

INCOMING INSPECTION REPORT

Customer	Nghị Sơn Refinery & Petrochemical LLC		
Customer P.O. No.	WO1003946086	Report Date	April 30, 2026
Engine Type	MS6001FA (GE Frame 6FA)	Component	MS6001FA Transition Piece
Component Part No.	119E9674G002	Qty. Received	6 Units (1 Complete Set)
Material	Nimonic 263 (Body, Picture Frame, Inlet Bore) Hastelloy-X (Forward Support Ring) FSX-414 (Lug / H-Block) SS304 (Impingement Sleeve, Bracket, Strip, Impingement Belt) L605 (Floating Seals — Inner, Outer)	As-Received Coating	TBC Coating — Inside Body & Inside Picture Frame Chrome Carbide Coating (Forward Support Ring) No Coating (Inlet Bore, H-Block)
Repair Classification	Level 7 of 10 Medium-High Repair (Standard / Medium band — upper boundary)	Coating Requirement	Chrome Carbide Coating (Inlet End & Support Ring) MCrAlY / TBC Internal Body
Total Initiated Starts	476	Total Emergency Trips	125

Reviewed and approved by



Paul McGuire
Engineering Manager

Work Order: WO1003946086	MS6001FA TRANSITION PIECE
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1. INTRODUCTION

Six (6) MS6001FA Transition Pieces have been received from Nghi Son Refinery and Petrochemical LLC and subjected to a comprehensive incoming inspection process. This process included receipt inspection, serial number verification, dimensional inspection, pre-strip ultrasonic wall thickness measurement, coating removal, incoming solution heat treatment, visual inspection, fluorescent penetrant inspection (FPI), post-strip ultrasonic inspection, and metallurgical evaluation of the base material. The initial findings and results of the incoming inspection are presented as follows.

Order Information		
Date of report		April 30, 2026
Customer P.O. no.		WO1003946086
Component Details		
Engine type		MS6001FA
Component type		Transition piece
Component part number		119E9674G002
Qty. received		6
Material type	Body	Nimonic 263
	Picture frame	Nimonic 263
	Inlet bore	Nimonic 263
	Forward support ring	Hastelloy-X
	Lug (H-block)	FSX-414
	Impingement sleeve	SS304
	Bracket	SS304 / Inconel 718 / SS310
	Strip	SS304
	Impingement belt	SS304
	Floating seals — inner, outer	L605
As-received coating type(s)	Body	TBC coating on inside body
	Picture frame	TBC coating on inside body
	Inlet bore	No
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	Forward support ring	Chrome carbide coating
	H-block	No
As-received wear strip applied(s)		Picture frame — Inner / outer / side
Additional items received with main set (if any)		-
Customer Supplied Component History		
Total Initiated Starts		476
Manually Initiated Starts		468
Fired Starts		180
Total Emergency Trips		125
Breaker Tripped At Load Count		127
Operational fuel type		(No information supplied)
Mode of operation (base load / peaking)		(No information supplied)
Maintenance Intervals — Combustion		(No information supplied)
Maintenance Intervals — Hot gas path		(No information supplied)

Note: Complete service history was not available beyond the operating data listed in this report. The assessment has been performed on the basis of the physical inspection findings and the operating data supplied above.

2. EXECUTIVE SUMMARY

Six (6) MS6001FA transition pieces received from Nghi Son Refinery and Petrochemical LLC were inspected upon receipt. Following cleaning, coating removal, incoming solution heat treatment, visual inspection, fluorescent penetrant inspection (FPI), ultrasonic wall thickness measurement, and dimensional inspection, UNEW Engineering has classified all six units as **Level 7 of 10 — Medium-High Repair**, the upper boundary of the Standard / Medium refurbishment band (Levels 4–7) under the UNEW repair severity classification for GE 6FA hot gas path and combustion components. No components are recommended for scrap.

The inspection data that drives this classification is extensive. Seventeen (17) discrete crack locations were confirmed by FPI across the set: cracks of 2 to 5 mm on all twelve (12) impingement sleeve halves, cracks of 5 to 10 mm on the outer picture frame wear strips of units 1, 3, 4, and 5, and a 10 mm crack on the inner picture frame wear strip of unit 6. Fretting was confirmed at every contact interface — inlet bore, inner, outer, and side picture frame wear strips, and H-blocks — and deformation and wear were confirmed on all twelve (12) inner and outer floating seals, requiring 100% replacement of the floating seal system.

Dimensional inspection recorded a 100% rejection rate at two independent geometric features: exit end dimensions are REJECT on all six units, with out-of-roundness values up to 4.79 mm, and picture frame slot dimensions are REJECT on all six units. Inlet bore ID and roundness are additionally REJECT on units 1, 4, and 6, with recorded out-of-roundness up to 4.12 mm. Full-set cold press correction and dimensional restoration are required to reinstate blueprint geometry prior to coating.

The metallurgical evaluation confirmed the body material as Nimonic 263 with a stable microstructure and full suitability for weld repair. Wall thickness is within acceptable limits on all six units and the transition piece bodies show no structural cracking, which is the controlling condition that keeps this set inside the repairable Standard / Medium band and below Heavy Repair (Levels 8–10). The operational history of 476 Total Initiated Starts against 125 Total Emergency Trips — more than one emergency trip for every four initiated starts — is consistent with the trip-driven thermal shock damage observed and supports the Level 7 classification.

The resulting restoration scope comprises GTAW weld repair at all cracked locations, replacement of 102 detail parts and repair of 42 detail parts across the set, three full furnace cycles (incoming solution heat treatment, post-repair heat treatment, and final age heat treatment), a minimum of eight discrete NDT hold points per unit, full-set cold press dimensional recovery, and complete strip and reapplication of the dual coating

system (Chrome Carbide at the inlet end and forward support ring; MCrAlY bond coat with TBC topcoat on the internal body). All repair operations will be performed in accordance with UNEW approved repair procedures and quality standards.

3. INSPECTION SUMMARY

Based on the findings of the incoming inspection process, the following assessment is submitted by UNEW Engineering for the required repair category, required coatings, and replacement materials necessary to restore the components to a serviceable condition. The repair classification in this report is determined by the recorded inspection data — the crack census, dimensional rejection rates, and restoration scope tabulated in Sections 3.2, 3.3, and 3.6 — in accordance with the UNEW ten-level repair severity classification.

3.1 OPERATIONAL HISTORY

The following operational history was supplied by the customer and is considered in the assessment of damage severity and repair classification:

Parameter	Value	Engineering Significance
Total Initiated Starts	476	Cyclic duty baseline
Manually Initiated Starts	468	—
Fired Starts	180	—
Total Emergency Trips	125	26.3% of initiated starts — severe trip-driven thermal shock duty
Breaker Tripped At Load Count	127	Repeated full-load thermal transients

Each emergency trip and breaker trip at load subjects the transition piece to an abrupt loss of firing temperature and a corresponding thermal shock transient. A trip count of this magnitude — more than one emergency trip for every four initiated starts — accelerates fretting at every mechanically loaded contact interface (inlet bore, picture frame wear strips, H-blocks, impingement sleeve contact areas) and drives crack initiation at the picture frame wear strip and impingement sleeve locations. The operational history is therefore consistent with the seventeen confirmed crack locations, the universal fretting, and the full-set dimensional distortion recorded during this inspection, and directly supports the Level 7 — Medium-High Repair classification.

3.2 DAMAGE SUMMARY

The following damage categories were identified across all six (6) transition pieces:

Damage Category	Finding (As Inspected)	Disposition
Frettage at Inlet Bore	Light frettage confirmed on all inlet bores across all 6 units. Inlet bore ID and roundness recorded as REJECT on units 1, 4, and 6, with out-of-roundness up to 4.12 mm.	Blend Repair
Wear and Cracking at Impingement Sleeve	Light to medium frettage confirmed across all 12 impingement sleeve halves. Cracks of 2 to 5 mm confirmed by FPI across the full set. Weld and blend repair required to restore sleeve profile.	Weld and Blend
Frettage and Cracking at Inner Picture Frame Wear Strip	Medium frettage confirmed on all inner picture frame wear strips across all 6 units. A 10 mm crack confirmed on unit 6. All inner wear strips require replacement.	Replace / Weld and Blend
Cracking at Outer Picture Frame Wear Strip	Cracks of 5 to 10 mm confirmed on outer picture frame wear strips of units 1, 3, 4, and 5. Weld and blend repair required at all affected locations.	Weld and Blend
Frettage at Side Picture Frame Wear Strip	Light to medium frettage confirmed on all side picture frame wear strips (2 per unit) across all 6 units. All side wear strips require replacement.	Replace
Frettage and Wear at H-Blocks	Light frettage confirmed on all H-blocks (2 per unit) across all 6 units. H-block dimensions remain within acceptable limits. Blend repair sufficient to restore contact surfaces.	Blend Repair
Deformation and Wear at Inner Floating Seals	Deformation and wear confirmed on all inner floating seals across all 6 units. All inner floating seals require replacement.	Replace
Deformation and Wear at Outer Floating Seals	Deformation and wear confirmed on all outer floating seals across all 6 units. All outer floating seals require replacement.	Replace
Exit End Dimensional Deviation	Exit end dimensions recorded as REJECT on all 6 units, with out-of-roundness up to 4.79 mm. Cold press correction required to reinstate blueprint geometry prior to coating.	Cold Press and Reshape
Picture Frame Slot Dimensional Deviation	Picture frame slot dimensions recorded as REJECT on all 6 units. Dimensional restoration required across the complete set.	Dimensional Restoration

3.3 DIMENSIONAL INSPECTION SUMMARY

Key dimensional findings from the incoming inspection are summarised below. Full measured data is recorded in Section 12.

