

CTL
EMU CRITICAL ITEMS LIST

12/24/94 SUPERSEDES 12/24/92

ANALYST:

Page: 1
Date: 11/09/94

NAME P/N DTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
<p>POROUS PLATE SUBLIMATOR, ITEM 140 ----- SV783850-20 (1)</p> <p>----- Z OR SV805279-3 (1)</p>	2/1R	<p>14BFND1: Sublimator break through.</p> <p>CAUSE: Contamination, feedwater. Shim tearing, temperature, loss of thermal insulator.</p>	<p>END ITEM: Feedwater flow path through porous plate unrestricted.</p> <p>OFE INTERFACE: Venting of the water reservoir supply to ambient. Loss of EMU cooling/ defog capability.</p> <p>MISSION: Terminate EVA.</p> <p>CREW/VEHICLE: None for single failure. Possible loss of crewman with loss of SOP.</p>	<p>A. Design - Structurally, the porous plate is backed up by the rigid outlet grid to maintain system geometry and strength. Suitable flatness tolerance controls and clamping loads prevent edge breakthrough. Use of 0.021 inch Kapton shim to prevent thermal contact.</p> <p>B. Test - Component Acceptance Test - A check for breakthru is done during testing per AT-E-140-2. During start-up for the EVA Design Point test the sublimator is observed as the feedwater line is pressurized to 14.8-15.2 psia. Any sign of ice or frost is considered breakthru. This test is repeated for a second start-up point. All rig lines and fixtures are cleaned to HS3150 EM150 to prevent them from contaminating the test item.</p> <p>PDA Test - None</p> <p>Certification Test - Breakthrough testing was performed during 9/84. The item successfully operated at 9 psi inlet pressure which is approximately 6 psi above normal operating pressure. The following engineering changes have been incorporated and certified since this configuration was certified: 42803-555 (incorporated increased capacity sublimator), 42806-277 (added Koropon/Polyurethane to prevent corrosion), 42806-306 (incorporated a revised Screw/Washer Configuration), 42806-361 modified Porous Plate Flow Requirement), 42806-801 (provided Shim Positioning Criteria), 42806-801-1 (replaced Nylar Shim with Kapton Shim).</p> <p>C. Inspection - The internal circuits of the sublimator are verified clean per HS3150 EM150. The Kapton shim position is verified during assembly and post assembly inspection operations.</p>

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	2/1R	140FM01:		

D. Failure History -

H-EMU-140-0013 (6/6/83)

Leakage from under porous plate due to excessive surface roughness in o-ring groove. Corrective Action: Added inspection of the groove surfaces.

J-EMU-140-001 (1/29/85) -

Excessive exterior ice buildup and water loop blockage due to excessive gap between sublimator core and grid. Corrective Action: Redefined the max allowable gap between the sublimator and grid. Shim material changed from Hoyalr to Kapton.

R-EMU-140-0014 (9/30/83) -

Feedwater leakage as a result of a bent porous plate. Plate thickness was oversized. Corrective Action: Added a HIP to ensure flatness and thickness during inspection.

E. Ground Turnaround -

Tested per FEMU-R-001, Chamber Run verifies performance of the sublimator.

F. Operational Use -

Crew Response -

EVA: When CWB data confirms loss of sublimator feedwater pressure, trouble shoot problem. If cooling is insufficient, terminate EVA. Open helmet purge valve to anti-fog helmet if required.

Training - Standard EMU training covers this failure mode.

Crewmen are trained for one man EVA scenario.

Operational Considerations -

Flight rules define go/no go criteria related to EMU thermal control. Flight rules define EMU as go to remain on SCB available for rescue if required. EVA checklist and PDF procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring for EMU systems.