NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		104FM28M		
SIZING RING ITEM 104 (1) LEFT (1) RIGHT ---------- 10159-04 (2)	1/1	External gas leakage beyond SOP make-up capability. Contamination, wear or deterioration of lip seal. Defective material; sizing ring.	END ITEM: Suit gas leakage to ambient. GFE INTERFACE: Depletion of primary O2 supply and SOP. Rapid depressurizatio n of SSA beyond SOP makeup capability. MISSION: Loss of EVA. CREW/VEHICLE: Loss of crewman. TIME TO EFFECT /ACTIONS: Seconds. TIME AVAILABLE: N/A TIME REQUIRED: N/A REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	A. Design - The sizing ring is made of 7075-T73 Aluminum Alloy and is finished with Type II CLI anodize. A static lip seal is provided for pressure retention. The seal is seated in a groove and is made of a polyurethane compound. The locking system consists of two spring loaded sequential locks and one manual lock. The locking latches are made of 7075-T73 Aluminum Alloy and the spring and retaining screws are made of stainless steel. The threaded portion of the sizing ring is designed for "one way" initiation of threaded engagement to ensure proper alignment and locking. The sizing ring threads were determined by analysis to have a minimum ultimate strenght of 2344 lbs and a yield strength of 1674 lbs. At 4.4 psid (normal operating pressure) the S/AD limit load is 1076 lbs, giving the sizing ring a safety factor of 2.2 for ultimate and 1.6 for yield. At 5.5 sid (max failure pressure) and 8.8 psid (max BTA operating pressure) the sizing ring provides safety factors for ultimate of 2.2 and 2.7 respectively. The S/AD minimum safety factor for hardware at 4.4 psid is 2.0 for ultimate and 1.5 for yield. At both 5.5 psid and 8.8 psid the S/AD minimum safety factor for hardware is 1.5 for ultimate. B. Test - Acceptance: The sizing ring is subjected to testing per ATP 10159 at Airlock with ILC source verification. The assembly is pressurized in the test fixture to 8.0 + 0.2 - 0.0 psig for a 5 minute duration and leakage tested to 4.3 psig +/- 0.1 psig. PDA: The following tests are conducred at the sizing ring level in accordance with ILC Document 0111-710112: 1. Initial leak test at 4.3 +/- 0.1 psig to verify leakage less than 4.0 scc/min. 2. Proof pressure test at 8.0 + 0.2 - 0.0 psig to verify no structural damage. 3. Post-proof pressure leak test at 4.3 +/- 0.1 psig to verify leakage less than 4.0 scc/min. 4. Final leak test at 4.3 +/- 0.1 psig to verify leakage less than 4.0 scc/min. Certification: The sizing ring was successfully tested (manned) during SSA certification to duplicate 458 hours operational life (Ref. ILC Report 0111-711330). The following usage, reflecting requirements of significance to the sizing ring, was documented during certification: Requirement S/AD Actual ---------- ---- ------ Knee Cycles 9078 20000 Don/Doff 98 400 Pressure Hours 458 916 Walking Steps 4320 77760 The sizing ring was successfuly subjected to an ultimate pressure of 13.2 psig during SSA certification testing (Ref. ILC Report 0111-711330). This is 1.5

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times maximum BTA operating pressure based on 8.8 psig.

Two acceptable alternate static seals were developed and passed certification testing (Ref. Certification Report 0111-712694). The following usage, reflecting requirements of significance to the seal, were documented during certification:

Requirement	S/AD	Actual
Engagement Cycles	300	600
Pressure Hours	458	916
Pressure Cycles	194 @ 4.3 psid	388
	74 @ 5.3 psid	148
	32 @ 6.6 psid	64

C. Inspection -
Components and material manufactured to ILC requirements at an Approved Supplier are documented from procurement through shipping by the supplier. ILC incoming receiving inspection verifies that the materials received are as identified in the procurement documents, that no damage has occurred during shipment and that supplier certifications have been received which provides traceability information.

The following MIPs are performed during the sizing ring manufacturing process to assure that the failure causes are precluded from the fabricated item:
1. Visually inspect static seal for damage.
2. Visually inspect ring for scratches and burrs.

During PDA, the following inspection points are performed at the brief level per ILC Document 0111-710112:
1. Inspection for cleanliness to VC level.
2. Visual inspection for damage, wear or material degradation.
3. Visual inspection for damage following proof-pressure test.

D. Failure History -
None.

E. Ground Turnaround -
Tested for non-EET processing per FEMU-R-001, Pre-Flight LTA Leakage test. None for EET processing. Additionally, every 4 years chronological time or 229 hours of manned pressurized time, the sizing ring is disassembled, cleaned, insepcted, lubricated and reassembled.

F. Operational Use -
Crew Response -
PreEVA/PostEVA: Trouble shoot problem, consider use of third EMU. If no success terminate EVA prep. EMU is no go for EVA.
EVA: When CWS data confirms SOP activation, abort EVA.

Training -
Standard training covers this failure mode.

Operational Consideration -

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		104FM28M		Flight rules define go/no go criteria related to EMU pressure integrity and regulation. EVA checklist procedures verify hardware integrity and systems operational staus prior to EVA. Real Time Data System allows ground monitoring of EMU systems.

EXTRAVEHICULAR MOBILITY UNIT

SYSTEMS SAFETY REVIEW PANEL REVIEW

FOR THE

I-104 LOWER TORSO ASSEMBLY (LTA)

CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

Prepared by: _____
HS - Project Engineering

_____
HS - Reliability

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Approved by: _____ 21 MAY 02
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NASA – EMU SSM

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