Inspection Parameter	Result	Status
Inlet Bore ID	Out of limit on units 1, 4, and 6. Within acceptable limits on units 2, 3, and 5.	REJECT — 3/6
Inlet Bore Roundness	Out of limit on units 1, 4, and 6 (recorded out-of-roundness 2.64 mm, 4.12 mm, and 2.79 mm respectively). Within acceptable limits on units 2, 3, and 5.	REJECT — 3/6
Exit End	All 6 units recorded as REJECT; recorded out-of-roundness from 1.36 mm up to 4.79 mm. Cold press correction required to reinstate geometry.	REJECT — 6/6
Wall Thickness	Wall thickness within acceptable limits across all 6 units.	ACCEPTABLE
H-Block Dimension	H-block dimensions within acceptable limits across all 6 units.	ACCEPTABLE
Size of PF Slot	Picture frame slot dimensions recorded as REJECT on all 6 units. Dimensional restoration required.	REJECT — 6/6

Two independent geometric features — the exit end and the picture frame slot — are dimensionally rejected on 100% of the set. This is not an isolated deviation on individual units: the entire set requires controlled cold press correction and dimensional restoration of the Nimonic 263 structure before the coating system can be applied. Under the UNEW repair severity classification, an important full-set dimensional recovery of this kind is a defining characteristic of Level 7 (Medium-High Repair).

3.4 BODY AND STRUCTURAL CONDITION

Visual inspection and fluorescent penetrant inspection confirmed that the transition piece bodies show no structural cracking, heavy corrosion, or base metal loss across all six units. The internal and external body surfaces exhibit normal oxidation consistent with the operational history, which will be removed by blending during repair. Wall thickness measurements are within acceptable limits across the complete set, confirming that no weld build-up to the main body is required. The base material was confirmed as Nimonic 263 by metallurgical evaluation, with a stable microstructure suitable for weld repair and heat treatment. This structural soundness of the primary pressure-containing body is the

controlling condition that holds the classification within the Standard / Medium band and below Heavy Repair (Levels 8–10).

3.5 REPAIR CLASSIFICATION

The combined findings — seventeen confirmed crack locations across the set, fretting at every contact interface, 100% replacement of the floating seal system, 100% dimensional rejection at two independent geometric features, and complete restoration of the dual coating system — place this set at **Level 7 of 10 — Medium-High Repair** under the UNEW repair severity classification for GE 6FA hot gas path and combustion components. Level 7 is defined as heavy local restoration that remains within the normal repairability margin, characterised by increased engineering review, multiple NDT steps, and important dimensional recovery. It is the upper limit of the Standard / Medium refurbishment band (Levels 4–7).

The transition piece bodies remain structurally sound with no evidence of deep cracking, heavy internal corrosion, or base metal loss, and wall thickness is acceptable on all six units; accordingly, no unit meets the criteria for Heavy Repair (Levels 8–10). All six units are within the Level 7 repair limits established by UNEW Engineering and will be restored to a serviceable condition in accordance with the approved Level 7 (Medium-High Repair) work scope. The detailed classification basis is presented in Section 3.6.

3.6 LEVEL 7 CLASSIFICATION BASIS — MEDIUM-HIGH REPAIR

Under the UNEW repair severity classification, Levels 1–3 represent Light Repair, Levels 4–7 represent Standard / Medium Refurbishment, and Levels 8–10 represent Heavy Repair. Level 7 (Medium-High Repair) is the upper limit of the Standard / Medium band: heavy local restoration that remains within the normal repairability margin, with increased engineering review, multiple NDT steps, and important dimensional recovery. The classification is determined by the recorded inspection data against the five core technical review categories, as tabulated below. Where multiple criteria apply, the more severe technical condition governs.

Technical Review Category	Recorded Finding — This Set (WO 825089)	Classification Indication
Welding and Material Buildup	17 discrete crack locations confirmed by FPI across the set: 2–5 mm cracks on all 12 impingement sleeve halves; 5–10 mm cracks on outer picture frame wear strips of units 1, 3, 4, 5; 10 mm crack on inner picture frame wear strip of unit 6. GTAW excavation, weld repair, and blend required at every cracked location, plus weld attachment of replacement wear strips on every unit. No weld build-up to the primary body structure is required.	Multi-location weld restoration on 100% of units — Level 7. Absence of primary-structure welding excludes Levels 8–10.
Dimensional Restoration	Exit end REJECT on 6/6 units (out-of-roundness up to 4.79 mm); picture frame slot REJECT on 6/6 units; inlet bore ID and roundness REJECT on 3/6 units (out-of-roundness up to 4.12 mm). Full-set cold press correction and dimensional restoration of the Nimonic 263 structure required prior to coating.	Important full-set dimensional recovery at two independent features — a defining Level 7 characteristic.
Coating and Base Metal Condition	Internal TBC system (MCrAlY bond coat + TBC topcoat) requires full strip and reapplication on all 6 units, on both body and picture frame. Chrome Carbide hard face coating requires reapplication at two areas (inlet end and forward support ring) on all 6 units. Base metal confirmed sound Nimonic 263; no substrate attack, no base-metal exposure damage.	Complete dual-coating-system restoration across the set — consistent with Levels 6–7. Sound base metal prevents escalation to Level 8.
Sealing Function Recovery	Deformation and wear confirmed on 100% of the floating seal system: all 6 inner and all 6 outer floating seals require replacement.	Sealing-function recovery is a critical-function criterion that

	Seal slot requires EDM re-creation following weld repair. Inner (6), side (12) picture frame wear strips require replacement; outer strips require weld repair.	raises repair severity — Level 7 driver.
Inspection, Heat Treatment, and Engineering Risk	Three full furnace cycles per unit (incoming solution heat treatment, post-repair heat treatment, final age heat treatment). Minimum eight NDT hold points per unit: pre-strip UT, post-strip UT, FPI in dirty condition, post-strip FPI, local FPI of prepared areas, pre-weld and post-weld FPI, and local NDT at wear strip locations. Trip-dominated service history (125 emergency trips against 476 initiated starts) requires engineering review of remaining margin.	Multiple NDT steps, repeated heat treatment, and increased engineering review — explicit Level 7 criteria.

Classification boundary review

Why the set exceeds Level 6 (Medium Repair)	Why the set does not reach Level 8 (Heavy Repair)
Dimensional rejection is not limited to measurable material loss on individual parts: two independent geometric features are rejected on 100% of the set, requiring controlled full-set cold press recovery. The crack population spans every unit and every impingement sleeve half (17 locations), not multiple isolated repair areas. The sealing function is compromised across the entire set — 12 of 12 floating seals deformed and replaced, seal slot re-created by EDM. Restoration requires three furnace cycles and a minimum of eight NDT hold points per unit — beyond the repeated-inspection expectation of Level 6.	The transition piece bodies are free of structural cracking on all six units — no major cracking of the primary structure. Wall thickness is ACCEPTABLE on 6/6 units: no weld build-up to the main body and no thin-wall recovery is required. No missing material, no through-wall damage, and no base-metal attack or substrate corrosion was detected. All recovery operations remain within the established repairability margin of UNEW approved procedures; acceptance risk is controlled.

GOVERNING DETERMINATION: The recorded data satisfies the Level 7 criteria in four of the five core technical review categories, while the structural soundness of the primary body excludes Heavy Repair (Levels 8–10). In accordance with the governing principle that the more severe technical condition shall control, the complete set is classified **Level 7 of 10 — Medium-High Repair**, the upper boundary of the Standard / Medium refurbishment band (Levels 4–7).

4. ENGINEERING EVALUATION AND RECOMMENDATION

Following receipt, cleaning, coating removal, incoming solution heat treatment, visual inspection, fluorescent penetrant inspection (FPI), wall thickness measurement, dimensional inspection, and metallurgical evaluation, UNEW Engineering has assessed all six (6) MS6001FA transition pieces (UNEW Work Order 825089) received from Nghi Son Refinery and Petrochemical LLC.

The damage identified across the complete set — seventeen confirmed crack locations, frettage at all contact interfaces, floating seal deformation with 100% seal replacement, and full-set dimensional rejection at the exit end and picture frame slots — is consistent with severe trip-driven cyclic operation and places the set at **Level 7 of 10 — Medium-High Repair**, the upper limit of the Standard / Medium refurbishment band established by UNEW Engineering. The transition piece bodies show no structural cracking, heavy internal corrosion, or base metal loss; accordingly no unit in the set requires Heavy Repair intervention (Levels 8–10), and no components are recommended for scrap.

The following operational factors were noted as contributors to the damage observed:

- 476 Total Initiated Starts with 125 Total Emergency Trips — an emergency trip incidence of 26.3%, consistent with repeated thermal shock events that accelerate frettage damage and wear at all contact interfaces across the transition piece body, picture frame, and impingement sleeve locations, and that drive crack initiation at the picture frame wear strips and impingement sleeves.
- 127 Breaker Trips at Load — consistent with repeated full-load thermal transients contributing to progressive frettage, floating seal deformation, and the full-set dimensional distortion recorded at the exit end and picture frame slots.
- No fuel type, mode of operation, or maintenance interval data was supplied by the customer. Complete service history was not available beyond the operating data listed in this report; the assessment has been performed on the basis of the physical inspection findings and the operating data provided.

4.1 DEFECT FINDINGS AND RECOMMENDED REPAIR ACTIONS

The table below defines the required repair action for each defect category identified during incoming inspection. All repair methods shall be performed in accordance with UNEW approved repair procedures.

