial TBC on leading-edge and suction surfaces to match design thermal load zones.
<b>Perform visual inspection (post-coat)</b>	Checked coating uniformity, bond adhesion, and overspray boundaries.
<b>Re-install core plugs &amp; cover plates; inspect welds</b>	Reattached impingement plates and core plugs using precision TIG welds; welds visually inspected for smooth fillets and absence of porosity.
<b>Perform final assembly &amp; inspection checks</b>	Verified all hardware reinstalled correctly; performed FPI of welds where applicable.
<b>Mate halves, perform final dimension &amp; harmonic inspections</b>	Assembled pairs tested for dimensional alignment and vibration characteristics; results recorded.

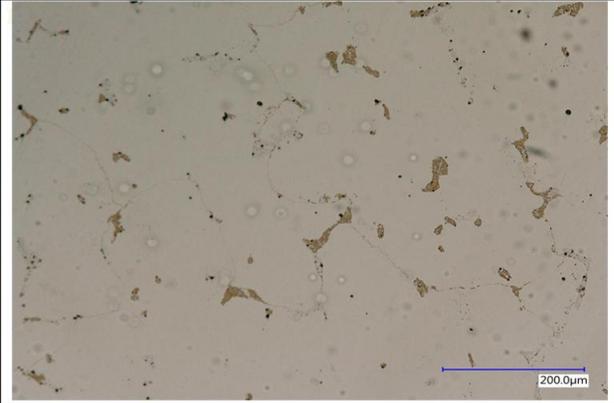
Task	Heavy-Repair Description
<b>Weld in place nozzle retaining pins</b>	Installed and welded retaining pins per drawing, ensuring correct protrusion and alignment.
<b>Perform final visual inspection</b>	Comprehensive visual under 10× magnification; confirmed surface, coating, and assembly integrity; accepted as serviceable.
<b>Replace feather seal cloth seal and joint seal (1 set)</b>	Installed new seals (EETH4017-01 – 08 & EETH4028-01 – 08) to ensure leak-free interface between segments.

### Result

All 24 nozzle segments completed the above heavy-repair sequence under UNEW engineering control and EthosEnergy QA. The parts were vacuum heat-treated, re-coated with HVOF MCrAlY + partial TBC, dimensionally restored, and certified **serviceable** for return to Nghi Son Refinery & Petrochemical.

**9. MATERIAL EVALUATION**

Report No.	L11058		Job order no.	824028							
Serial no.(or ID)	Item# 1		Cutting location	Outer shroud							
Received status	<input checked="" type="checkbox"/> As-Received <input type="checkbox"/> Pre-Weld HT <input type="checkbox"/> Post-Weld HT <input type="checkbox"/> Other										
<b>Analysis Result</b>											
Main composition, %				Hardness Test	-						
Element	<b>Co</b>	<b>Cr</b>	<b>Ni</b>	<b>Ti</b>	<b>W</b>	<b>Ta</b>	<b>Mo</b>	<b>Fe</b>	<b>Al</b>	Grain size	-
Nominal	52.5	29.0	10.0	-	7.5	-	-	1.0	-	Coating Type	MCrAlY (HVOF) and TBC top-coating
Result	51.9	27.7	10.9	-	7.3	-	-	0.9	-	Nearest Alloy	FSX-414
<b>Microstructure</b>											
											
Fig.1			Showing the hot gas path coating and substrate condition.(Etched)			Fig.2			Showing the typical microstructure at higher magnification.(Etched)		
<p>The sample was mounted in L11058 to assess if the material would be acceptable for repair. The following was observed. Hot gas path was protected by MCrAlY (HVOF) and TBC top-coating, refer to Fig.1. Base material was confirmed as FSX-414 alloy, comprising of fine grain boundary carbide and a gamma matrix with primary carbide and dispersed secondary carbide, Fig.2.</p>											
<b>Recommendation</b>											
<p>Based on the finding above, the base material was considered suitable for repair following coating removal by grit blast and acid stripping respectively.</p>											

Report No.	L11058-1		Job order no.	824028							
Serial no.(or ID)	Item# 22		Cutting location	Inner Shroud							
Received status	<input type="checkbox"/> As-Received <input checked="" type="checkbox"/> Pre-Weld HT <input type="checkbox"/> Post-Weld HT <input type="checkbox"/> Other										
Analysis Result											
Main composition,%			Hardness Test	23.9 HRC							
Element	Co	Cr	Ni	Ti	W	Ta	Mo	Fe	Al	Grain size	-
Nominal	<i>(Refer to As-received analysis result)</i>								Coating Type	<i>(Refer to As-received analysis result)</i>	
Result	<i>(Refer to As-received analysis result)</i>								Nearest Alloy	<i>(Refer to As-received analysis result)</i>	
Microstructure											
											
Fig.1 Showing heat treated material condition. (Etched)			Fig.2 Showing the typical microstructure at higher magnification.(Etched)								
<p>The sample was mounted in L11058-1 to assess the material microstructure in pre-weld solution heat treated condition. Examination revealed that the base material has been significantly improved. The grain boundaries carbide and detrimental phase was satisfyingly refined (compare with the as-received microstructure in the report no.L11058). (Fig.1 and 2)</p>											
Recommendation											
<p>The base material was satisfyingly recovered by the used solution heat treatment program.</p>											

**10. PHOTOGRAPHS:**



Fig.1 Final inspection.



Fig.2 Final inspection.

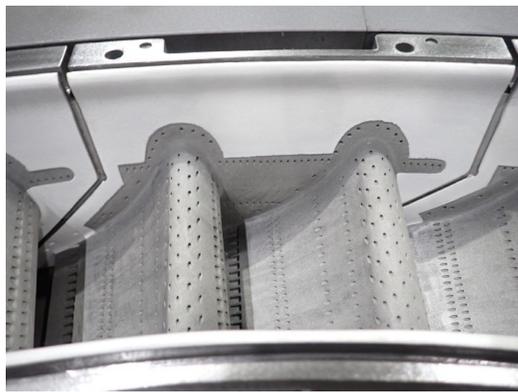


Fig.3 Final inspection.



Fig.4 Final inspection.

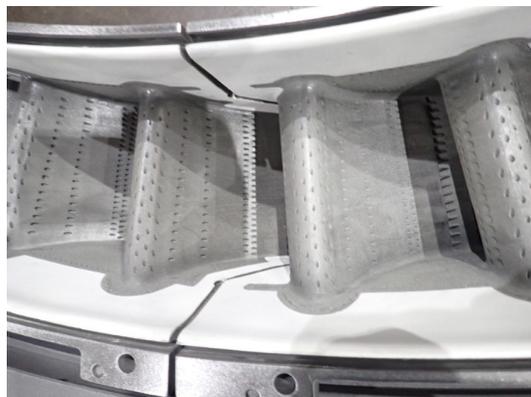


Fig.5 Final inspection.



Fig.6 Final inspection.



Fig.7 Final inspection.



Fig.8 Final inspection.



Fig.9 Final inspection.



Fig.10 Final inspection.



