NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		104FM28Z		
LEG FABRIC ATTACHMENT RING ITEM 104 (1) LEFT (1) RIGHT ---------- 10153-01 (2)	1/1	External gas leakage beyond SOP make-up capability. Defective material; o-ring, clamping ring, fabric attachment ring. Loose or missing clamping ring screws.	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 fabric attachment ring is made of 7075-T73 Aluminum Alloy and is finished with Type II CLI anodize. All surfaces have a 63 finish. The threaded portion of the sizing ring is designed for "one way" initiation of threaded engagement to ensure proper alignment and locking. The clamping ring and the o-ring are used to seal the leg resraint and bladder to the fabric ring. The fabric attachment ring threads were determined by analysis to have a minimum ultimate strength 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 fabric attachment ring a safety factor of 2.2 for ultimate and 1.6 for yield. At 5.5 psid (max failure pressure) and 8.8 psid (max BTA operating pressure) the fabric attachment 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. The threaded portion of the fabric attachment ring is coated with a dry film lubricant to allow smooth travel of the ring when being mated. Design requirements for proper installation of helicoils into the fabric attachment ring are specified in its assembly procedures. Loss of fabric attachment ring clamping screws is precluded in the design by adherence standard engineering torque requirements for screw installation. The screws are torqued to 7-9 in lbs. B. Test - Acceptance: The fabric attachment ring is subjected to testing per ATP 10153 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 at 4.3 +/- 0.1 psig. PDA: The following tests are conducted at the leg level in accordance with ILC Document 0111-710112: 1. Initial leak test at 4.3 +/- 0.1 psig to verify leakage less than 6.0 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 6.0 scc/min. 4. Final leak test at 4.3 +/- 0.1 psig to verify leakage less than 6.0 scc/min. Certification: The fabric attachment 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 fabric attachment ring, was documented during certification: Requirement S/AD Actual Ankle/Cycles 11614 24000 Don/Doff 98 400 Pressure Hours 458 916

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Walking Steps 4320 77760

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 the supplier certifications have been received which provides traceabiltiy information.

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

During PDA, the following inspection points are performed at the brief 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, Pre-Flight LTA leakage test. None for EET processing. Additionally, every 4 years chronological time or 229 hours of manned pressurized time the fabric attachment ring is disassembled, cleaned, inspected, lubricated and reassembled.

F. Operational Use -
Crew Response -
PreEVA/PostEVA: Troubleshoot problem, conside ruse 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 -
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-104 LOWER TORSO ASSEMBLY (LTA)

CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

Prepared by: _____
HS - Project Engineering

_____
HS - Reliability

_____ 4/24/02
HS - Engineering Manager

Approved by: _____ 21 MAY 02
NASA – SSA/SSM

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NASA – EMU SSM

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