

CEL
EMU CRITICAL ITEMS LIST

Page: 1
Date: 11/29/93

12/24/93 SUPERSEDES 12/24/91

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
VALVE, PITOT ACTUATED, ITEM 125 SV769480-4 (1)	2/1R	<p>125FM02: Internal leakage, separator outlet to separator inlet (fan on).</p> <p>CAUSE: Diaphragm Leakage, housing seal bypass leakage.</p>	<p>END ITEM: Water from the separator (123) outlet flows to the separator inlet.</p> <p>B/E INTERFACE: Water carryover into the ventilation loop.</p> <p>MISSION: Terminate EVA due to helmet fogging.</p> <p>CREW/VEHICLE: None for single failure. Possible loss of crewmen with loss of SOP.</p>	<p>A. Design - A standard elastomeric, radial O-ring prevents housing bypass leakage and diaphragm to housing leakage, the dimensions & rigidity of assembly will provide a controlled squeeze. The silicone diaphragm is visually inspected for defects under 10X magnification. Diaphragm material is silastic 35. During operation the diaphragm is stretched a maximum of 36% unit elongation. This compares with specified material properties of an allowable unit elongation of 500% minimum resulting in a 13.8 margin of safety. The O-seal material is fluoro silicone. The valve spring is designed for the fatigue limit for one million piston cycles (certification requirement is 5000 cycles). Piston clearances are larger than the retention capacity of the upstream filter. This prevents jamming due to particle in the flow stream. The piston has a large length to diameter ratio and short teflon coated rubbing surfaces to reduce friction.</p> <p>B. Test - Test Component Acceptance Test - A reverse proof pressure test is performed by pressurizing the outlet (sep. in) of the valve to 85.2 - 89.2 Psia for 5 minutes. Additionally a proof pressure test is performed on the pitot sense port (sep. outlet) by pressurizing it to 68.2 - 74.2 Psia for 5 minutes. Sequentially a leakage test is performed by pressurizing the pitot sense port to 48.0 - 50.0 Psia for 5 minutes. With the item submerged in water there shall be no bubbles/5 minutes. (This is an ext. leak test but it does check for this failure). An internal leakage test is performed by pressurizing the inlet and outlet (sep. in) to 18.9 - 19.1 Psia over a 30 minute period. Leakage from pitot sense port shall not exceed 1.0 cc/min as measured with an inverted beaker in water.</p> <p>CEI PDA Test - The item is leakage tested in a system leakage test with the item pressurized to 15.7 - 15.9 Psig with a volumetric micrometer over a 60 minute period. This leakage represents system leakage.</p> <p>Certification Test - The item completed 4,000 pressure and 1,017 manual cycles during 3/85 and an additional 4000 cycles during 9/86, for a</p>

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Z/1R 125FWD2:

total of 5817 manual cycles. This fulfilled the cycle certification requirements of 3,978 and 1,011 respectively. No Class I engineering changes have been incorporated since this time.

C. Inspection -

The sealing interfaces between the valve housing and the valve body are 100% inspected to meet dimensional and surface finish requirements. The diaphragm is 100% inspected to meet dimensional and surface finish requirements, along with being visually inspected for defects. An inprocess test is run to check for internal leakage around the diaphragm. No leakage is allowed.

Causes - Housing seal bypass leakage.

The sealing interfaces between the valve module housing and the valve housing are 100% inspected to meet dimensional and surface finish requirements.

The O₂ seal is 100% inspected to meet dimensional and surface finish requirements. An inprocess test is run to check for internal leakage past the valve housing seal. No leakage is allowed.

D. Failure History -

None.

E. Ground Turnaround -

Tested per FEMU-R-001 Water servicing, leakage and gas removal.

F. Operational Use -

Crew Response:

Pre EVA: Trouble-shoot problem, if no success, consider EMU 3 if available. EMU go for SCU without fan.

EVA: If helmet fogging occurs or significant amounts of water detected exiting helmet vent duct, terminate EVA. Open helmet purge vlv and deactivate fan to protect against toxic gas from LiOR cartridge.

TRAINING:

Standard EMU training covers this failure mode.

OPERATIONAL CONSIDERATIONS:

Flight rules define EMU as go to remain on SCU (available

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12/24/93 SUPERSEDES 12/24/91

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Page: 3
Date: 11/29/93

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	2/1R	125FH021		for rescue if required). EVA checklist and PDF procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.