No.	Defect / Condition	Location / Affected Items	Repair Method	Action
1	Frettage at inlet bore	Light frettage confirmed on all 6 inlet bores. Inlet bore ID and roundness REJECT on units 1, 4,	Blend Repair	REQUIRED
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		and 6 (out-of-roundness up to 4.12 mm).		
2	Wear and cracking at impingement sleeve	Light to medium frettage and cracks of 2 to 5 mm confirmed across all 12 impingement sleeve halves on all 6 units.	Weld and Blend	REQUIRED
3	Cracking at inner picture frame wear strip	10 mm crack confirmed on inner picture frame wear strip of unit 6. Medium frettage on all 6 units — all inner wear strips to be replaced.	Replace / Weld and Blend	REQUIRED
4	Cracking at outer picture frame wear strip	Cracks of 5 to 10 mm confirmed on outer picture frame wear strips of units 1, 3, 4, and 5.	Weld and Blend	REQUIRED
5	Frettage at side picture frame wear strip	Light to medium frettage confirmed on all side picture frame wear strips (2 per unit) across all 6 units. All to be replaced.	Replace	REQUIRED
6	Frettage and wear at H-blocks	Light frettage confirmed on all H-blocks (2 per unit) across all 6 units. H-block dimensions within acceptable limits.	Blend Repair	REQUIRED
7	Deformation and wear at inner floating seals	Deformation and wear confirmed on all inner floating seals across all 6 units. All to be replaced.	Replace	REQUIRED
8	Deformation and wear at outer floating seals	Deformation and wear confirmed on all outer floating seals across all 6 units. All to be replaced.	Replace	REQUIRED
9	Exit end dimensional deviation	Exit end dimensions recorded as REJECT on all 6 units. Cold press correction required to reinstate blueprint geometry.	Cold Press and Reshape	REQUIRED
10	Picture frame slot dimensional deviation	Picture frame slot dimensions recorded as REJECT on all 6 units. Dimensional restoration required across the complete set.	Dimensional Restoration	REQUIRED
11	TBC coating degradation — internal body and picture frame	Internal TBC coating on body and picture frame requires full removal and reapplication on all 6 units.	Full Strip and Recoat	REQUIRED

NOTE: All weld repairs will be performed using approved filler materials compatible with Nimonic 263 base alloy. Pre-weld and post-weld fluorescent penetrant inspection (FPI) is mandatory for all weld repaired areas. Full post-weld heat treatment will be applied after all welding operations are complete to restore material properties and relieve residual stresses.

4.2 RECOMMENDED REPAIR SEQUENCE

All components shall be repaired in the following sequence to ensure structural integrity, correct geometry, and coating adhesion:

Step	Process	Applies To
1	Receipt inspection, serial number recording and verification on TP body and jacket assembly.	All 6 Units
2	Metallurgical evaluation of base material and coating type, report on condition.	All 6 Units
3	Dimensional inspection and pre-strip wall thickness inspection.	All 6 Units
4	Disassemble aft bracket from TP body. Bag and tag hardware for re-use.	All 6 Units
5	Disassemble TP outer jacket. Ensure serial number of TP body is etched onto jacket skins.	All 6 Units
6	Perform pre-strip ultrasonic inspection.	All 6 Units
7	Mask internal cooling passages and abrasive blast to remove TBC coating.	All 6 Units
8	Perform incoming solution heat treatment in partial pressure vacuum environment.	All 6 Units
9	Degrease components. Grit blast to remove residual coating.	All 6 Units
10	Perform visual inspection and fluorescent penetrant inspection (FPI). Record all defects.	All 6 Units
11	Perform post-strip ultrasonic inspection.	All 6 Units
12	Compile and issue incoming inspection report.	All 6 Units
13	Blend to remove oxidation product from transition piece body.	All 6 Units
14	Scallop all defective areas in preparation for weld repair.	All 6 Units
15	Cold straighten transition piece main body to reinstate blueprint dimensions.	All 6 Units
16	Perform local fluorescent penetrant inspection of prepared areas.	All 6 Units
17	Degrease and prepare all areas for weld repair.	All 6 Units
18	Perform GTAW weld repairs to all cracked and defective areas.	All 6 Units
19	EDM to recreate the seal slot.	All 6 Units
20	Repair by welding and blending H-blocks to restore dimensional acceptance.	All 6 Units

21	Blend all repaired areas to restore component profile.	All 6 Units
22	Perform post-repair heat treatment to restore material properties.	All 6 Units
23	Assemble matched aft bracket to TP body.	All 6 Units
24	Perform final age heat treatment.	All 6 Units
25	Set in fixture and perform dimensional inspection.	All 6 Units
26	Weld in place new extender wear strips.	All 6 Units
27	Perform local NDT inspection at wear strip locations.	All 6 Units
28	Apply Chrome Carbide hard face coating by APS process to inlet end.	All 6 Units
29	Apply Chrome Carbide hard face coating by APS process to forward support ring.	All 6 Units
30	Set up and reassemble matched TP jackets. Assemble new U frames.	All 6 Units
31	Perform fluorescent penetrant inspection.	All 6 Units
32	Apply MCrAlY bond coat and TBC topcoat by APS process to internal body surface.	All 6 Units
33	Perform visual inspection.	All 6 Units
34	Perform final dimensional inspection and final visual inspection.	All 6 Units
35	Compile Final Report, pack and ship components with all required documentation as listed in Purchase Order.	All 6 Units

4.3 COATING RECOMMENDATION

The following coating scope applies to the complete set of six (6) MS6001FA transition pieces:

Coating Process	Surface / Area	Applies To
Abrasive blast to remove existing TBC and MCrAlY coating.	All internal gas path surfaces.	All 6 Units
Abrasive blast internal surface. Blow out with clean dry compressed air to remove residual media.	Internal gas path surface.	All 6 Units
Apply Chrome Carbide hard face coating by APS process.	Inlet end.	All 6 Units
Apply Chrome Carbide hard face coating by APS process.	Forward support ring.	All 6 Units
Apply MCrAlY bond coat by APS process.	Internal gas path surface — body and picture frame.	All 6 Units
Apply Thermal Barrier Coating (TBC) by APS process.	Internal body surface.	All 6 Units
Demask, dress and perform visual inspection.	All coated surfaces.	All 6 Units
Perform final dimensional inspection and final visual inspection.	All surfaces.	All 6 Units

4.4 ENGINEERING RECOMMENDATION CONCLUSION

CLASSIFICATION: Level 7 of 10 — Medium-High Repair, All 6 MS6001FA Transition Pieces — Work Order 825089

UNEW Engineering confirms that the complete set of six (6) MS6001FA transition pieces (UNEW Work Order 825089) is classified as **Level 7 of 10 — Medium-High Repair** based on the findings of the incoming inspection. The damage identified — seventeen confirmed crack locations at the picture frame wear strips and impingement sleeves, fretting at all contact interfaces, 100% floating seal deformation and replacement, and full-set dimensional rejection at the exit end and picture frame slots — is consistent with severe trip-driven cyclic operation and requires heavy local restoration, important full-set dimensional recovery, three furnace cycles, and multiple NDT hold points per unit. It does

not indicate deep structural damage, heavy internal corrosion, or base metal loss in the transition piece body.

All six units are within the repairable limits established by UNEW Engineering and will be restored to a serviceable condition in accordance with the Level 7 (Medium-High Repair) work scope defined in this report — the upper boundary of the Standard / Medium refurbishment band. All repair methods, heat treatment programs, weld procedures, and coating processes will be performed in accordance with UNEW approved process specifications and quality procedures.

5. SPARE PART (REPAIR / REPLACE)

Item	Part Description	Received / Required	Condition	Quantity	Remark
1	Inner floating seal (Cloth seal)	6/6	Replace	6	Additional
2	Outer floating seal (Cloth seal)	6/6	Replace	6	Additional
3	Side wear resistant strip	12/12	Replace	12	Additional
4	Inner wear resistant strip	6/6	Replace	6	Additional
5	Outer wear resistant strip	6/6	Repair	6	-
6	H-Block	12/12	Repair	12	-
7	Nut (Support bracket)	12/12	Replace	12	Standard
8	Aft Bracket Hardware (Bolt)	12/12	Replace	12	Additional
9	Washer (Support bracket)	24/24	Re-use	24	-
10	Guide bush (Support bracket)	12/12	Re-use	12	-
11	Bushing (Support bracket)	12/12	Re-use	12	-
12	Support bracket	6/6	Repair	6	-
13	Nut (Inner picture frame support plate)	6/6	Replace	6	Standard
14	Bolt (Inner picture frame support plate)	6/6	Replace	6	Additional
15	Washer (Inner picture frame support plate)	6/6	Re-use	6	-
16	Inner picture frame support plate	6/6	Repair	6	-
17	Impingement sleeve (half sleeve)	12/12	Repair	12	-
18	Gusset — inner	6/6	Replace	6	Additional
19	Gusset — outer	6/6	Replace	6	Additional
20	Sealing strip — inner	6/6	Replace	6	Standard
21	Sealing strip — outer	6/6	Replace	6	Standard
22	Impingement belt — inner	6/6	Replace	6	Additional
23	Impingement belt — outer	6/6	Replace	6	Additional

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Replacement / repair census: across the six-unit set, 102 detail parts are to be replaced with new and 42 detail parts are to be repaired; 54 hardware items are suitable for re-use. The scale of this detail-part turnover is consistent with the Level 7 (Medium-High Repair) classification.

6. PACKING DATA FROM CUSTOMER

The six (6) transition piece assemblies were received against the customer packing list summarised below. The customer packing list is retained in the UNEW work order file.