Fig.11 Final inspection.



Fig.12 Final inspection.

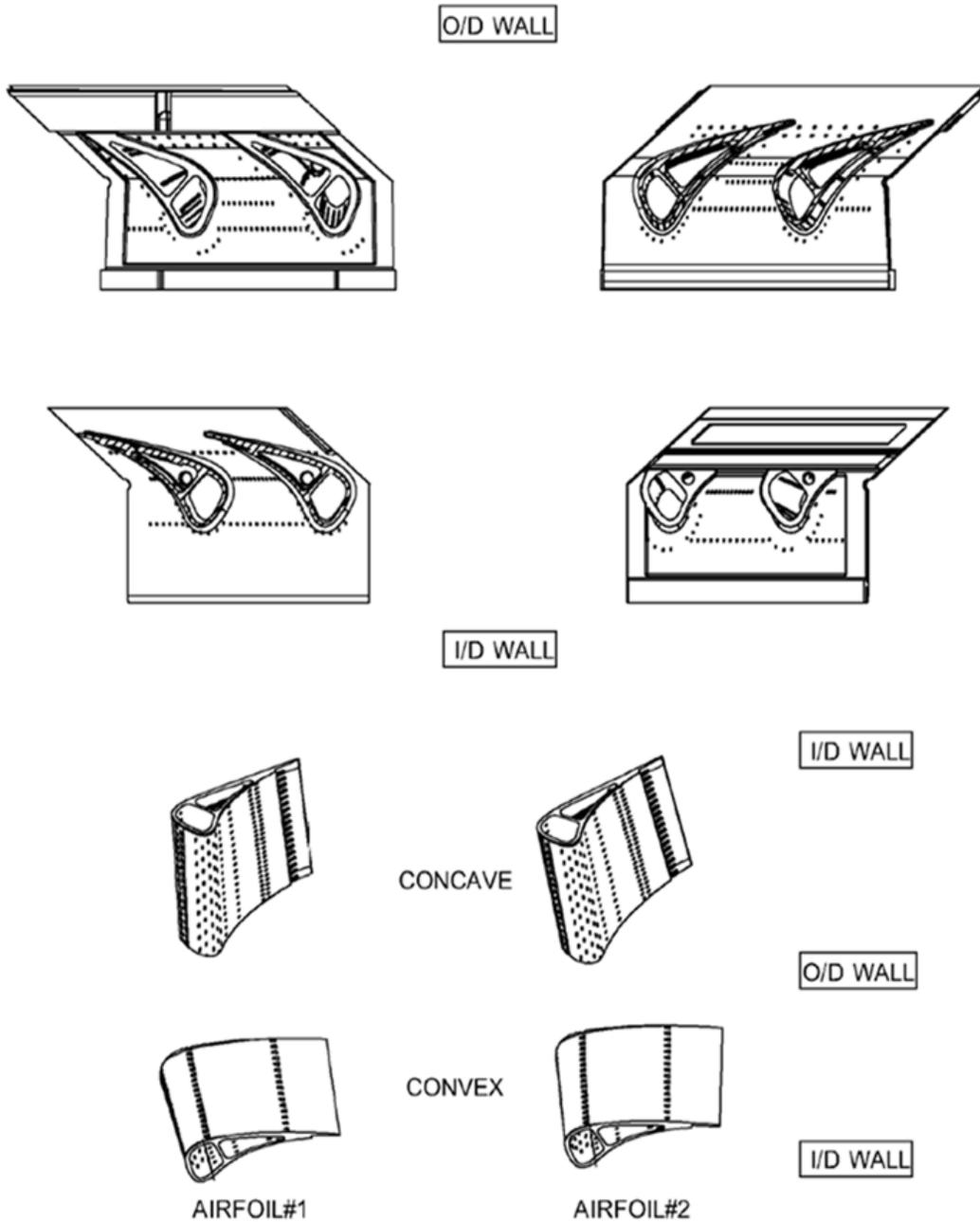


Fig.13 Final inspection.



Fig.14 Final inspection.

**11.DEFECT TABLE:**





Information		Non- Gas path Inner & Outer shrouds										Core Plug Cavity			
Segment No.	S/N	Corr / Erosion		Cracks		FOD		Deform.		Frettage		Cracks		Missing material	
		Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	A/F #1	A/F #2	C.C - A/F	C.V - A/F
1	A1FC 07293			TPR	TPR						B				
2	G1FC 00796				TPR						B				
3	A1FC 07299			TPR	TPR						B				
4	A1FC 07296			TPR	TPR						B				
5	G1FC 00813			TPR	TPR						B				
6	G1FC 00807			TPR	TPR						B				
7	G1FC 00260			TPR	TPR						B				
8	G1FC 00797			TPR	TPR						B				
9	G1FC 00814										B				
10	G1FC 00808			TPR	TPR						B				
11	A1FC 07263			TPR	TPR						B				
12	A1FC 07264			TPR	TPR						B				
13	A1FC 07277			TPR	TPR						B				
14	G1FC 00798				TPR						B				
15	A1FC 07294			TPR	TPR						B				
16	A1FC 07278			TPR	TPR						B				
17	A1FC 07196			TPR	TPR						B				
18	A1FC 07297				TPR						B				
19	A1FC 07291			TPR	TPR						B				
20	G1FC 00801			TPR	TPR						B				
21	G1FC 00657			TPR	TPR						B				
22	G1FC 00597			TPR	TPR						B				
23	A1FC 07288			TPR	TPR						B				
24	A1FC 07295			TPR	TPR						B				

B = Blend repair to be performed in accordance with the location blend limits.

JK = jacking and contouring to be performed based on the deformation and distortion detected.

WB = Weld and Blend to be performed based on the area limits and defects detected.

WM = Weld and Machining to be performed to build material dimensions and restore original dimensions and contours.

WE = Welding and Electric discharge machining (EDM) to be performed to build material dimensions and restore original dimensions.

TPR = Transient Phase Restoration to be performed based on the defects detected.

R = Replace with new.

ACC = Acceptable as is.

Rej = Dimension unacceptable and will require repair or cause of scrap.

