

12/24/94 SUPERSEDES 12/24/92

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
COOLANT ISOLATION VALVE, ITEM 171 SV7B4982-3 (1)	3/100	171FMD1: Fails closed.  CAUSE: Contamination, clogging of the inlet filter; electrical open in the solenoid coil or electrical connector; poppet jams due to contamination. Contamination between poppet and magnet. Failure of electronic component.	END ITEM: No flow through valve seat.  GPE INTERFACE: None for single failure. If the 172 Valve also fails closed, water will carryover into the vent loop.  MISSION: None for single failure.  CREW/VEHICLE: None for single or double failure. Possible loss of crewman with loss of SOP.	A. Design - The valve is protected from particulates with 140 micron inlet and outlet filters. The sealing of poppet will continue to operate with particles less than 140 microns in size. The electronics drive module is fabricated using "5" level established reliability passive components and JANIXY level semiconductors. Semiconductor failure is minimized through the use of high reliability components. Established reliability capacitors (level 5) and resistors (level 4) are used and are qualified to the requirements of their respective MIL specs and thermal shocked per condition B of MIL-STD-202 Method 107. The transistors and diodes are qualified to the requirements of MIL-B-19500 and receive the burn-in of JANIXY level parts per the applicable methods, 1038, 1039, 1040 of MIL-STD-750. The material for the inlet and outlet screens and screen retainers is stainless steel. A 65 ohm limiting resistor is in series with the coil, reducing continuous current in the power-closed direction to 0.2 amps if the limiting resistor path is shorted. The maximum spec current draw of 0.5 amps reduces a 7 hour mission by less than an hour.  B. Test - Component Acceptance Test (Eckel Valve Co.) An actuation test is performed with 30-33 psig applied to the inlet and with the valve closed and an applied voltage of 15.0 VDC (16.0 VDC is normal).  PDA Test Flow through the item is verified per SEMU-60-010. The circuit is pressurized through the item to 15.7-15.9 psig and read on a pressure gauge, which is located downstream of the item. A requirement is imposed, that if the pressure does not increase when 16.0 vdc is applied, then it is an indication that the item is closed, and shall be rejected.  Certification Test The item completed 4,200 cycles during 1/85 which fulfills the 35 year certification requirement of 4,140 cycles.  C. Inspection - A cleanliness level of SVHS3150 EM150 is maintained on both the filter and valve during assembly and test.

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	3/188	171FMD1		

Inspection (Continued) - Internal lead wires are inspected during source inspection and external wiring during PLSS assembly for proper placement in the cavity, and for cleanliness.

D. Failure History -

Failure History Electrical related failures:

H-EMU-171-0001 (7-28-83) The 171 solenoid valve would not open when energized with the specification voltage due to contamination. Corrective Action:

The contamination could not be identified as from the valve. The vendor's test facility was cleaned and the vendor's final Acceptance test procedures have been modified to include a check of proper operation of the valve.

H-EMU-171-0002 (9/23/83)

Valve failed to flow water at specification conditions due to a faulty rig power supply. Corrective Action: A cautionary note was added to the Acceptance Test Procedures to check the power supply if failure occurs during testing.

E. Ground Turnaround -

Tested per FEMU-R-001, Water Servicing, Leakage, and Gas Removal.

F. Operational Use -

Crew Response

EVA : No response, single failure undetectable by crew or ground.

Training

Standard EMU training covers this failure mode.

Operational Considerations

EVA checklist and FDP procedures verify hardware integrity and systems operational status prior to EVA. Valve not nominally closed during EVA.