Shipment Reference	
Packing list number	VI/2026.02-UNEW
Packing list date	3 March 2026
Contract reference	128/2024.NSRP.Maint-UNEW
Consignor	Nghi Son Refinery and Petrochemical LLC (NSRP), Nghi Son Economic Zone, Hai Binh Ward, Thanh Hoa Province, Viet Nam
Bill to	UNEW Inc., 3321 SE Gran Park Way, Stuart, Florida, USA 34997
Origin / Terms	USA / FOB, INCOTERMS 2010

Description	MAXIMO	P/N	S/N	Box
6FA+E TRANSITION PC ASSY (6 PC)	2060129787	119E9674G002	213998-773 213998-774 213998-775 213998-776 213998-777 213998-778	2/8, 3/8, 4/8 H100 × W100 × L138 cm

7. COMPONENT SERIAL NUMBER CORRELATION

CORRELATION SHEET			
Item	Part Number	Serial Number	Material
1	119E9674G002	213998-774	Nimonic 263
2	119E9674G002	213998-778	Nimonic 263
3	119E9674G002	213998-777	Nimonic 263
4	119E9674G002	213998-776	Nimonic 263
5	119E9674G002	213998-773	Nimonic 263
6	119E9674G002	213998-775	Nimonic 263

8. SCOPE OF WORK

Work Scope	Inspect	Repair (Level 7)	Coating
Inspect			
Perform receipt inspection and record serial numbers.	X		
Perform visual inspection in dirty condition, segregate obvious scrap components.	X		
Set in single fixture and perform dimensional inspection.	X		
Perform metallurgical evaluation of base material and coating type, report on condition.	X		
Disassemble aft bracket from TP body, bag and tag hardware for re-use.	X		
Disassemble TP outer jacket, ensure serial No. of TP body is etched onto jacket skins.	X		
Perform pre-strip ultrasonic inspection.	X		
Mask internal cooling passages and abrasive blast to remove TBC coating.	X		
Perform incoming solution heat treatment in partial pressure vacuum environment.	X		
Degrease components.	X		
Grit blast to remove residual coating.	X		
Perform visual inspection.	X		
Perform fluorescent penetrant inspection.	X		
Perform post-strip ultrasonic inspection.	X		
Compile and issue incoming inspection report.	X		
Repair — Level 7 (Medium-High)			
Blend to remove oxidation product from transition piece body.		X	
Scallop all defective areas.		X	
Cold straighten Transition Piece main body to reinstate blueprint dimensions.		X	

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Perform local fluorescent penetrant inspection of prepared areas.		X	
Degrease and prepare for weld repair.		X	
Perform weld repairs.		X	
EDM to recreate the seal slot.		X	
Repair by welding and blending "H" blocks to restore dimensional acceptance.		X	
Blend all repaired areas.		X	
Post repair heat treatments.		X	
Assemble matched Aft bracket to T/P body.		X	
Perform final age heat treatment.		X	
Set in fixture and perform dimensional inspection.		X	
Weld in place new Extender wear strips.		X	
Perform local NDT inspection to wear strip locations.		X	
Coating			
Apply Hard face coating to inlet end.			X
Apply Hard face coating to support ring.			X
Set up and reassemble matched T/P jackets.			X
Assemble NEW U frames to Transition piece jackets.			X
Perform fluorescent penetrant inspection.			X
Apply Bond coat and TBC topcoat.			X
Perform visual inspection.			X
Perform final inspection.			X
Compile Final Report, pack and ship components with all required documentation as listed in Purchase Order.			X

Required:

- Chrome Carbide inlet end, support ring & MCrAlY / TBC internal body (standard work scope).
- Replace Bolt (Inner picture frame support plate), 6 ea.
- Replace Aft bracket hardware (Bolt), 6 ea.
- Floating seals cloth seal — inner, 6 ea.

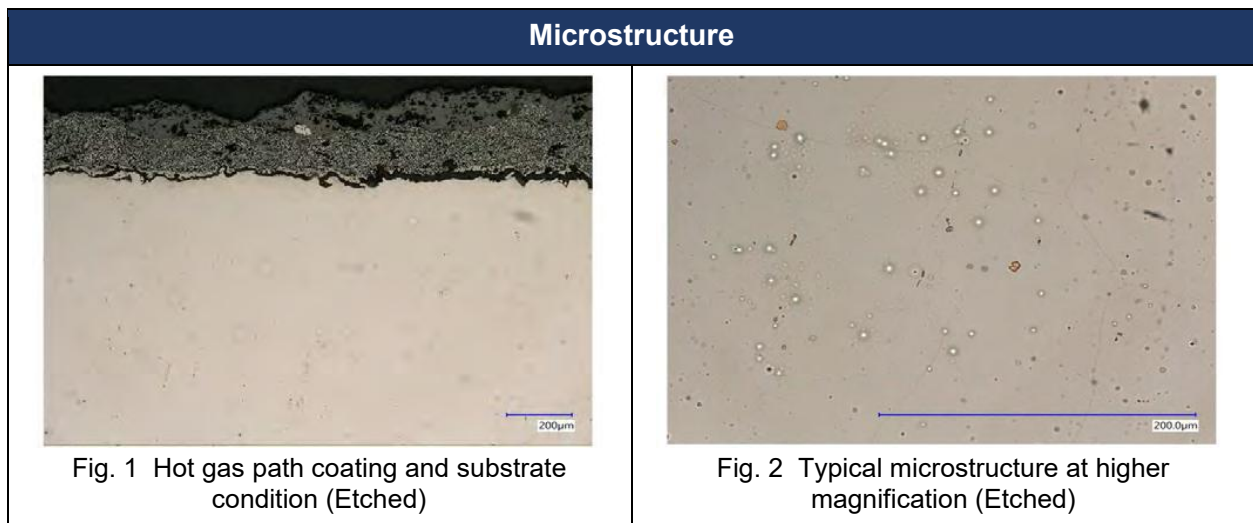
Work Order: WO1003946086	MS6001FA TRANSITION PIECE
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- Floating seals cloth seal — outer, 6 ea.
- Picture Frame Wear Strip (ID), 6 ea.
- Picture Frame Wear Strip (Side), 12 ea.

9. MATERIAL EVALUATION

Report No.	L11385	Job order no.	825089
Serial no. (or ID)	Item # 1	Cutting location	Outlet bore
Received status	As-Received	Hardness Test	-
Grain size	-	Coating Type	TBC coating
Nearest Alloy	Nimonic 263		

Main Composition, %									
Element	Co	Cr	Ni	Ti	W	Ta	Mo	Fe	Al
Nominal	20.0	20.0	Bal	2.1	-	-	6.0	-	1.2
Result	18.1	19.2	52.6	1.9	-	-	6.5	-	-



A metallurgical coupon was extracted from Item 1 at the outlet bore location by metallurgical sectioning and evaluated under Report No. L11385 to establish the base material condition and confirm suitability for repair. Examination confirmed that the hot gas path surface was protected by TBC coating, as shown in Fig. 1. The base material was confirmed as Nimonic 263 alloy, comprising fine grain boundary carbide and a gamma matrix with fine gamma prime, primary carbide, and dispersed secondary carbide, as shown in Fig. 2. It should be noted that the gamma prime of this alloy is very fine in nature and can be further characterised by scanning electron microscopy (SEM) if required.

10. PHOTOGRAPHS

Fig.1 As-received condition.



Fig.2 As-received condition.



Fig.3 As-received condition.



Fig.4 As-received condition.



Fig.5 Typical condition of body.



Fig.6 Typical condition of body.



Fig.7 Typical condition of body.



Fig.8 Typical condition of impingement sleeve.



Fig.9 Typical condition of impingement sleeve.

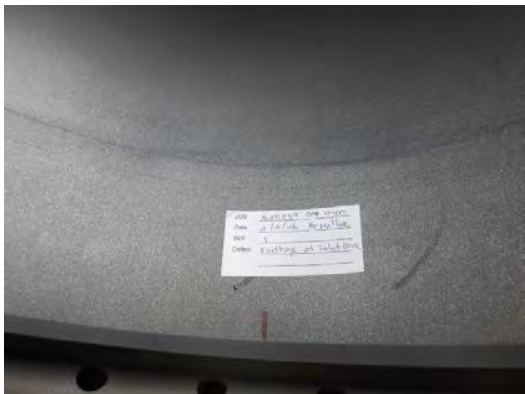


Fig.10 Fretting on inlet bore.

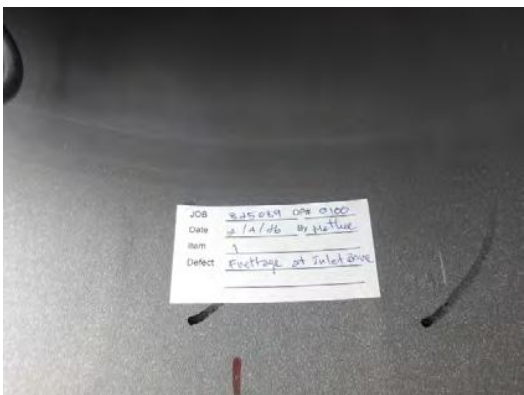


Fig.11 Fretting on inlet bore.



Fig.12 Fretting on inner picture frame wear strip.



Fig.13 Fretage on inner picture frame wear strip.



Fig.14 Fretage on inner picture frame wear strip.