S = Non-repairable / Scrap

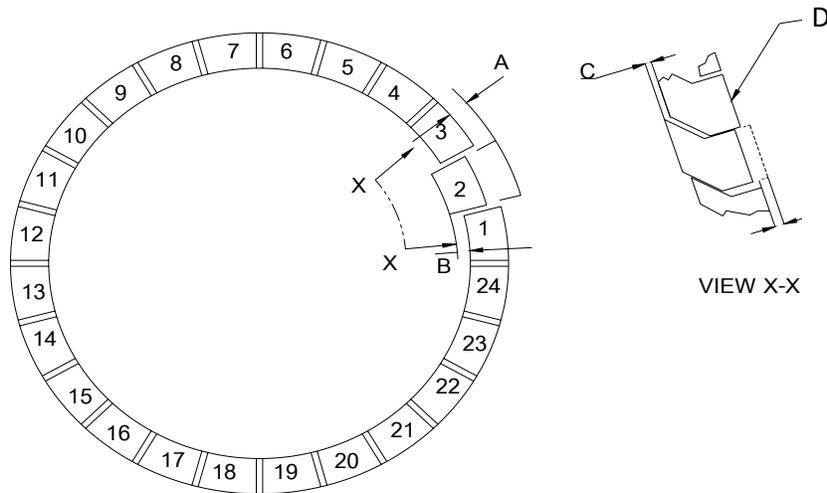
L = Light repair category

M = Medium repair category

H = Heavy repair category

**12. DIMENTION INSPECTION:**

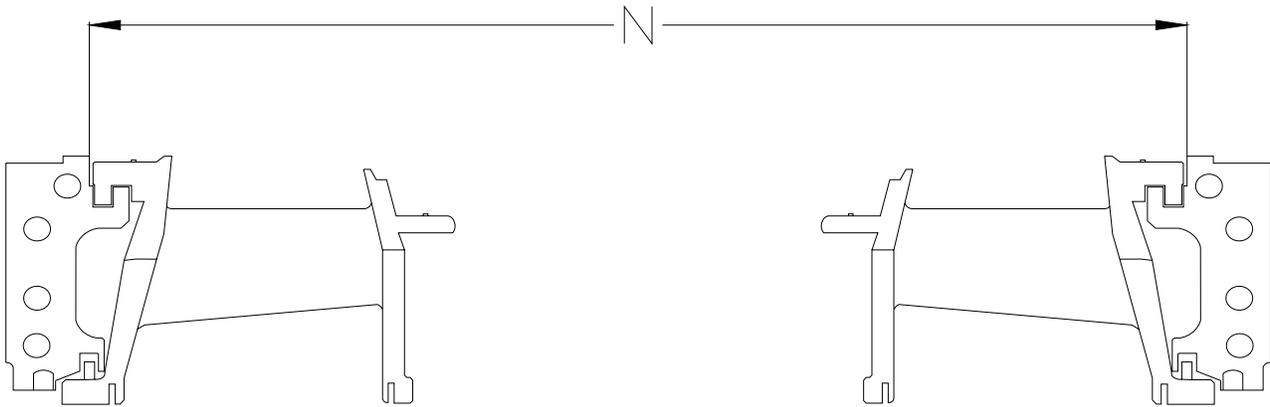
**ALIGNMENT CHECK**



SEGMENT No.	Horizontal(mm)		Vertical (mm)		Result
	A	B	C	D	
1-2	0.31	0.36	0.48	0.24	ACC
2-3	0.43	0.48	0.60	0.35	ACC
3-4	0.46	0.42	0.77	0.68	ACC
4-5	0.44	0.38	0.71	0.61	ACC
5-6	0.39	0.47	0.74	0.62	ACC
6-7	0.47	0.36	0.53	0.65	ACC
7-8	0.45	0.29	0.57	0.52	ACC
8-9	0.36	0.41	0.70	0.77	ACC
9-10	0.42	0.43	0.42	0.60	ACC
10-11	0.48	0.34	0.53	0.47	ACC
11-12	0.37	0.46	0.56	0.53	ACC
12-13	0.43	0.41	0.28	0.62	ACC
13-14	0.41	0.44	0.35	0.68	ACC
14-15	0.53	0.46	0.51	0.87	ACC
15-16	0.47	0.48	0.70	0.80	ACC
16-17	0.46	0.39	0.78	0.16	ACC
17-18	0.34	0.47	0.63	0.24	ACC
18-19	0.45	0.45	0.46	0.35	ACC
19-20	0.39	0.41	0.68	0.52	ACC
20-21	0.42	0.34	0.46	0.57	ACC
21-22	0.42	0.44	0.30	0.68	ACC
22-23	0.40	0.39	0.39	0.59	ACC
23-24	0.47	0.45	0.57	0.46	ACC
24-1	0.48	0.36	0.52	0.34	ACC

Unit:mm

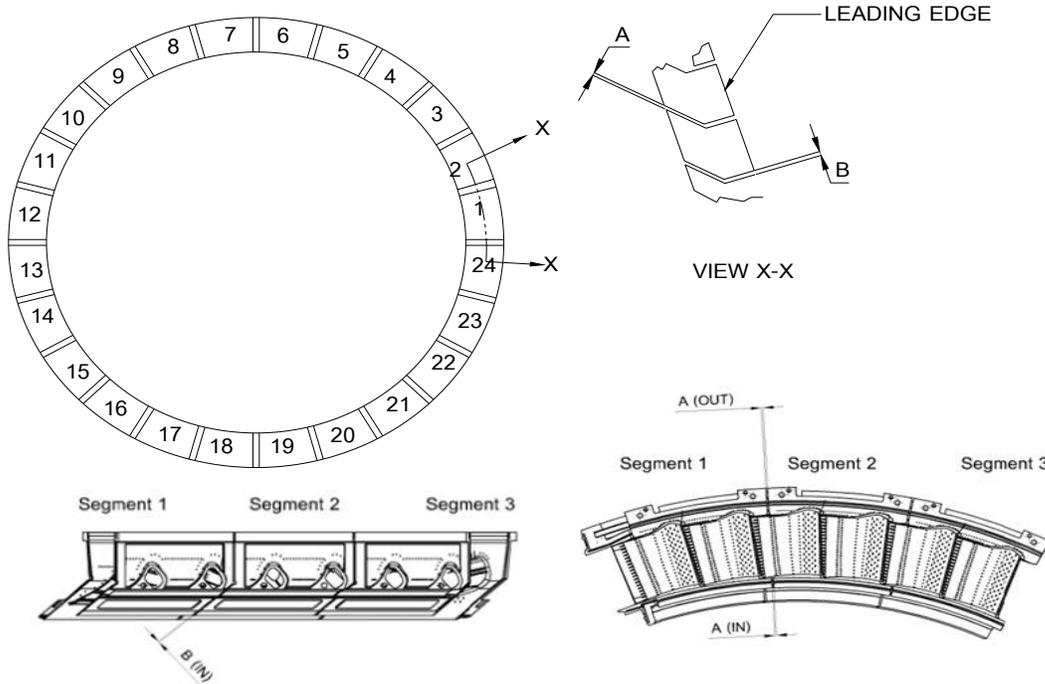
**ROUNDNESS CHECK**



No.	A-A	B-B	C-C	D-D	Roundness	Result
FINAL	1733.31	1734.31	1734.21	1733.27	1.04	ACCEPTED

