

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
WATER PRESSURE REGULATOR ITEM 136 ----- SV792528-5 (1)	2/1R	136FM02 Fails open, regulates high.  Seat contamination, seat return spring relaxes, housing or seat assembly seal failure, plunger rod or piston sticks open due to contamination.	END ITEM: Sublimator feedwater pressure increases from 4.6 psid to as high as 15 psid.  GFE INTERFACE: Possible sublimator breakthrough and loss of cooling capability. Possible helmet fogging.  MISSION: Terminate EVA. Close Item 137 valve if cooling is insufficient.  CREW/VEHICLE: None for single failure. Possible loss of crewman with loss of SOP.  TIME TO EFFECT /ACTIONS: Minutes. Close Item 137 valve. If no cooling, open purge valve to activate SOP.  TIME AVAILABLE: Minutes.  TIME REQUIRED: Seconds.	A. Design - The item has an elastomeric (80 durometer) poppet to provide good sealing and minimize sensitivity to contamination. The plunger rod, poppet, and the plate retainer are protected from contamination by a 38 micron inlet filter. All details have clearances in excess of the possible 38 micron contaminant. The ambient reference piston is protected by a 140 micron filter and has local guide lands to minimize close clearance areas. The piston and housing are teflon coated to minimize friction. The redesign of the plunger rod and regulator poppet has maximized the L/D ratio of the local guides to minimize friction, and to keep the parts from cocking and jamming. The outer diameter of the plunger plate has been increased for better guidance and the material has been changed to Rulon J to minimize friction and help reduce hysteresis. Both the poppet spring and the piston spring have calculated infinite lives. Infinite life (minimum of 10E+8 cycles) springs will operate within their designed working range without being life limited. The seat seal and housing seal are of the radial O-seal type. This elastomeric seal conforms to the sealing surfaces to provide a seal over the required temperature range of 32 degrees F to 120 degrees F.  B. Test - Component Acceptance Test - Internal leakage and performance tests are performed per AT-E-136-2. For the performance test the flow through the valve is measured over the inlet pressure range of 8.8-15.9 psig and the outlet pressure range of 2.55-3.95 psig. The flow is monitored in both the increasing and decreasing directions. For the internal leakage test the regulator inlet is pressurized to 14.95-15.35 psig maximum and a flow of 7.5-7.9 cc/min established through the valve. Then the flow is shutoff downstream of the valve and the regulator outlet pressure is monitored for a two minute period. The outlet pressure must not exceed 4.2 psig. This test is repeated for a total of 3 times.  PDA Test - A leakage test is performed per SEMU-60-010. An inlet pressure to the regulator of 14.6-15.7 psig and a flow of 6.85-8.35 cc/min is established. Then the flow downstream of the regulator is shut off and the regulator outlet pressure monitored for a 1 minute test period. The outlet pressure must not exceed 4.3 psig.  Certification Test - Certified for a useful life of 15 years (ref. SEMU-46-004).  C. Inspection - Poppet seat is visually reviewed at 10X during assembly to insure no flaws or defects are in the seat.  All detail parts are cleaned to SVHS3150 EM150 precision cleaning level before assembly and maintained at this level throughout the assembly. Tooling used is also cleaned to this level. O-rings are carefully lubricated with Braycote/ SVHS 8523 before assembly to insure proper seating and sealing of the O-ring.  The assembled item is viewed at 5x mag to insure that no fragments or particles have been generated during assembly or have been introduced into the assembly.

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		REDUNDANCY SCREENS: A-PASS B-PASS C-PASS		<p>The assembled valves are x-rayed to verify proper seating of the compression spring. IPT testing is performed to obtain proper setting of adjustment screw before final bonding which will prevent inadvertent movement.</p> <p>Springs are 100% inspected for visual and dimensional requirements, they are also physically tested for load and displacement to insure correct load and spring rate can be obtained at assembly. Plunger or piston rod sticking open due to contamination is prevented by maintaining precision cleaning of details per SVHS 3150/EM50 during assy and testing. The detail housings are inspected for 32 microinch finish before coating with teflon coating to further reduce friction.</p> <p>D. Failure History -          The following RDR'S are against obsolete configurations and are no longer valid for consideration for this failure mode.</p> <p>J-EMU-100-002    J-EMU-136-C001    H-EMU-136-D009          H-EMU-100-A002    J-EMU-136-C002    B-EMU-136-A001          H-EMU-136-004    J-EMU-136-A001    H-EMU-136-D012          EMU-136-005    J-EMU-136-003    H-EMU-136-D014          J-EMU-136-001    F-EMU-136-4B02    H-EMU-136-D011          H-EMU-136-D004    F-EMU-136-4B01          J-EMU-136-002    F-EMU-136-4C01          H-EMU-136-D006    J-EMU-136-006          H-EMU-136-D005    J-EMU-136-A002          H-EMU-136-C001    J-EMU-136-007          H-EMU-136-D007    H-EMU-136-D010</p> <p>E. Ground Turnaround -          Tested for non-EET processing per FEMU-R-001, Item 136 Regulation and Leakage Screen. None for EET processing.</p> <p>F. Operational Use -          Crew Response -          EVA: When CWS data confirms loss of sublimator pressure trouble shoot problem by using feedwater switch. If cooling is insufficient or helmet fogging, terminate EVA. Open helmet purge valve to anti-fog helmet if required.          Training -          Standard EMU training covers this failure mode. Crewman are trained for one man EVA scenario.          Operational Considerations -          Flight rules define go/no go criteria related to EMU thermal control. Flight rules require termination of EVA for activation of SOP. Flight rules define EMU go to remain on SCU (available for rescue if required). Real Time Data System allows ground monitoring for EMU systems.</p>

EXTRAVEHICULAR MOBILITY UNIT  
SYSTEMS SAFETY REVIEW PANEL REVIEW  
FOR THE  
I-136 FEEDWATER PRESSURE REGULATOR  
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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