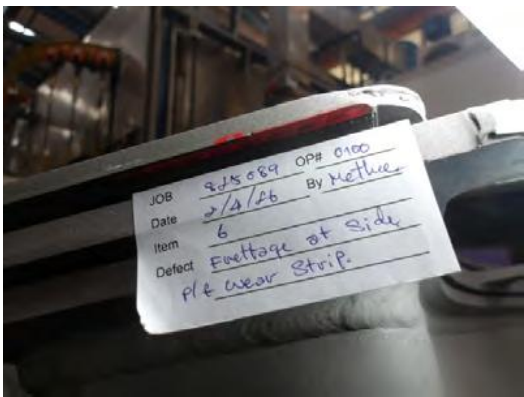


Fig.15 Fretage on side picture frame wear strip.

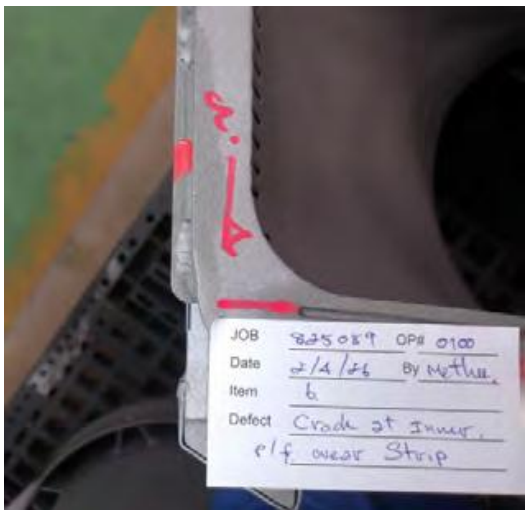


Fig.16 Crack on inner picture frame wear strip.

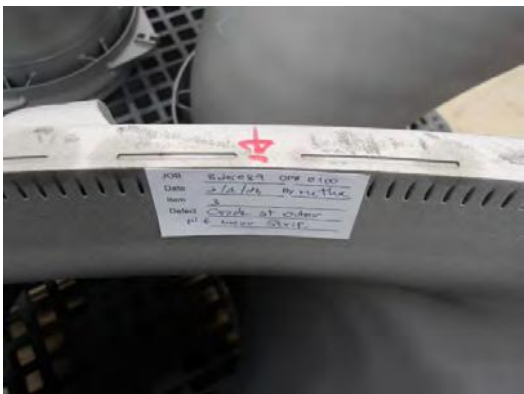


Fig.17 Crack on outer picture frame wear strip.

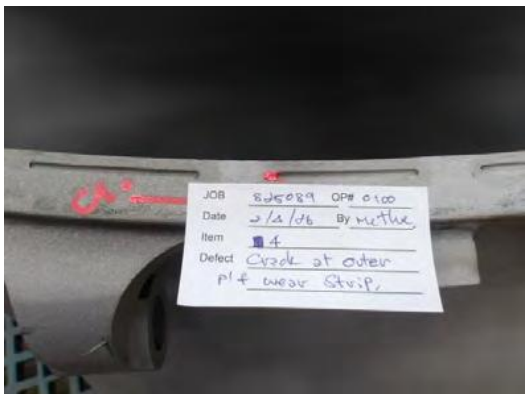


Fig.18 Crack on outer picture frame wear strip.

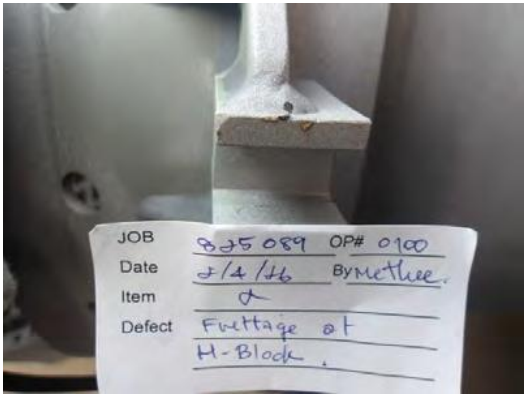


Fig.19 Fretting on H-Block.



Fig.20 Deformation on inner floating seal.



Fig.21 Deformation on inner floating seal.



Fig.22 Fretting on inner floating seal.



Fig.23 Fretting on outer floating seal.



Fig.24 Deformation on outer floating seal.



Fig.25 Deformation on outer floating seal.

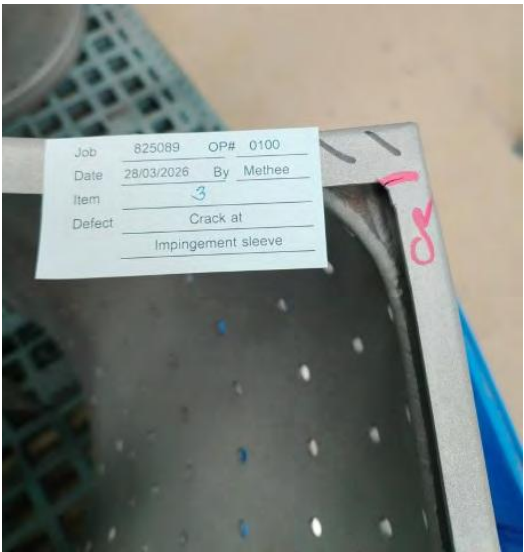


Fig.26 Crack on impingement sleeve.

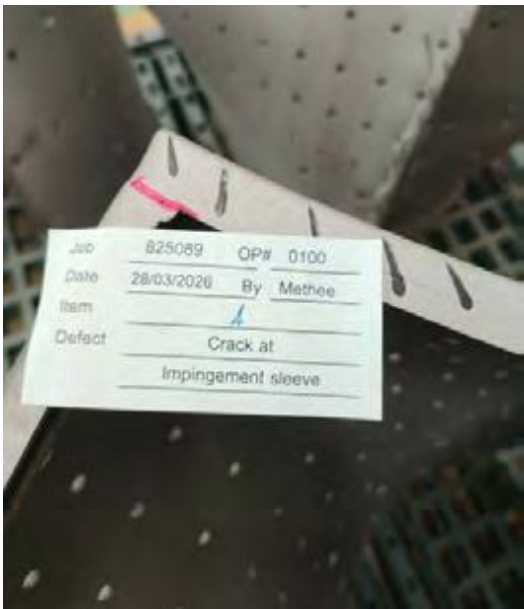


Fig.27 Crack on impingement sleeve.

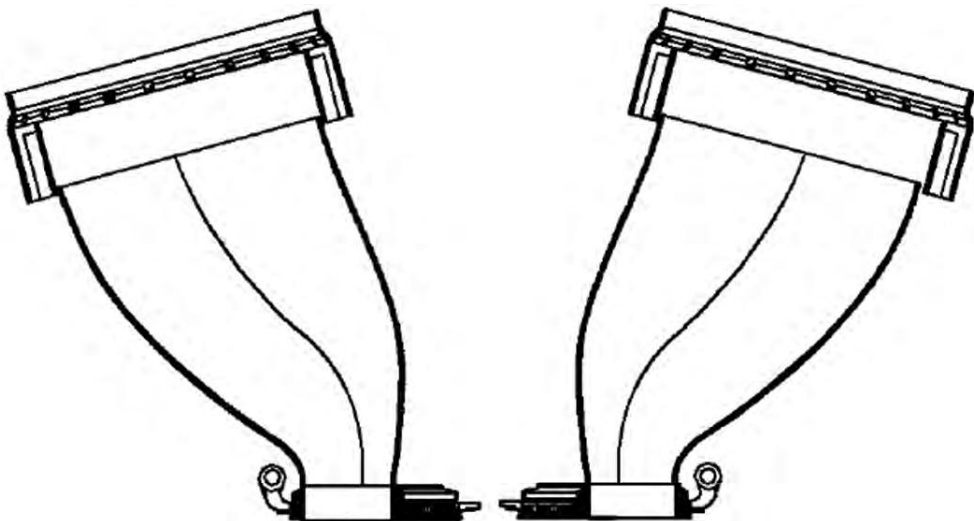


Fig.28 Fretting on impingement sleeve.

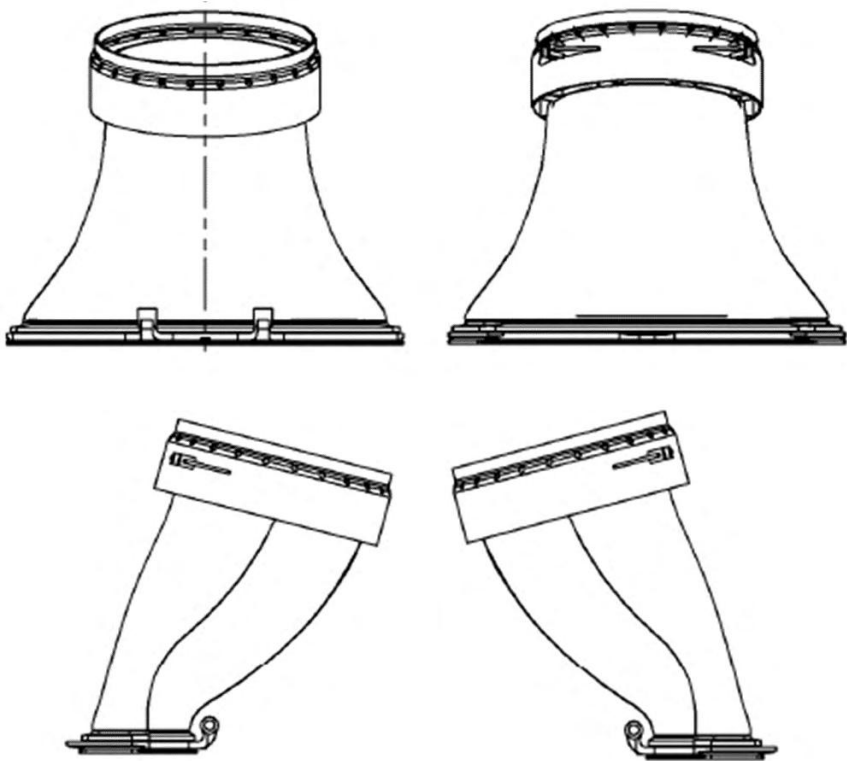


Fig.29 Fretting on impingement sleeve.

