

CIL
 ENU CRITICAL ITEMS LIST

12/24/94 SUPERSEDES 12/24/92

ANALYST:

Page: 1
 Date: 11/09/94

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
POROUS PLATE SUBLIMATOR, ITEM 140 ----- SV783850-20 (1) ----- 2 OR SV805279-3 (1)	2/1R	140FN10: Reduced heat rejection capability. ----- CAUSE: Porous plate deflection.	END ITEM: Shinned gap between porous plate and adjacent plate is increased, resulting in degradation of heat rejection capability. ----- O/E INTERFACE: Increase in coolant temperature and air stream dewpoint. Loss of cooling and defogging capability. ----- MISSION: Terminate EVA. ----- CREW/VEHICLE: None for single failure. Possible loss of crewman with loss of SOP.	A. Design - The Porous Plate is fabricated of 304L Stainless Steel. The maximum yield strength, determined by ASTM Standard Test Method E835, Method B, Three Point Beam Test, is 19,400 psi. The rib framework supporting the Porous Plate is fabricated of AMS 5512 (307 Stainless Steel) with a yield strength of 30,000 psi. At a maximum operating pressure of 6.05 psig, the safety factor for the Porous Plate is 1.5. The safety factor at this maximum operating pressure for the supporting rib is 2.5. If the Item 136 Regulating Valve fails to close and permits 15 psid pressure across the plate, some local yielding will occur at the edge of the Porous Plate. This small permanent deformation will increase the 0.001 inch gap between the Porous Plate and the Parting Sheet for circulating coolant. This condition would cause a degradation of the heat rejection capacity of the sublimator. ----- B. Test - Component Acceptance Test - Performance Tests are run for both IVA and EVA conditions per A1-E-140-2. At IVA conditions, the sublimator must maintain a minimum Heat Transfer Coefficient of 20 BTU/Hr/deg. F, and maintain a vent outlet dew point of 55.6 deg. F maximum. At EVA conditions, the sublimator must maintain a minimum Heat Transfer Coefficient of 120 BTU/Hr/deg. F and maintain a vent outlet Dew Point of 54.5 deg. F maximum. Additionally, the Porous Plate (SV787723) is Bubble-Point Tested and Flow Tested with Isopropyl Alcohol to verify proper thickness. The Bubble-Point Test is performed per ARP 901. The flow test is performed per 8/P, which defines the upper and lower flow criteria for flow through the Plate. ----- PDA Test - None. ----- Certification Test - Breakthrough testing was performed during 9/84. The item successfully operated at 9 psid inlet pressure which is approximately 6 psid 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

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
	Z/1R	14DFM10:		<p>(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 Nelar Shim with Kapton shim).</p> <p>C. Inspection - H.S. Inspects the Porous Plate to insure adequate thickness per B/P. H.S. Inspection verifies the plate meets the material requirements (see design).</p> <p>D. Failure History - None.</p> <p>E. Ground Turnaround - Porous plates are changed and sublimator performance is verified during the Chamber Run per FEMU-R-001, Sublimator Performance.</p> <p>F. Operational Use - Crew Response EVA: when cooling is not adequate reduce work rate if possible. If cooling still inadequate, terminate EVA. Otherwise no response. Trainings Standard training covers this failure mode. Flight rules define go/no-go criteria related to thermal control. Real Time Data System allows ground monitoring of EMU systems.</p>