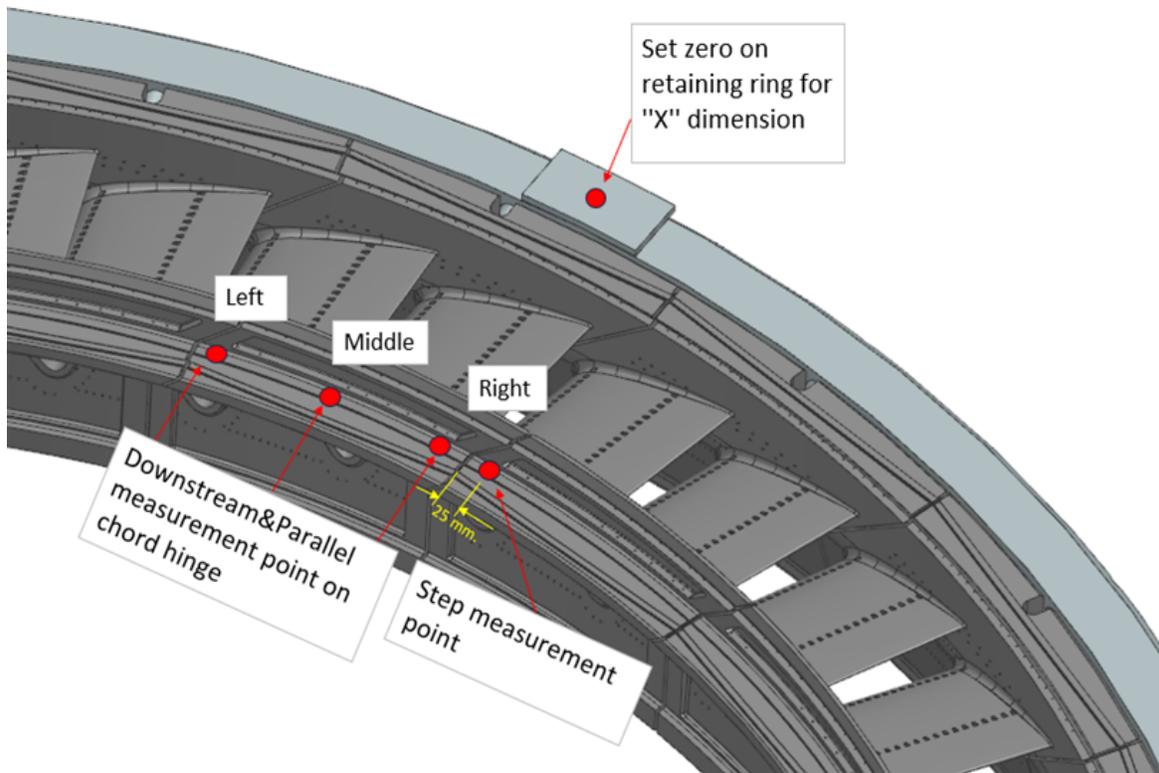
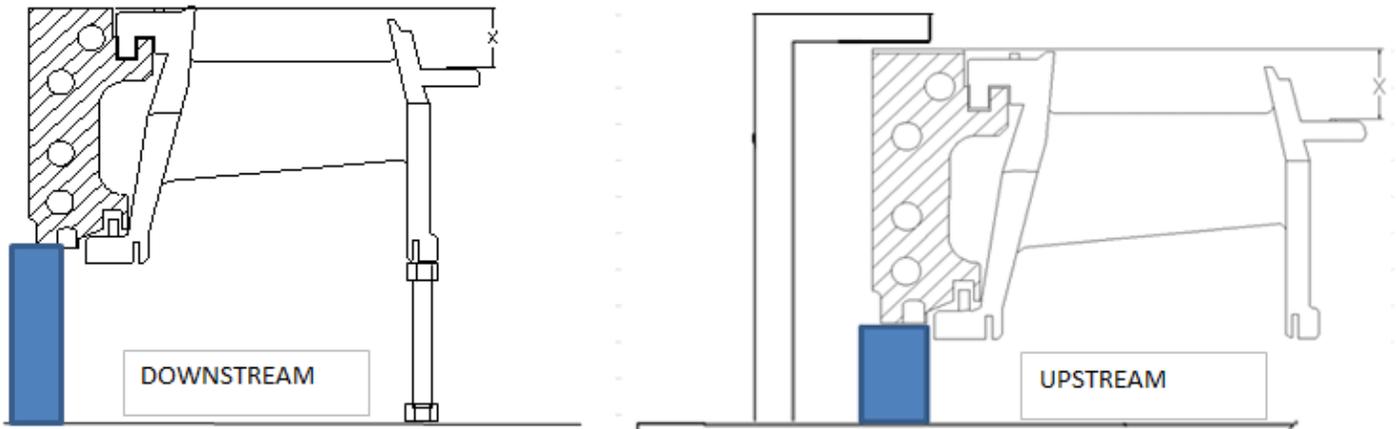
Unit:mm

**GAP MEASUREMENT CHECK**



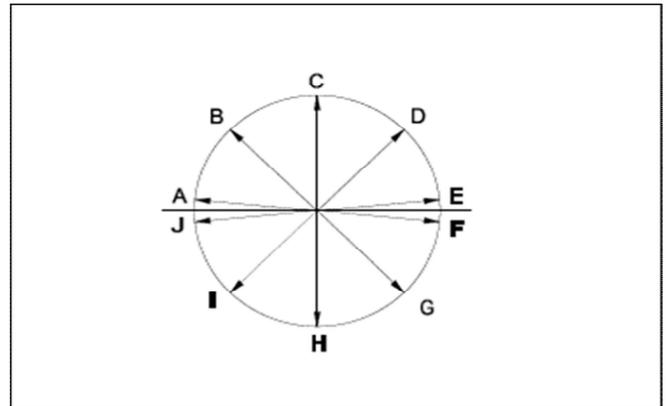
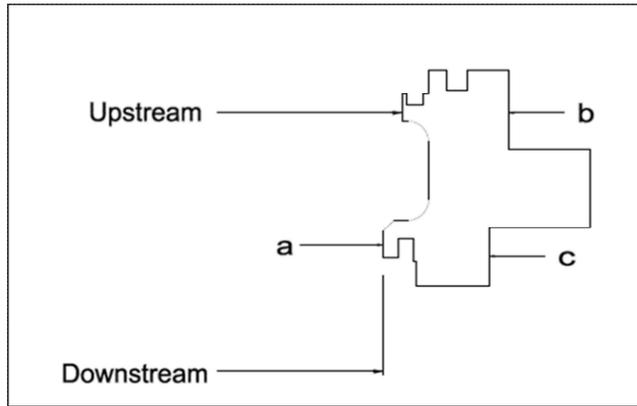
SEGMENT NO.	I/D Wall		O/D Wall		Result
	A (mm.)	B (mm.)	A (mm.)	B (mm.)	
1-2	2.03	3.45	2.26	3.50	ACC
2-3	2.03	3.47	2.17	3.58	ACC
3-4	2.03	3.27	2.39	3.27	ACC
4-5	2.11	3.52	2.30	3.50	ACC
5-6	2.13	3.55	2.01	3.57	ACC
6-7	2.05	3.38	2.22	3.59	ACC
7-8	2.32	3.37	2.01	3.57	ACC
8-9	2.18	3.40	2.29	3.60	ACC
9-10	2.25	3.37	2.33	3.32	ACC
10-11	2.38	3.61	2.09	3.45	ACC
11-12	2.18	3.36	2.39	3.32	ACC
12-13	2.40	3.51	2.39	3.61	ACC
13-14	2.07	3.30	2.41	3.52	ACC
14-15	2.20	3.53	2.29	3.59	ACC
15-16	2.24	3.51	2.37	3.27	ACC
16-17	2.11	3.39	2.22	3.42	ACC
17-18	2.17	3.30	2.32	3.50	ACC
18-19	2.07	3.50	2.40	3.60	ACC
19-20	2.39	3.26	2.36	3.59	ACC
20-21	2.16	3.24	2.26	3.57	ACC
21-22	2.39	3.24	2.14	3.59	ACC
22-23	2.06	3.55	2.27	3.27	ACC
23-24	2.16	3.31	2.03	3.24	ACC
24-1	2.02	3.61	2.40	3.61	ACC

