NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		103FM10U		
SIZING RING ITEM 103 (1) LEFT (1) RIGHT ---------- 10146-05 (2)	1/1	External 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 capabilities. 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 is finished with Type II CLI anodize. A static lip seal 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 strength of 3224 lbs and a yield strength of 2718 lbs. At 4.4 psid (normal operating pressure) the S/AD limit load is 438 lbs., giving the sizing ring a safety factor of 7.4 for ultimate and 6.2 for yield. At 5.5 psid (max failure pressure) and 8.8 psid (max BTA operating pressure) the sizing ring provides safety factors for ultmate of 7.9 and 10.2 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. Normal rotation loads result in arm bearing rotation which precludes torque induced loads into the sizing rings. The threaded portion of the sizing ring is coated with a dry film lubricant to allow smooth travel of the ring when being mated. B. Test - Acceptance: The sizing ring is subjected to testing per ATP 10146 at Airlock with ILC source verification. PDA: the following tests are conducted at the Arm Assembly level in accordance with ILC Document 0111-710112: 1. Initial leak test at 4.3 +/-0.1 psig to verify leakage less than 24.0 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 24.0 scc/min. 4. Final leak test at 4.3 +/-0.1 psig to verify leakage less than 24.0 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 Elbow/Cycles 49660 102000 Engage/Disengage 300 800 Don/Doff 98 400 Pressure Hours 458 916

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
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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 Suppplier are documented from procurement through shipping by the supplier. ILC incoming receiving inspection verifies that the matrials received are as identified in the procurement documents, that no damage has occured during shipment and that supplier certifications have been received which provides traceability information.

The following MIPs are performed during the arm assembly 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 arm assembly 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, Arm Pre-Flight Test Requirements, Structural and Leakage Test. None for EET processing. Additionally, every 4 years chronological time or 229 hours of manned pressurizied time, the sizing ring is disassembled, cleaned, inspected, lubricated and reassembled.

F. Operational Use -
Crew Response -
Pre EVA/Post EVA: 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
		103FM10U		Flight rules define go/no go criteria related to EMU pressure integrity and regulation. EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.

EXTRAVEHICULAR MOBILITY UNIT

SYSTEMS SAFETY REVIEW PANEL REVIEW

FOR THE

I-103 ARM ASSEMBLY

CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

Prepared by: _____ 5/27/02
HS - Project Engineering

Approved by: _____
NASA - SSA/SSM

_____
HS - Reliability

_____ 5/14/02
NASA - EMU/SSM

_____
HS - Engineering Manager

_____ 6/17/02
NASA - S&MA

_____ 5/23/02
NASA - MOD

_____ 6/04/02
NASA - Crew

_____ 6/04/02
NASA - Program Manager