

CIL  
EMU CRITICAL ITEMS LIST

Page: 1  
Date: 12/02/91

12/24/91 SUPERSEDES 01/02/90

ANALYST:

NAME P/N QTY	CRSI	FAILURE MODE & CRUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
FAN/SEPARATOR/ PUMP/MOTOR ASSEMBLY, ITEM 123 ----- 6V787094-8 (1)	2/2	12394051 Restricted flow, pump rotor stalls or slows down.  (MISE) Contamination lodged between the impeller & the housing, contamination entrained in the hydrodynamic bearing.	END ITEM: Loss of or reduction in coolant flow to the sublimator and to the LCVG.  SFE INTERFACE: Loss of LCVG cooling. Vent flow prevents sublimator freeze up. Vent loop cooling available for helmet deicing.  MISSION: Terminate EVA with crew discomfort (hot).  CREW/VEHICLE: None.	A. Design - The upstream gas trap (item 141) provides particulate filtration. The hydrophilic screen is a 755 (.002 dfa) x 1700 (.001 dia) wires per square inch screen which has a glass bead filtration rating of 20 microns. Filtration of the feedwater supply is provided by the 20 micron filter (item 127). Both 127 and 141 operate with very little Delta P (Approx. .35 psi) which could cause breakthrough.  B. Test - Component Acceptance Test - The integrity of the pump rotor is verified during EVA and EVA performance testing. During EVA the item shall pump 251-271 gph H2O at an inlet pressure of 30 psia, the pressure rise shall be a minimum of 4.7 psid. During IVA the item shall pump 172-197 gph H2O at an inlet pressure of 30 psia, the pressure rise shall be a minimum of 4.94 psid. The item is subjected to a burn-in cycle test where it must operate for 24 hours. It is cycled 3 times at 3 hours IVA and 5 hours EVA conditions. The item is performance tested again in the EVA condition, as per above.  Certification Test - The item completed 10,000 hours of operation and 8,400 on/off cycles (as of 10/84), exceeding the 15 year certification requirement by more than a factor of three. The 15 year structural vibration, electrical vibration and design shock was completed 12/84. The following engineering changes have been incorporated and certified since this configuration was certified: 42804-342-35 (change Power Consumption Requirement - amps), 42805-406 (incorporated Nitronic 60 Retaining Nut), 42806-424 (Seal Cup change to ensure a good weld).  42806-818 (Water Pump changes IOK inspection in areas susceptible to contamination, more break edges and deburring operations to close ODR-g-EMU-123-840), 42806-934 (change Bearing Limited Life Requirements).  CEI PBA Test - The item is cycled (on for two (2) hours, then off) ten (10) times in the "IVA" mode to give 20 hours minimum of run time. The item is then performance tested in the "IVA" & "PRESS" mode. In "IVA" the item must pump 187 gph H2O

12/24/91 SUPERSEDES 01/02/90

ANALYSIS:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
	2/2	123FH05:		<p>minimum at a minimum pressure rise of 4.67 psid. In "PRESS" the item must pump 176 gph H<sub>2</sub>O minimum at a minimum pressure rise of 4.23 psid.</p>

C. Inspection -

SV787984-8 F/P/S Assembly Level

- Water pump assembly details are cleaned to HS3150 EN508.
- The cleanliness of the water pump assembly and the tools used to assemble it are verified with an HSD NIP.
- A 10X minimum magnification inspection of the rotor, seal cup, pump housing, assembly shims, preload spring and spring retainer is performed with an HSD NIP.
- An HSD NIP exists to verify that the rotative assembly "rotates freely, no rubbing or binding permitted."
- Both HS and government NIP's exist before in-process testing to verify that all items assembled were cleaned to the appropriate levels.
- An IPT is performed to verify pump flow is 251 to 276 gph (EVA) and 172 to 197 gph (IWA).

SV772277-8 Water Pump Assembly Level -

- Length of rotor is match machined to pump housing and seal cup. Both the dimensioning and the machining operations have specific Hamilton NIP's.
- A Delta-P test is performed on the pump assembly to verify delta-P is 5 psid minimum when rotated at 10,300 +/- 100 rpm and flow adjusted to 260 gph.
- A specific operation is included to clean all pump details to HS 3150 EN508 with an HSD NIP. The seal cup is flushed at this time and the water passage holes in the bottom of the cup are probed with a .010" dia lockwire to verify no obstructions exist.
- At final inspection, both HS and government NIP's exist to verify cleanliness of all details.

SV772043-6 Water Pump Rotor Assembly Level -

- Pump rotor is detail cleaned under 10X magnification. Both HSD and government NIP's exist to verify this.

D. Failure History -

K-EMU-123-0001 (7-16-88) -

- Water Pump seized because of dirt and cracked cup.
- A filter was added upstream of pump.

SEMU-44-001H  
Page 811