**DROP CHECK**



Downstream Deflection Check (Drop Check)														
SEGMENT	X' Downstream (mm)					X' Upstream (mm)					Flexible 'X' (mm)			Result
	Left	Middle	Right	Parallel	Step	Left	Middle	Right	Parallel	Step	Left	Middle	Right	
1	29.32	29.22	29.10	-0.22	-0.09	30.48	30.25	30.21	-0.27	-0.17	1.16	1.03	1.11	ACC
2	29.19	29.17	29.25	0.06	0.04	30.38	30.24	30.37	-0.01	-0.13	1.19	1.07	1.12	ACC
3	29.21	29.26	29.42	0.21	0.21	30.50	30.56	30.59	0.09	0.26	1.29	1.30	1.17	ACC
4	29.21	29.19	29.23	0.02	0.00	30.33	30.33	30.36	0.03	-0.12	1.12	1.14	1.13	ACC
5	29.23	29.36	29.21	-0.02	-0.10	30.48	30.49	30.54	0.06	-0.04	1.25	1.13	1.33	ACC
6	29.31	29.13	29.31	0.00	-0.02	30.58	30.48	30.65	0.07	0.06	1.27	1.35	1.34	ACC
7	29.33	29.25	29.32	-0.01	0.07	30.59	30.55	30.49	-0.10	-0.42	1.26	1.30	1.17	ACC
8	29.25	29.15	29.11	-0.14	0.01	30.91	30.79	30.49	-0.42	-0.24	1.66	1.64	1.38	ACC
9	29.10	29.02	29.45	0.35	0.25	30.73	30.71	30.96	0.23	0.45	1.63	1.69	1.51	ACC
10	29.20	29.27	29.29	0.09	0.16	30.51	30.41	30.37	-0.14	-0.08	1.31	1.14	1.08	ACC
11	29.13	29.08	29.18	0.05	0.02	30.45	30.51	30.38	-0.07	-0.38	1.32	1.43	1.20	ACC
12	29.16	29.10	29.33	0.17	0.16	30.76	30.67	30.40	-0.36	-0.02	1.60	1.57	1.07	ACC
13	29.17	29.03	29.02	-0.15	-0.11	30.42	30.29	30.28	-0.14	-0.38	1.25	1.26	1.26	ACC
14	29.13	29.39	29.19	0.06	-0.12	30.66	30.72	30.80	0.14	0.37	1.53	1.33	1.61	ACC
15	29.31	29.17	29.03	-0.28	0.03	30.43	30.43	30.35	-0.08	-0.11	1.12	1.26	1.32	ACC
16	29.00	29.12	29.31	0.31	0.06	30.46	30.51	30.66	0.20	0.10	1.46	1.39	1.35	ACC
17	29.25	29.17	29.24	-0.01	-0.08	30.56	30.46	30.41	-0.15	-0.37	1.31	1.29	1.17	ACC
18	29.32	29.24	29.24	-0.08	0.04	30.78	30.62	30.61	-0.17	0.05	1.46	1.38	1.37	ACC
19	29.20	29.08	29.01	-0.19	-0.29	30.56	30.62	30.55	-0.01	0.12	1.36	1.54	1.54	ACC
20	29.30	29.14	29.18	-0.12	0.17	30.43	30.39	30.32	-0.11	-0.15	1.13	1.25	1.14	ACC
21	29.01	29.05	29.13	0.12	0.02	30.47	30.43	30.32	-0.15	-0.13	1.46	1.38	1.19	ACC
22	29.11	29.14	29.14	0.03	-0.03	30.45	30.47	30.57	0.12	-0.30	1.34	1.33	1.43	ACC
23	29.17	29.16	29.02	-0.15	-0.19	30.87	30.78	30.70	-0.17	0.25	1.70	1.62	1.68	ACC
24	29.21	29.28	29.35	0.14	0.03	30.45	30.51	30.59	0.14	0.11	1.24	1.23	1.24	ACC

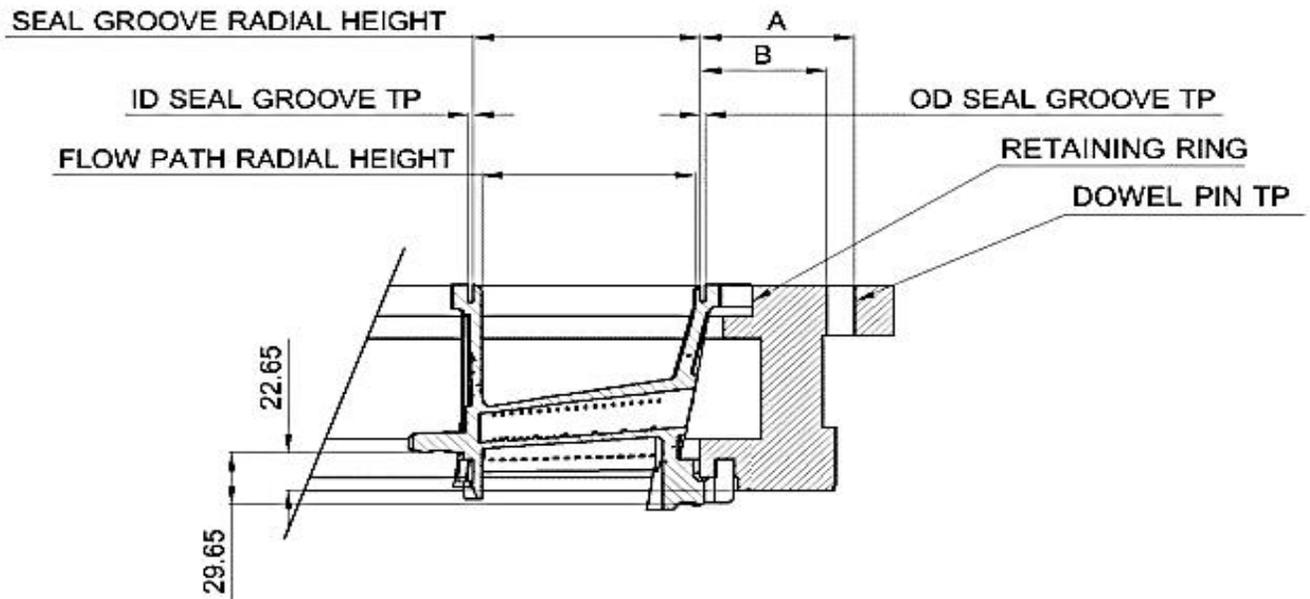
**RETAINING RING ROUNDNESS**



	A-F	B-G	C-H	D-I	E-J	Roundness	Result
A-Upstream	1715.29	1716.26	1716.82	1716.51	1715.53	1.53	ACCEPTED
A-Downstream	1687.86	1688.19	1688.63	1688.21	1687.84	0.79	ACCEPTED

Unit : mm.