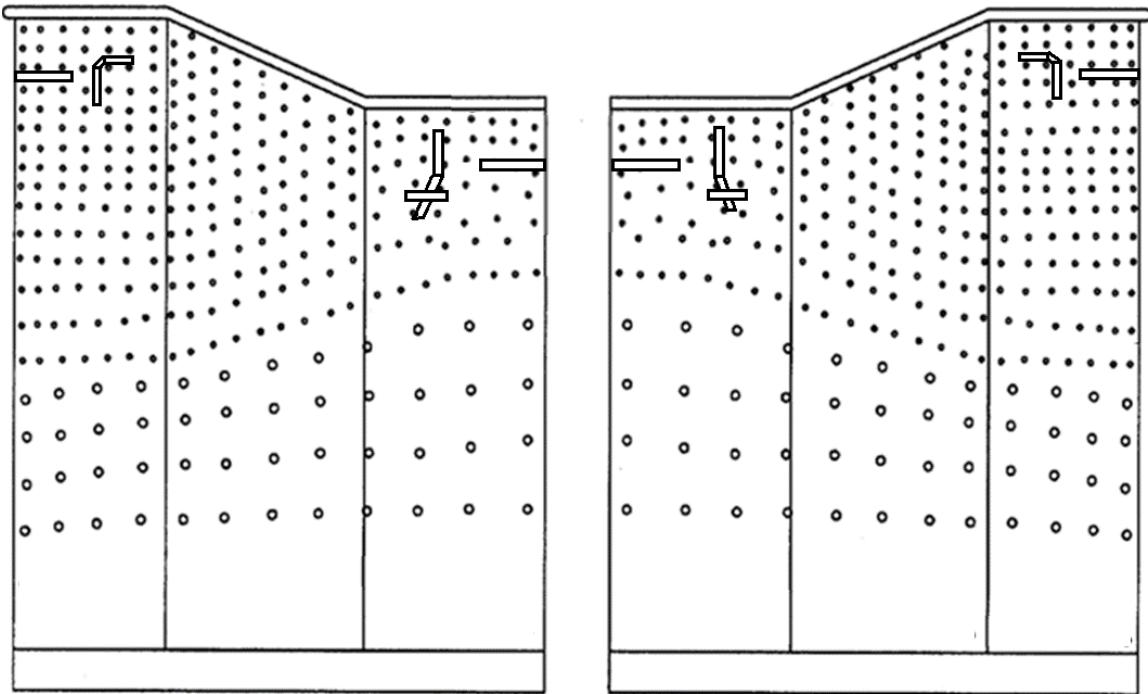
11. DEFECT LEGEND TABLE



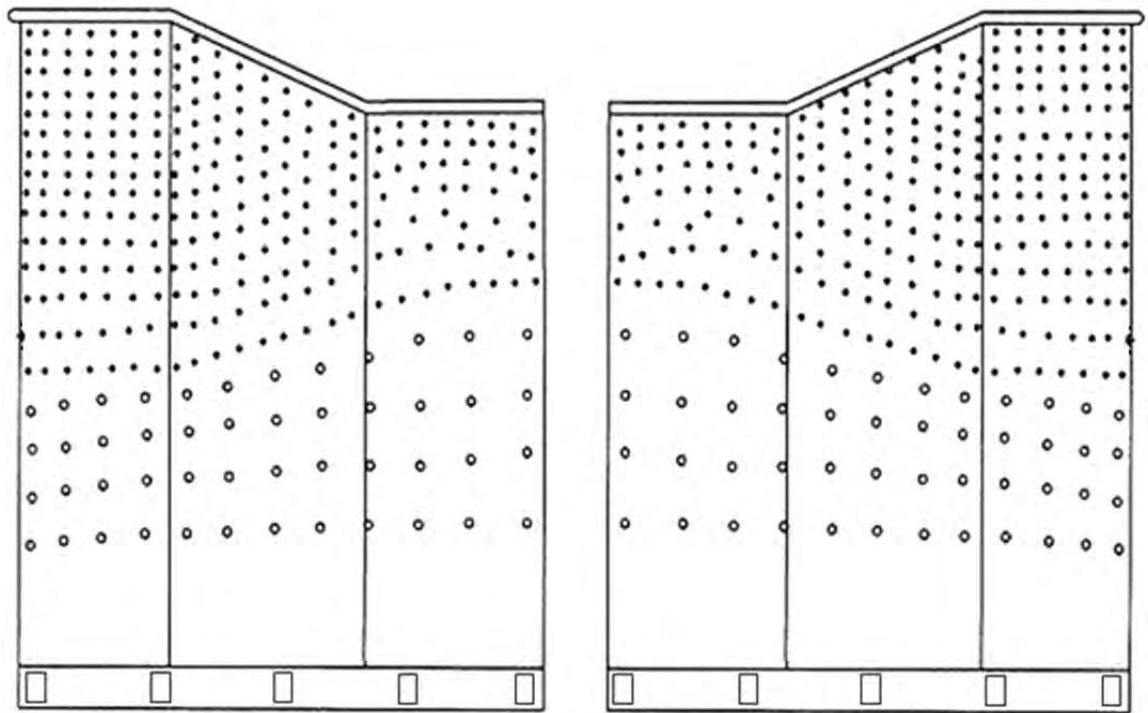
OUTSIDE VIEW



INSIDE VIEW



OUTSIDE VIEW



INSIDE VIEW

11.1 INSPECTION FINDINGS AND DIMENSIONAL DATA MATRIX

Defect Type / Location		1	2	3	4	5	6
Body	Wear						
	Cracking						
	Corrosion						
	Missing material						
Inlet bore	Wear	B	B	B	B	B	B
	Cracking						
	Corrosion						
	Missing material						
Inner picture frame support plate	Wear						
	Cracking						
	Corrosion						
	FOD						
	Deformation						
Impingement sleeve	Wear	B/WB	B/WB	B/WB	B/WB	B/WB	B/WB
	Cracking	WB	WB	WB	WB	WB	WB
	Corrosion						
	Deformation						
Support bracket	Wear						
	Cracking						
	Corrosion						
	FOD	B	B	B	B	B	B
Inner picture frame wear strip (if applicable)	Wear	R	R	R	R	R	R
	Cracking						R
	Deformation						
	Missing material						
Outer picture frame wear strip (if applicable)	Wear						
	Cracking	WB		WB	WB	WB	

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INCOMING INSPECTION REPORT



	Corrosion						
	Missing material						
Side picture frame wear strip (2 per transition piece)	Wear — Qty	2	2	2	2	2	2
	Wear — Code	R	R	R	R	R	R
	Cracking						
	Deformation						
H-block	Wear — Qty	2	2	2	2	2	2
	Wear — Code	B	B	B	B	B	B
	Cracking						
	Fixture rejection						
Inner floating seal	Wear	R	R	R	R	R	R
	Cracking						
	Deformation	R	R	R	R	R	R
Outer floating seal	Wear	R	R	R	R	R	R
	Cracking						
	Deformation	R	R	R	R	R	R
Dimensional Data		1	2	3	4	5	6
Inlet bore ID		REJ	ACC	ACC	REJ	ACC	REJ
Inlet bore roundness		REJ	ACC	ACC	REJ	ACC	REJ
Exit end		REJ	REJ	REJ	REJ	REJ	REJ
Wall thickness		ACC	ACC	ACC	ACC	ACC	ACC
H-block dimension		ACC	ACC	ACC	ACC	ACC	ACC
Size of PF slot		REJ	REJ	REJ	REJ	REJ	REJ

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.

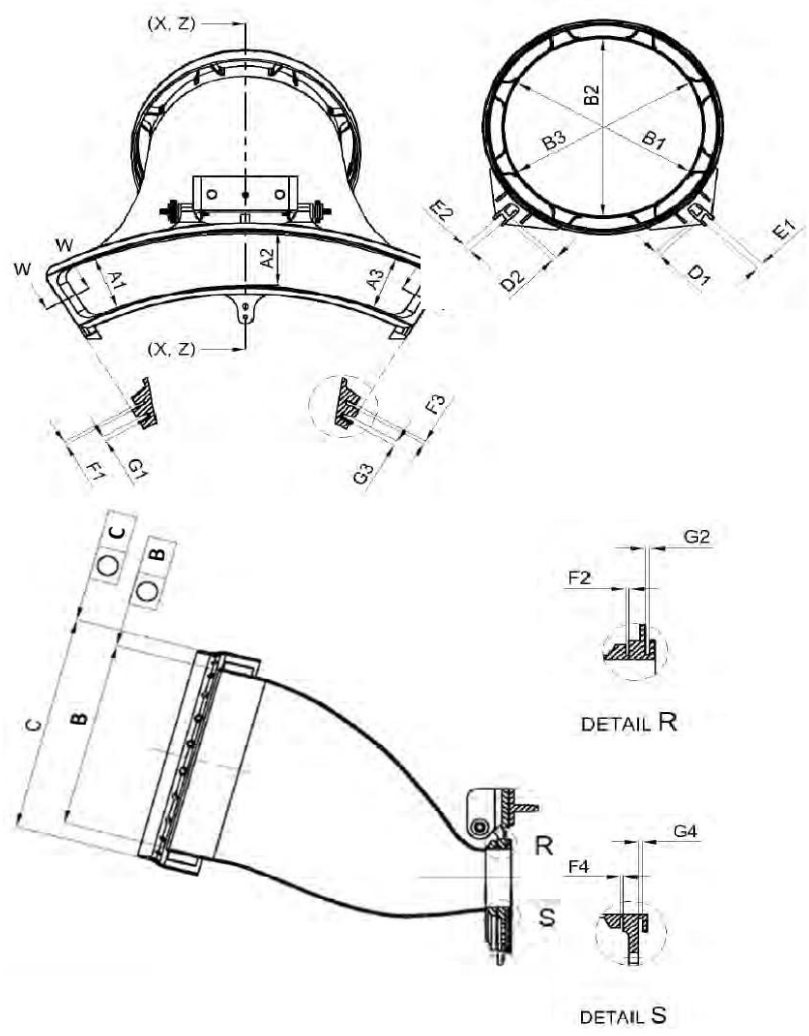
R = Replace with new. ACC = Acceptable as is. REJ = Dimension unacceptable and will require repair or cause of scrap. S = Non-repairable / Scrap.

