

CIL  
EMU CRITICAL ITEMS LIST

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Date: 11/09/94

12/26/94 SUPERSEDES 12/24/91

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
POSITIVE PRESSURE RELIEF VALVE, ITEM 146 ----- SV787036-9 (1)	2/1R	146FM02: External leakage.  CAUSE: Failure, housing seal bypass leakage, contamination, seat,	END ITEM: Suit gas leakage to ambient.  GFE INTERFACE: Excessive consumption of the primary oxygen supply. The SOP is automatically activated during EVA if the suit pressure drops to 3.33 psid.  MISSION: Terminate EVA. Loss of use of one EMU.  CREW/VEHICLE: None for single failure. Possible loss of crewmen with loss of SOP.	A. Design - This item has a 140 micron filter at the inlet to limit contamination to the valve seat and seal. The seal is a low diameter elastomer (Fluro Silicon) to provide maximum seal compression. The valve lower housing has stroke limit stops to prevent excessive elastomeric creep. In addition, the elastomer is checked for hardness to assure adequate seat force. The "aluminum horn" interface seal is a radial type (viton) "O" seal. This seal is also made of elastomeric material which allows conformance of the seal to the housings being sealed and provides a sealing force over the tolerance and environmental ranges of the item.  B. Test - Component Acceptance: A leakage test is performed per AT-E-146-1. For the leakage test the valve inlet is pressurized to 4.5 psid minimum. Leakage through the valve must not exceed 1.0 scc/min.  To prevent contamination of the valve during testing, the test rig and all test fixtures are cleaned to MS3150 EN150 and a 2 micron filter is installed into the test setup just upstream of the item.  PDA: A leakage test is performed during SEMU-60-010 in which the vent loop is pressurized with oxygen to 18.9 - 19.9 psia. Leakage is not to exceed 4.66 scc/min.  Certification: The item completed 5100 cycles during 8/86 which far exceeds the cycle certification requirement of 3476 cycles. The following engineering changes have not been incorporated in the cert valve but have been incorporated in flight valves and have been certified by analysis: 42806-42-2 (finer valve inlet screen), 42806-503-2 (5.5 psid max suit pressure), 42806-311 (corrected Minimum Flow Value) and 42806-435 (Increased Maximum Flow Rate).  C. Inspection - O-ring grooves are 100% inspected per drawing dimensions and surface requirements. The "Aluminum Horn" interface O-ring

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	2/1R	146RND2:		Is inspected for surface characteristics per SVHS 3432 Class III (1.5 AQL).

A cleanliness level of MS3150 EM1508 is maintained during assembly and testing of the valve. The valve is visually inspected at EOP and Final Inspection. EM1058 cleanliness, EOP, and Final Inspection require mandatory inspection points.

**G. Failure History -**

RDR's J-EMU-146-A002, -A003, A004 were written against the old design aluminum valve, SV787705, for creep of the elastomeric seat. This problem was addressed during the redesign to the stainless steel valve, SV787036. Included in the redesign were the addition of steps to prevent compression/creep of the elastomeric seat. Other redesign features include the relocation of the flow orifice to isolate it from the valve seat/seat area. Three other RDR's J-EMU-146-A008 (1/10/86), J-EMU-146-A007 (1/11/86) and J-EMU-145-084 (1/17/86) "Leakage at Reseat", were investigated and best evidence to date shows the contamination of the valve seat caused by migration of corrosion products from PLSS structure. (Note: all three RDR's involve PLSS 1011 only).  
N-EMU-146--081 (4/30/87), valve failed to reseat at spec pressure. EA2806-503-2 issued. Operation sheet changed to calibrate I-146 valve to reseat at 4.80 +/- 0.5 psid to meet spec requirement of 4.70 psid.

**E. Ground Turnaround -**

Tested per FEMU-R-081, Gas Structural and Leakage.

**F. Operational Use -**

**Crew Response.**

Pre EVA: If detected during EVA prep, trouble-shoot problem, if no success, consider EMU 3 if available. EMU no go for EVA.

EVA: When CMS data confirm an accelerated primary O2 use rate, terminate EVA.

**Training -**

Standard EMU training covers this failure mode.

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CRIT  
2/1R

FAILURE  
MODE &  
CAUSES  
146FM02:

FAILURE EFFECT

RATIONALE FOR ACCEPTANCE

Operational Considerations -  
Flight rules define EMU no go for loss of positive pressure  
relief valve. EVA checklist and FDF procedures verify  
hardware integrity and systems operational status prior to  
EVA. Real Time Data System allows ground monitoring of EMU  
systems.