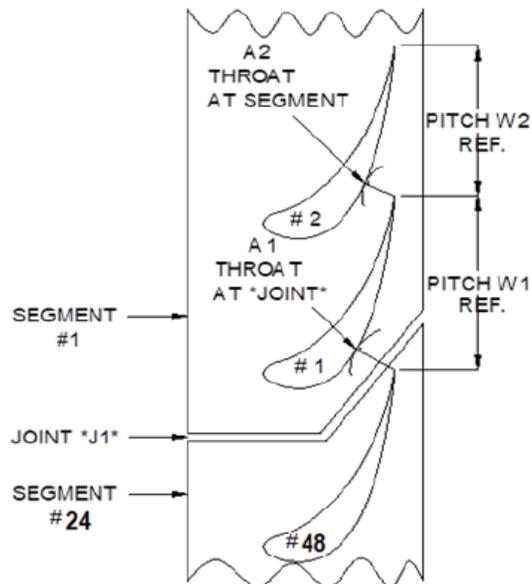
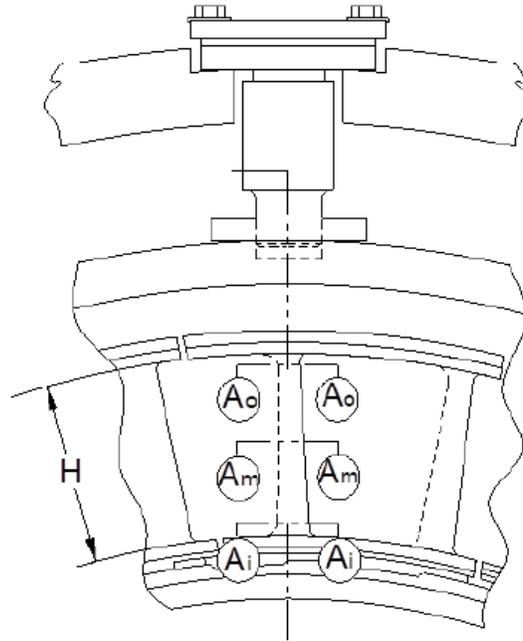
**RADIAL HEIGHTS**



Item	Dowel OD to Outer seal groove	Dowel ID to Outer wall flow path	Result
	A	B	
1	87.12	70.98	ACC
2	87.17	70.91	ACC
3	87.12	70.90	ACC
4	87.04	70.92	ACC
5	87.09	71.08	ACC
6	87.25	71.16	ACC
7	87.05	71.00	ACC
8	87.20	71.15	ACC
9	87.05	70.96	ACC
10	87.08	70.91	ACC
11	87.25	70.98	ACC
12	87.12	70.95	ACC