Repair severity bands: L = Light repair (Levels 1–3); M = Standard / Medium repair (Levels 4–7, this set: Level 7 — Medium-High); H = Heavy repair (Levels 8–10); EX = Salvage repair category.

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MS6001FA TRANSITION PIECE

12. DIMENSION INSPECTION



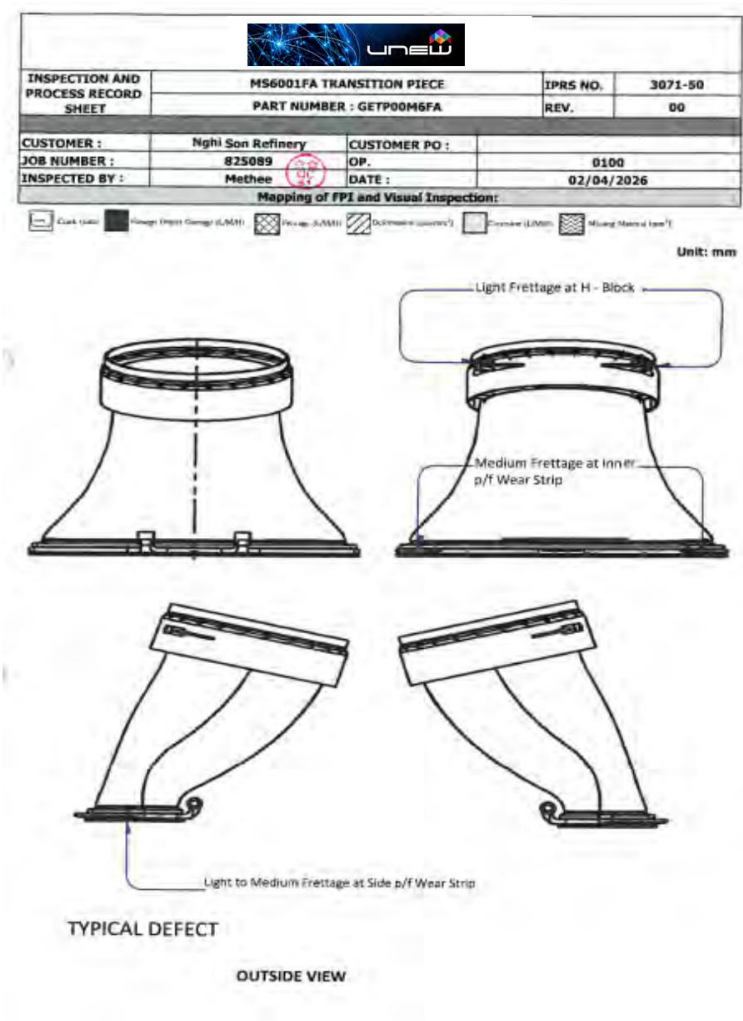
Dimension Inspection — POSITION (Unit: mm)										
ITEM	A1	A2	A3	B1	B2	B3	B roundness	C1	C2	C3
1	127.38	128.17	127.25	394.82	393.40	396.04	2.64	455.31	454.33	458.85
2	127.38	127.88	126.62	395.01	393.95	394.69	1.06	456.85	455.49	456.51
3	127.72	128.09	126.42	395.30	393.49	394.69	1.81	457.87	456.13	456.74
4	127.19	128.00	126.77	395.90	391.78	393.26	4.12	459.68	454.89	456.88
5	126.98	127.76	126.39	395.16	393.78	395.26	1.48	457.90	455.48	457.45
6	127.23	127.91	126.72	395.65	392.86	394.79	2.79	457.98	454.68	457.38

Dimension Inspection — POSITION (Unit: mm)										
ITEM	C roundness	D1	D2	E1	E2	G1	G2	G3	G4	F1
1	4.52	9.60	9.58	14.86	14.90	3.50	3.50	3.50	3.50	4.00
2	1.36	9.44	9.48	14.71	14.78	3.50	3.50	3.50	3.50	4.00
3	1.74	9.50	9.51	14.74	14.85	3.50	3.50	3.50	3.50	4.00
4	4.79	9.35	9.56	14.85	14.91	3.50	3.50	3.50	3.50	4.00
5	2.42	9.49	9.38	14.87	14.77	3.50	3.50	3.50	3.50	4.00
6	3.30	9.56	9.42	14.86	14.93	3.50	3.50	3.50	3.50	4.00

Dimension Inspection — POSITION (Unit: mm)			
ITEM	F2	F3	F4
1	3.60	4.00	3.50
2	3.70	4.10	3.80
3	3.60	4.10	3.60
4	3.50	4.10	3.50
5	3.60	4.00	3.60
6	3.60	4.10	3.60

Roundness values shown in red exceed acceptable limits: exit end (C) roundness on all six units, inlet bore (B) roundness on units 1, 4, and 6. These recorded deviations drive the full-set cold press and dimensional restoration requirement supporting the Level 7 classification.

13. DEFECT MAP



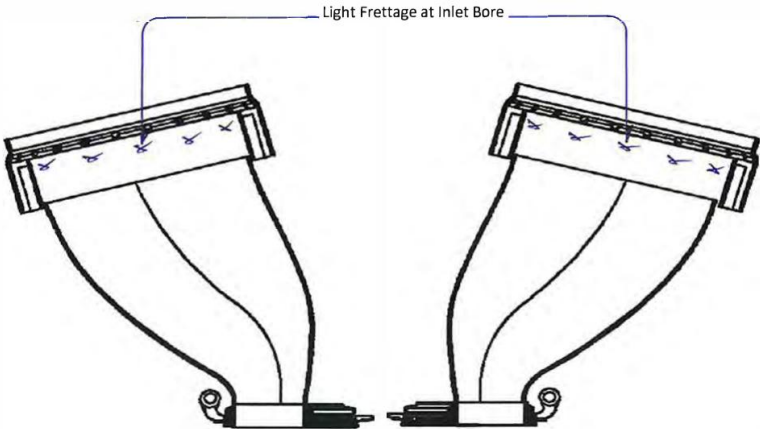


INSPECTION AND PROCESS RECORD SHEET	MS6001FA TRANSITION PIECE		IPRS NO.	3071-50
	PART NUMBER : GETP00M6FA		REV.	00
CUSTOMER :	Nghi Son Refinery	CUSTOMER PO		
JOB NUMBER :	825089	OP.	0100	
INSPECTED BY :	Methee	DATE :	02/04/2026	

Mapping of FPI and Visual Inspection:

Crack (mm) Foreign Object Damage (L/M/H) Fretting (L/M/H) Deformation (uncut mm) Corrosion (L/M/H) Missing Material (mm)

