

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE															
LEG RESTRAINT AND BLADDER ASSEMBLY ITEM 104 (1) LEFT (1) RIGHT ----- 0104-810467-02 (2)	2/1R	104FM28Y Loss of primary axial restraint webbing. Defective material; worn thread or webbing.	END ITEM: Loss of primary axial load restaining capability. GFE INTERFACE: Axial load will be transferred to secondary restraint. MISSION: None for single failure. CREW/VEHICLE: None with loss of primary webbing. Loss of crewman with loss of secondary restraint webbing. TIME TO EFFECT /ACTIONS: Minutes. TIME AVAILABLE: Days. TIME REQUIRED: Hours. REDUNDANCY SCREENS: A-PASS B-N/A C-PASS	A. Design - The leg assembly axial restraints are fabricated from 3/4" wide Spectra 1000 webbing. Size "F" and "FF" polyester thread conforming to V-T-285D type II, class I is used to fabricate the primary axial restraints with type 301 lock stitching conforming to FED-STD-751A. Seams are terminated by backtack and searing of thread ends. Worn thread is precluded by design as a function of the abrasion protection afforded the axial restraints by the TMG. Leg assembly axial restraints pulled to destruction during design verification testing exhibited an ultimate strength of 2239 lbs. At 4.4 psid (normal operating pressure), the S/AD limit load for the restraint is 574 lbs. This load results in a restraint line ultimate safety factor of 3.9. At 5.5 psid (max failure pressure), the restraint exhibits an ultimate safety factor of 6.1. At 8.8 psid (max BTA operating pressure), the restraint exhibits an ultimate safety factor of 7.8. The S/AD minimum safety factor for softgoods at 4.4 psid is 2.0 for ultimate. At both 5.5 psid and 8.8 psid, the S/AD minimum ultimate safety factor is 1.5. B. Test - Acceptance: The leg primary and secondary axial restraints are subjected to the S/AD limit load, as referenced in the design section, during fabrication of each leg restraint and bladder assembly. PDA: The following test is conducted at the leg level in accordance with ILC Document 0111-710112: 1. Proof pressure test at 8.0 + 0.2 - 0.0 psig for a minimum of 5 minutes conducted with the TMG removed. Certification: The leg axial restraints were 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 leg restraints, was documented during certification: <table border="1"> <thead> <tr> <th>Requirement</th> <th>S/AD</th> <th>Actual</th> </tr> </thead> <tbody> <tr> <td>Knee Cycles</td> <td>9078</td> <td>20000</td> </tr> <tr> <td>Don/Doff</td> <td>98</td> <td>400</td> </tr> <tr> <td>Pressure Hours</td> <td>458</td> <td>916</td> </tr> <tr> <td>Walking Steps</td> <td>4320</td> <td>77760</td> </tr> </tbody> </table> The leg restraint and bladder assembly was successfully subjected to an ultimate pressure of 13.2 psid during SSA certification testing (Ref. ILC Report 0111-711330). This is 1.5 times maximum BTA operating pressure based on 8.8 psid. 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 provide traceability	Requirement	S/AD	Actual	Knee Cycles	9078	20000	Don/Doff	98	400	Pressure Hours	458	916	Walking Steps	4320	77760
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104FM28Y

information.

The following MIPs are performed during the leg assembly manufacturing process to assure that the failure cause is precluded from the fabricated item:

1. Visual inspection upon completion of the restraint webbing pull test for signs of defective thread and material.

During PDA, the following inspection points are performed at the lower torso assembly level in accordance with ILC Document 0111-710112:

1. Visual inspection for material degradation.
2. Visual inspection for structural damage following proof pressure test.

D. Failure History -

None.

E. Ground Turnaround -

None, for every component within its limited life requirement.

Every 4 years chronological time or 229 hours of manned pressurized time, the leg restraint and bladder assembly is removed from the LTA and subjected to complete visual inspection for material degradation or damage.

F. Operational Use -

Crew Response -

PreEVA/PostEVA: If not detected, no response. If detected audibly or tactilly, troubleshoot problem. If no success, use spare LTA if available or terminate EVA prep.

EVA: Single failure not detectable, no response.

Special Training -

No training specifically covers this failure mode.

Operational Considerations -

Not applicable.

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

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