Unit:mm

HARMONIC



Seg N°	Gas Path Number	Throat Dimensions			H at centre	Pitch Dim.		Gas Path Area	Harmonic		Throat Dimensions			H at centre	Pitch Dim.		Gas Path Area	Harmonic			
		AO	AM	AI		WM	WO		Middle	Outer	%dev	%dev	%dev		%dev	%dev		%dev	%dev	Outer	Middle
1	J 1	28.98	25.55	22.71	106.50	100.57	106.03	2736.78	0.25	0.27	-0.45%	-1.20%	0.44%	-0.22%	-0.27%	-0.47%	-0.84%	-0.93%	0.02%		
	S 2	28.47	25.12	22.31	106.17	100.13	105.56	2681.32	0.25	0.27	-1.08%	-1.68%	-0.09%	-0.52%	0.05%	-0.14%	-1.68%	-1.73%	-0.94%		
2	J 3	29.30	25.75	22.67	106.18	100.78	106.26	2746.61	0.26	0.28	0.65%	-0.43%	0.27%	-0.52%	-0.06%	-0.25%	-0.49%	-0.37%	0.91%		
	S 4	28.47	25.45	22.78	107.44	99.23	104.65	2743.75	0.26	0.27	-1.08%	-0.39%	2.02%	0.67%	-0.85%	-1.00%	0.61%	0.46%	-0.08%		
3	J 5	29.39	26.04	23.14	106.02	101.89	106.78	2772.69	0.26	0.28	0.96%	0.70%	2.34%	-0.67%	1.04%	0.23%	0.46%	-0.34%	0.73%		
	S 6	28.80	25.32	22.22	106.85	99.90	105.37	2715.59	0.25	0.27	0.07%	-0.90%	-0.49%	0.11%	-0.18%	-0.32%	-0.43%	-0.72%	0.39%		
4	J 7	28.86	25.75	22.89	106.16	100.38	105.61	2740.26	0.26	0.27	-0.86%	-0.43%	1.24%	-0.53%	-0.46%	-0.86%	-0.72%	0.03%	0.00%		
	S 8	28.16	25.48	22.06	107.01	100.11	105.77	2706.82	0.25	0.27	-2.15%	-0.27%	-1.21%	0.26%	0.03%	0.06%	-0.75%	-0.30%	-2.21%		
5	J 9	28.92	25.64	22.61	106.03	100.26	105.93	2725.24	0.26	0.27	-0.65%	-0.85%	0.00%	-0.66%	-0.58%	-0.56%	-1.26%	-0.28%	-0.09%		
	S 10	28.35	25.64	22.69	107.10	100.24	104.69	2739.62	0.26	0.27	-1.49%	0.35%	1.61%	0.35%	0.16%	-0.96%	0.45%	0.19%	-0.53%		
6	J 11	29.35	25.85	22.28	105.44	101.95	106.35	2723.78	0.25	0.28	0.82%	-0.04%	-1.46%	-1.21%	1.10%	-0.17%	-1.31%	-1.13%	1.00%		
	S 12	28.92	25.40	22.26	107.19	99.82	104.85	2732.81	0.25	0.28	0.49%	-0.59%	-0.31%	0.43%	-0.26%	-0.81%	0.20%	-0.33%	1.31%		
7	J 13	29.27	25.49	22.59	106.00	100.60	106.17	2725.26	0.25	0.28	0.55%	-1.43%	-0.09%	-0.68%	-0.24%	-0.34%	-1.26%	-1.20%	0.89%		
	S 14	28.08	25.36	22.51	106.97	99.83	106.30	2709.28	0.25	0.26	-2.43%	-0.74%	0.81%	0.22%	-0.25%	0.56%	-0.66%	-0.50%	-2.97%		
8	J 15	28.55	26.00	22.63	106.78	101.12	105.97	2754.39	0.26	0.27	-1.92%	0.54%	0.09%	0.05%	0.28%	-0.53%	-0.20%	0.26%	-1.41%		
	S 16	28.58	25.84	22.91	107.12	99.68	105.53	2762.89	0.26	0.27	-0.69%	1.14%	2.60%	0.37%	-0.40%	-0.17%	1.31%	1.54%	-0.53%		
9	J 17	29.31	26.09	23.31	106.15	100.50	106.34	2781.13	0.26	0.28	0.69%	0.89%	3.10%	-0.54%	-0.34%	-0.18%	0.76%	1.23%	0.87%		
	S 18	28.47	25.31	22.82	107.35	100.93	105.74	2735.01	0.25	0.27	-1.08%	-0.94%	2.19%	0.58%	0.85%	0.03%	0.29%	-1.77%	-1.11%		
10	J 19	29.12	25.75	22.99	105.86	99.78	105.32	2742.04	0.26	0.28	0.03%	-0.43%	1.68%	-0.82%	-1.05%	-1.14%	-0.65%	0.63%	1.18%		
	S 20	28.53	25.31	22.46	107.37	101.51	106.59	2727.47	0.25	0.27	-0.87%	-0.94%	0.58%	0.60%	1.43%	0.83%	0.01%	-2.33%	-1.69%		
11	J 21	28.93	25.82	22.76	106.08	100.94	105.99	2740.31	0.26	0.27	-0.62%	-0.15%	0.66%	-0.61%	0.10%	-0.51%	-0.71%	-0.25%	-0.11%		
	S 22	28.61	25.62	22.57	107.15	101.92	106.57	2743.58	0.25	0.27	-0.59%	0.27%	1.07%	0.39%	1.84%	0.81%	0.60%	-1.54%	-1.39%		
12	J 23	28.18	25.98	22.84	106.05	101.89	105.18	2730.26	0.25	0.27	-3.19%	0.46%	1.02%	-0.64%	1.04%	-1.27%	-1.08%	-0.57%	-1.95%		
	S 24	28.30	25.24	22.12	107.16	99.74	106.05	2703.11	0.25	0.27	-1.67%	-1.21%	-0.94%	0.40%	-0.34%	0.32%	-0.88%	-0.88%	-1.98%		
13	J 25	28.94	25.59	22.68	106.29	101.46	106.88	2731.65	0.25	0.27	-0.58%	-1.04%	0.31%	-0.41%	0.61%	0.33%	-1.03%	-1.65%	-0.91%		
	S 26	28.21	25.60	22.35	107.15	99.46	105.40	2725.90	0.26	0.27	-1.98%	0.20%	0.09%	0.39%	-0.62%	-0.29%	-0.05%	0.82%	-1.69%		
14	J 27	28.83	25.64	22.71	105.81	99.84	104.60	2719.85	0.26	0.28	-0.96%	-0.85%	0.44%	-0.86%	-0.99%	-1.81%	-1.46%	0.14%	0.87%		
	S 28	28.57	25.58	22.72	107.26	100.11	105.91	2747.20	0.26	0.27	-0.73%	0.12%	1.75%	0.50%	0.03%	0.19%	0.73%	0.09%	-0.92%		
15	J 29	28.83	25.96	22.22	105.75	100.97	105.50	2722.27	0.26	0.27	-0.96%	0.39%	-1.72%	-0.92%	0.13%	-0.97%	-1.37%	0.26%	0.01%		
	S 30	28.86	25.44	22.39	107.38	99.70	105.24	2741.68	0.26	0.27	0.28%	-0.43%	0.27%	0.61%	-0.38%	-0.44%	0.53%	-0.05%	0.73%		
16	J 31	28.88	26.19	22.69	106.34	100.80	106.14	2763.51	0.26	0.27	-0.79%	1.28%	0.35%	-0.37%	-0.04%	-0.37%	0.13%	1.32%	-0.43%		
	S 32	28.82	25.42	22.52	107.52	100.10	105.06	2746.60	0.25	0.27	0.14%	-0.51%	0.85%	0.74%	0.02%	-0.61%	0.71%	-0.53%	0.76%		
17	J 33	29.25	26.37	22.52	105.90	101.04	105.90	2766.90	0.26	0.28	0.48%	1.97%	-0.40%	-0.78%	0.20%	-0.59%	0.25%	1.77%	1.08%		
	S 34	28.61	25.52	22.74	107.26	100.40	105.48	2745.59	0.25	0.27	-0.59%	-0.12%	1.84%	0.50%	0.32%	-0.22%	0.67%	-0.44%	-0.37%		
18	J 35	29.04	25.78	22.40	106.29	101.07	106.38	2736.97	0.26	0.27	-0.24%	-0.31%	-0.93%	-0.41%	0.23%	-0.14%	-0.84%	-0.54%	-0.10%		
	S 36	28.32	25.66	22.76	107.45	99.44	105.38	2750.72	0.26	0.27	-1.60%	0.43%	1.93%	0.67%	-0.64%	-0.31%	0.86%	1.08%	-1.29%		
19	J 37	28.83	25.43	22.35	105.90	101.29	105.41	2701.51	0.25	0.27	-0.96%	-1.66%	-1.15%	-0.78%	0.45%	-1.05%	-2.12%	-2.10%	0.09%		
	S 38	29.02	25.49	22.39	107.19	99.92	105.43	2743.80	0.26	0.28	0.83%	-0.23%	0.27%	0.43%	-0.16%	-0.26%	0.61%	-0.08%	1.10%		
20	J 39	28.89	26.02	23.46	106.11	99.94	104.66	2769.21	0.26	0.28	-0.76%	0.62%	3.76%	-0.58%	-0.89%	-1.76%	0.33%	1.52%	1.02%		
	S 40	28.88	25.98	22.25	107.27	100.49	106.11	2764.62	0.26	0.27	0.35%	1.68%	-0.36%	0.51%	0.41%	0.38%	1.37%	1.27%	-0.03%		
21	J 41	29.17	25.78	22.68	105.62	100.36	106.11	2730.54	0.26	0.27	0.21%	-0.31%	0.31%	-1.04%	-0.48%	-0.39%	-1.07%	0.17%	0.60%		
	S 42	28.80	25.86	22.78	107.29	100.61	105.67	2770.76	0.26	0.27	0.07%	1.21%	2.02%	0.52%	0.53%	-0.04%	1.60%	0.68%	0.11%		
22	J 43	29.06	25.87	22.92	106.58	100.30	104.63	2763.62	0.26	0.28	-0.17%	0.04%	1.37%	-0.14%	-0.54%	-1.78%	0.13%	0.58%	1.64%		
	S 44	28.92	25.59	22.77	107.62	100.68	107.20	2767.72	0.25	0.27	0.49%	0.16%	1.97%	0.83%	0.60%	1.41%	1.48%	-0.44%	-0.91%		
23	J 45	29.09	25.64	22.64	106.35	101.39	107.13	2738.78	0.25	0.27	-0.07%	-0.85%	0.13%	-0.36%	0.55%	0.56%	-0.77%	-1.39%	-0.63%		
	S 46	28.98	25.74	22.93	107.19	99.58	105.48	2770.59	0.26	0.27	0.69%	0.74%	2.69%	0.43%	-0.50%	-0.22%	1.59%	1.25%	0.91%		
24	J 47	28.61	25.58	23.11	106.87	100.93	105.99	2748.70	0.25	0.27	-1.72%	-1.08%	2.21%	0.13%	0.09%	-0.51%	-0.41%	-1.17%	-1.22%		
	S 48	28.58	25.38	22.75	107.63	99.88	105.47	2746.99	0.25	0.27	-0.69%	-0.67%	1.88%	0.84%	-0.20%	-0.23%	0.72%	-0.47%	-0.47%		

