| NAME P/N QTY | CRIT | FAILURE MODE & CAUSES | FAILURE EFFECT | RATIONALE FOR ACCEPTANCE |
|---|---|---|---|---|
| POSITIVE PRESSURE RELIEF VALVE, ITEM 146<br>---<br>SV787036-9 (1) | 2/1R | 146FM01:<br>Fails to close.<br><br>CAUSE:<br>Failure, spring contamination, jamming. | END ITEM:<br>Suit gas leakage to ambient.<br><br>OFE INTERFACE:<br>Excessive consumption of the primary oxygen supply. The max. flow rate is limited to 5.386 lb/hr of dry O2 at 70 deg F and 32 deg F dewpoint, thus maintaining a minimum suit pressure of 3.42 psid with the SOP during EVA.<br><br>MISSION:<br>Terminate EVA. Loss of use of one EMU.<br><br>CREW/VEHICLE:<br>None for single failure. Possible loss of crewman with loss of SOP. | A. Design -<br>The item has a 140 micron filter at the inlet. The piston to upper housing clearance is greater than 140 microns and the lower guide is fluted to prevent particle entrapment. The seat is an elastomeric material to accomodate particulate matter. In addition, the seat is checked for hardness uniformity to assure proper sealing. The spring is of non-buckling type (calculated spring stress provide cyclic life of 1048 cycles) and is guided by spring seats to prevent contact between the spring and poppet during stroking. The sliding surfaces are coated with Nedox to minimize friction effects.<br><br>B. Test -<br>Component Acceptance:<br>Leakage performance tests are performed per A1-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 N2.<br><br>The performance test consists of verifying that the valve cracks and reseats at a minimum pressure of 4.7 psid. Crack and reseat pressures are defined as a flow through the valve of 0.042 - 0.046 lbm/hr N2. This crack and reseat test is performed with the valve oriented in four different positions.<br><br>To prevent contamination of the valve during testing, the test rig and all test fixtures are cleaned to HS3150 EM150 and a 2 micron filter is installed into the test setup just upstream of the item.<br><br>POA:<br>A leakage test is performed during SEMU-60-010 in which the vent loop is pressurized with oxygen to 18.9 - 19.1 psia. Leakage is not to exceed 4.66 scc/min.<br><br>Certification:<br>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), 42806-5030-2 (5.5 psid max suit pressure), |

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| | 2/1R | 146FM01: | | 42806-311 (corrected Minimum Flow value and 42806-435 (Increased Maximum Flow Rate). |

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. EM150B cleanliness, EOP, and Final Inspection require mandatory inspection points. A dimensional inspection is performed at Airlock Inc. Per ATP 9898-03 Para 6.1.3

D. Failure History -
H-EMU-146-0001 and 0002 (7-7-75)
Documents a "low cracking" condition. Investigation of 0001 revealed soft spots on the elastomeric seat. Corrective action consisted of a seal mold modification, by the vendor, to prevent air entrapment during molding. An additional inspection step to check the elastomer seat hardness with a dial indicator was implemented. Investigation of 0002 revealed that valve orientation influenced test results. Revisions of test procedures (ATP SVHS 9427) were instituted to orient the valve such that discharge is at + 30 degrees from horizontal. This assures that test conditions resemble valve installation. The remaining ROR's H-EMU-146-0003 (9/20/83) and J-EMU-146-A005 (10/11/83) were attributed to rig problems during testing and do not reflect valve failures.

E. Ground Turnaround -
Tested per FEMU-R-001, Item 146 Flow (Positive Pressure Relief Valve).

F. Operational Use -
Crew Response.
Pre EVA: If detected during airlock depress, trouble-shoot problem, if no success, consider EMU 3 if available. EMU no go for EVA.
EVA: When EMS data confirms an accelerated primary O2 use rate, coupled with loss of suit pressure regulation, Abort EVA.
Training

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|---|---|---|---|---|
| | 2/1R | 148FM01: | | Standard EMU training covers this failure mode<br>Operational Considerations<br>Flight rules define EMU no go for loss of positive pressure relief valve. EVA checklist and POF procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems. |