

12/26/94 SUPERSEDES 12/26/91

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
POSITIVE PRESSURE RELIEF VALVE, ITEM 146 ----- SV7B7036-9 (1)	Z/IR	146FM03A: Fails to open. Restricted flow. CAUSE: Failure, poppet sticks, jams. Contamination, filter clogs.	END ITEM: Blockage of vent flow through valve seat. GFE INTERFACE: Unable to provide overpressure protection during EVA for a failed open 1130, 113E or 2130 regulator. Suit overpressurization for a failed open 1130, 113E, or 2130 regulator. MISSION: None for single failure. CREW/VEHICLE: None for single failure. Possible loss of crewman with failed open 1130, 113E, or 2130 regulator.	A. Design - Poppet sticking closed is precluded by: 1. The lower housing seat is teflon coated to minimize sticktion force of the silicone elastomeric poppet seal. Poppet jamming part way open is precluded by: 1. Guiding of the poppet at both forward and rear diameters with radius control of the sliding edges. 2. Redox coated sliding stainless steel surfaces with 16 micro-inch finish. Clogging of the valve inlet filter or flow passages is precluded by: 1. The item is of 300 series stainless steel construction to prevent corrosion particles and has a 140 micron filter at the inlet. Filter pressure drop is normally 0.065 psid allowing for contamination collection up to 2.75 psid before exceeding EMU proof pressure of 0.25 psid. 2. Flow passages and adjustment orifices are larger than the filtration to prevent contamination buildup. B. Test - Component Acceptance: The Positive Pressure Relief Valve undergoes testing per AT-E-146-1 at both sea level and vacuum conditions to verify proper valve operation. At vacuum the valve must crack and reset at a minimum pressure of 4.7 psid. Crack and reset tests are increasing and decreasing flow tests with pressure recorded at a flow through the valve of 0.052 - 0.046 lbs/hr #2. These tests verify the valve has not failed closed or failed open. A vacuum discharge flow test is run to verify that the valve will flow a minimum of 7.43 lbs/hr #2 at a maximum pressure of 5.5 psid. This test is repeated three times. In addition, a sea level discharge flow test is run to verify

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	2/1R	146FM03R:		<p>an AEDC effective flow area) of 0.0163 - 0.0179 square inches at a pressure drop of 5.45 - 5.55 psid. The vacuum test verifies that the Item 146 valve will pass more flow than a failed open 113B, 113E or 213D regulator. The sea level test is run for the same reason and also for comparison to PDA, PIA, Checkout and Ground Turnaround tests which are only run at sea level discharge.</p> <p>To prevent contamination of the valve during testing, the test rig and all test fixtures are cleaned to HS3150 EM 150B and a 2 micron filter is installed into the test setup just upstream of the item.</p> <p>PDA: A sea level discharge flow test per SEMU-60-010 verifies an AC @ (effective flow area) of 0.0160 - 0.0182 square inches at a pressure drop of 5.45 - 5.55 psid. This test verifies the valve will open and pass the required flow.</p> <p>Certification: The item completed 5100 cycles during 8/84 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 analysts: 42806-42-2 (finer valve inlet screen) and 42806-503-2 (5.5 psid max suit pressure).</p> <p>C. Inspection - A cleanliness level of HS3150 EM150B is maintained during assembly and testing of the valve. The valve is visually inspected at EOP and Final Inspection, thus the screen is checked for contamination. EM150B cleanliness, EOP, and Final Inspection require mandatory inspection points. A dimensional inspection is performed at Air Lock Inc. per ATP 9898-03 Para 6.1.3.</p> <p>D. Failure History - J-EMU-100-D21 (7/23/84) "High Relief Pressure". Investigation revealed that excessive lubricant had contaminated the valve poppet/sealing surface. This prevented normal valve operation. Corrective action added cautionary notes to the operation sheets to protect against improper lubrication</p>

12/24/96 SUPERSEDES 12/24/91

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	2/IR	146FM03A:		<p>during assembly.</p> <p>J-EMU-146-003 (5/11/85) "High Cracking" was investigated and found to be the result of a procedural problem during "Canned Man Testing". Test Procedure CSB-SH-29A Rev. A was modified per test deviation sheets pages 28, 29, 31 to rectify this problem.</p> <p>The following RDRs occurred on the old configuration aluminum PPRV (6V767705). RDR J-EMU-146-001 (9/5/80) and J-EMU-146-001 (1/5/81).</p> <p>J-EMU-146-001 (12/10/81), "Suit Pressure Reads High", was traced to a procedural problem which resulted in an erroneous reading from the 146 pressure transducer.</p> <p>E. Ground Turnaround - Tested per FEMU-R-001, 146 Flow (Positive Pressure Relief Valve).</p> <p>F. Operational Use - Crew Response. Pre EVA: (Airlock depress) When CMS data confirms loss of positive pressure relief vlv, stop depress and consider EMU 3 if available. EMU no go for EVA.</p> <p>EVA: No response, single failure undetectable by crew or ground.</p> <p>Training Standard EMU training covers this failure mode.</p> <p>Operational Considerations Flight rules define EMU no go for loss of positive pressure relief vlv. EVA checklist and POP procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.</p>