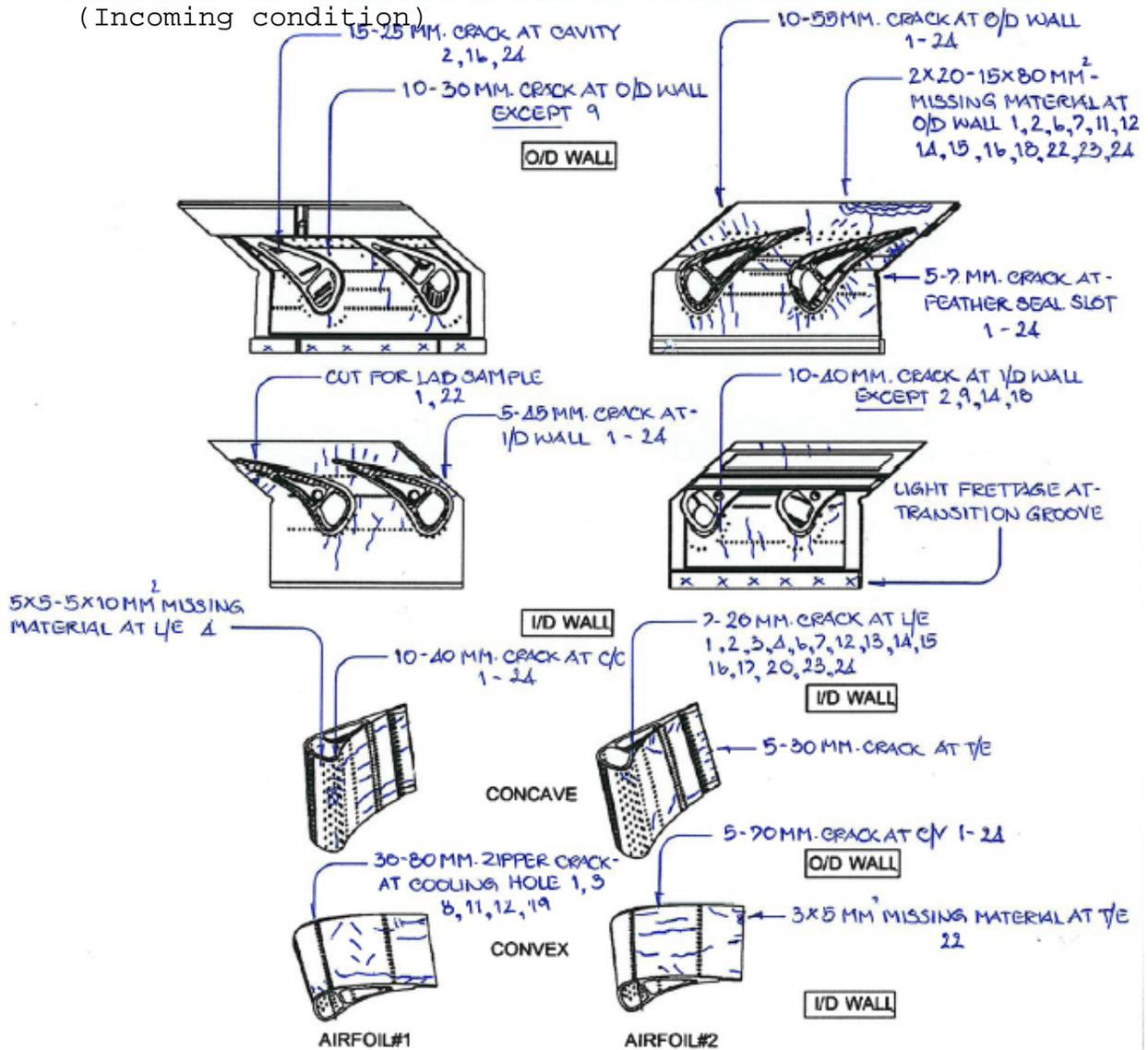
Total Joint Area	65812.24		Total Joint Area IN^2	102.009
Total Segment Area	65723.40	% Area Deviation	Total Segment Area IN^2	101.871
Total Nozzle Area	131535.64		Total Nozzle Area IN^2	203.881

Unit : mm.

13. DEFECT MAP:

INSPECTION AND PROCESS RECORD SHEET	MS6001FA 1st STAGE NOZZLE		IPRS NO. 3062-110
	PART NUMBER : GENZ01M6FA		REV. 02
CUSTOMER :	Nghi Son Refinery &	CUSTOMER PO :	PO04102025-HGP
JOB NUMBER :	824028	OP.	0230
INSPECTED BY :	Pisut Kh	DATE :	14 July 2025
DEFECT MAP RECORD SHEET			

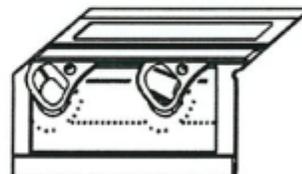
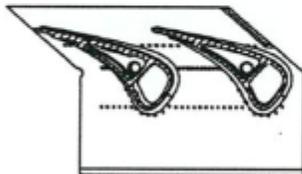
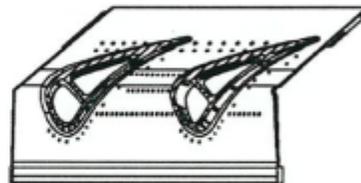
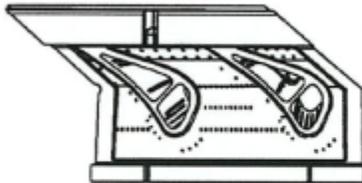
(Incoming condition)



\*Bowing Airfoil indicate in Light (L), Medium (M), Heavy (H) (At Trailing edge)

INSPECTION AND PROCESS RECORD SHEET	MS6001FA 1st STAGE NOZZLE		IPRS NO. 3062-110
	PART NUMBER : GENZ01M6FA		REV. 02
CUSTOMER :	Nghi Son Refinery &	CUSTOMER PO :	PO04102025-HGP
JOB NUMBER :	824028	OP.	FINAL
INSPECTED BY :		DATE :	12 OCT 2025
DEFECT MAP RECORD SHEET			

O/D WALL



I/D WALL

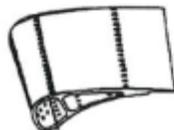


CONCAVE

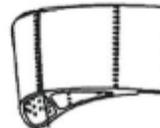


I/D WALL

O/D WALL



CONVEX



I/D WALL

AIRFOIL#1

AIRFOIL#2