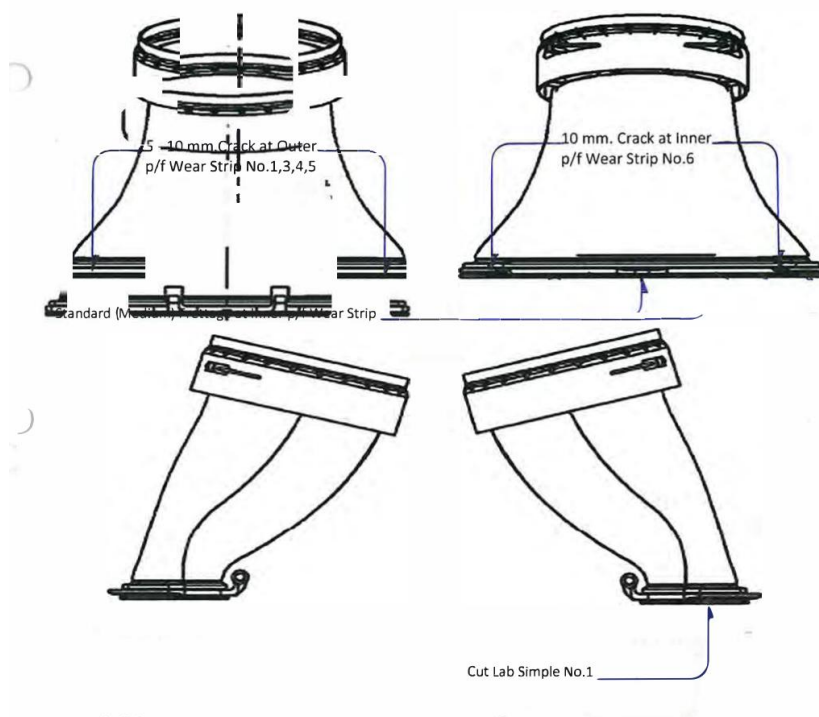
Unit: mm

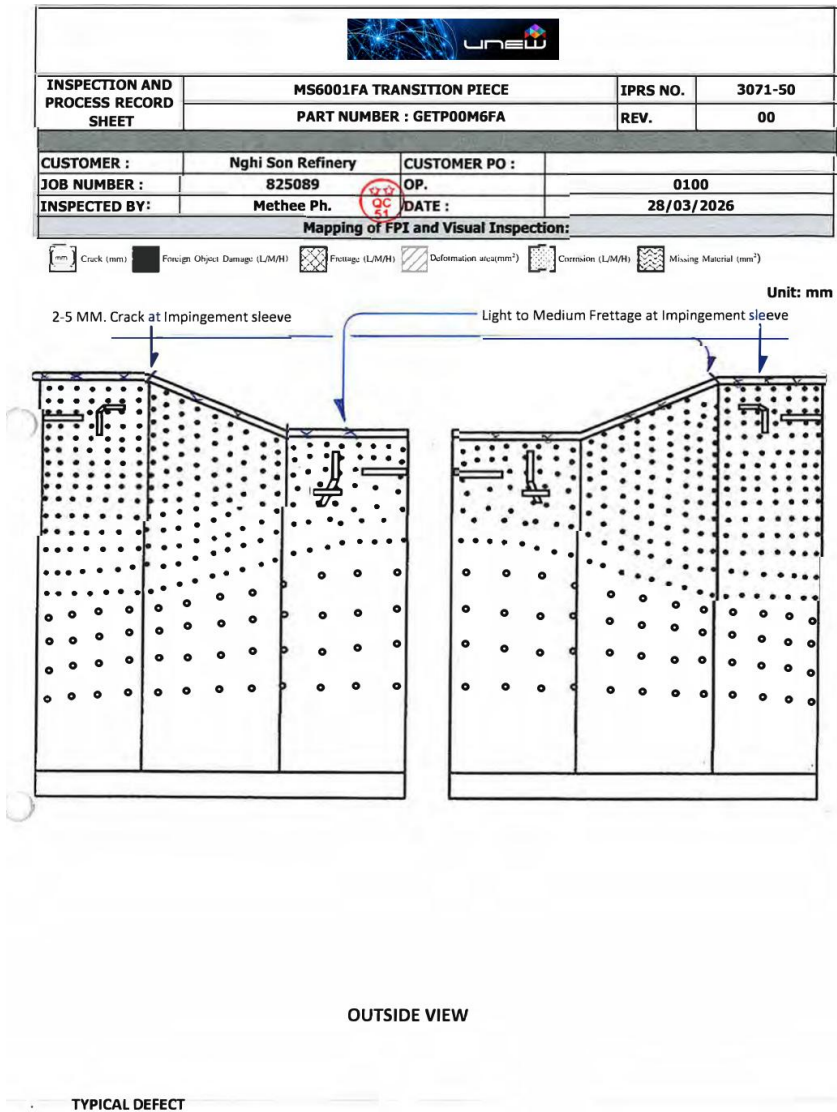


TYPICAL DEFECT

INSIDE VIEW

INSPECTION AND PROCESS RECORD SHEET				IPRS NO. 3071-50	
		PART NUMBER : GETP00M6FA		REV. 00	
CUSTOMER : Nghi Son Refinery		CUSTOMER PO			
JOB NUMBER : 825089		OP.		0100	
INSPECTED BY : Methee		DATE :		02/04/2026	
Mapping of EPI and Visual Inspection:					
 Crack (mm)	 Foreign Object Damage (LMMH)	 Pitting (LMMH)	 Deformation (mm)	 Corrosion (LMMH)	 Missing Material (mm)
Unit: mm					



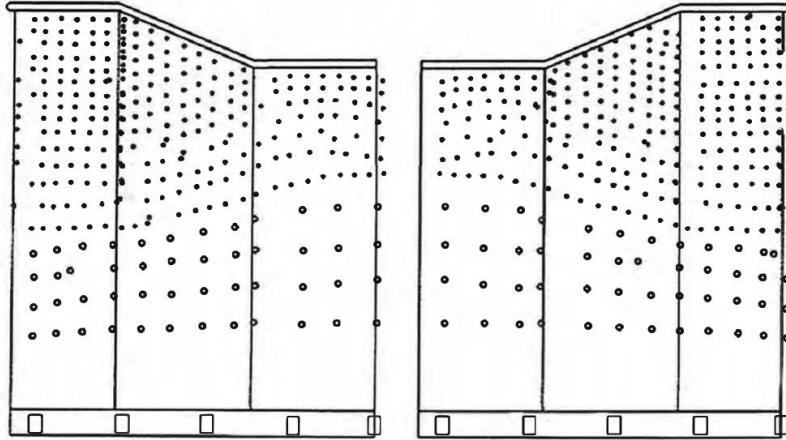


				
INSPECTION AND PROCESS RECORD SHEET	MS6001FA TRANSITION PIECE		IPRS NO.	3071-50
	PART NUMBER : GETP00M6FA		REV.	00
CUSTOMER : Nghi Son Refinery				
JOB NUMBER :	825089	CUSTOMER PO :		
INSPECTED BY	Methee Ph.	OP.	0100	
		DATE :	28/03/2026	

Mapping of FPI and Visual Inspection:

 Crack (mm)
  Foreign Object Damage (L/M/H)
  Fretting (L/M/H)
  Distortion (mm)
  Corrosion (L/M/H)
  Missing Material (mm)

Unit: mm

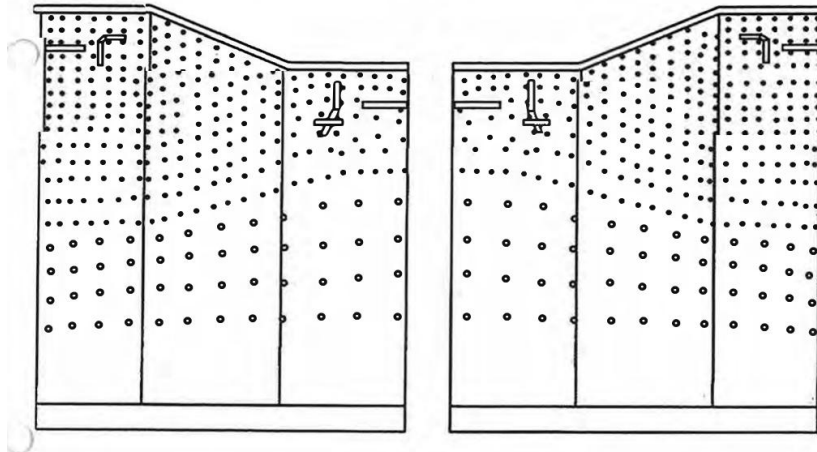


INSIDE VIEW

TYPICAL DEFECT

			
INSPECTION AND PROCESS RECORD SHEET	MS6001FA TRANSITION PIECE		IPRS NO. 3071-50
	PART NUMBER : GETP00M6FA		REV. 00
CUSTOMER : Nghi Son Refinery CUSTOMER PO :			
JOB NUMBER : 825089		OP.	0100
INSPECTED BY : Methee Ph.		DATE :	28/03/2026
Mapping of FPI and Visual Inspection:			
 Crack (mm)	 Foreign Object Damage (L/M/H)	 Pitting (L/M/H)	 Deformation area(mm ²)
		 Corrosion (L/M/H)	 Missing Material (mm ²)

Unit: mm



OUTSIDE VIEW

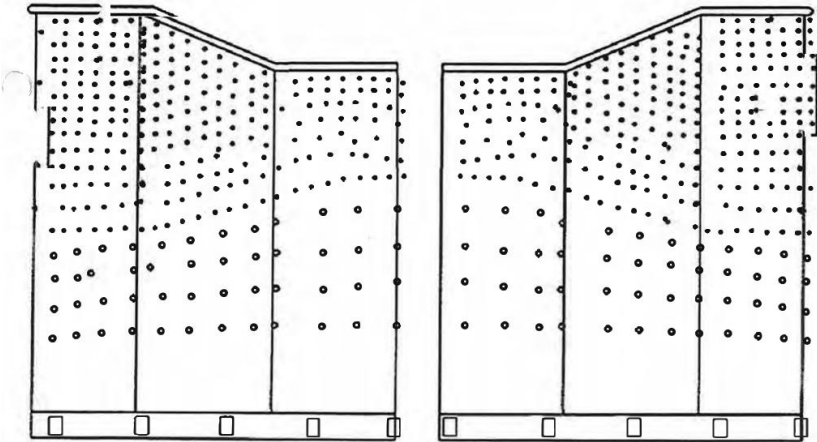
NON TYPICAL DEFECT



INSPECTION AND PROCESS RECORD SHEET	MS6001FA TRANSITION PIECE	IPRS NO.	3071-50
	PART NUMBER : GETP00M6FA	REV.	00
Mapping of FPI and Visual Inspection:			
CUSTOMER :	Nghi Son Refinery	CUSTOMER PO :	
JOB NUMBER :	825089	OP.	0100
INSPECTED BY	Methee Ph.	DATE :	28/03/2026

Crack (mm) Foreign Object Damage (L/M/H) Pitting (L/M/H) Deformation area(mm²) Corrosion (L/M/H) Missing Material (mm²)

Unit: mm



INSIDE VIEW

NON TYPICAL DEFECT