

CII
EMU CRITICAL ITEMS LIST

12/24/91 SUPERSEDES 08/31/90

ANALYSIS:

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NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
<p>O2 PRESSURE REGULATOR, 1ST STAGE, ITEM 2130 ----- SV799042-J (1)</p>	1/1	<p>Z130FH04A: External gas leakage.</p> <p>CAUSE: Seal failure, metal diaphragm leakage. TPD cap leakage. Fill valve leakage.</p>	<p>END ITEM: Leakage of emergency O2 supply to ambient.</p> <p>GFE INTERFACE: Premature depletion of SOP.</p> <p>MISSION: Abort EMA.</p> <p>CREW/VEHICLE: Possible loss of crewman with excessive leakage.</p>	<p>A. Design - Leakage paths are through the diaphragm, the diaphragm silicone O-Ring, the fill valve and its silicone O-Seal, the test port and its silicone O-Seal. All of these O-Rings are backed up by KEL-F Delta Rings to prevent extrusion and the seal surfaces have a 32 microinch finish. The fill and test ports caps have metal to metal seals made of low reactive materials (Nayoro-28 and Monel K-500) and they have a redundant ball seal upstream.</p> <p>The diaphragm is 0.003 inch thick inconel 718. It is formed with convolutions to minimize stresses due to stroking. Pressure induced stresses are minimized by supporting the diaphragm with a matching molded teflon cushion backed with a 0.003 inch thick teflon impregnated fiberglass sheet. This cushioned assembly is supported by a Belleville Spring Assembly.</p> <p>B. Test - Vendor Component Acceptance Test - The regulator manufacturer, CFI, performs an external leakage test to ensure seal, diaphragm, item 213F cap and TPD cap integrity.</p> <p>FSA Tests - The item is external leakage tested on the secondary oxygen package. The SOP bottles are pressurized to 5800-6200 psig with a 2% O₂ and 98% N₂ mixture. The fill valve, item 213F and the test port, TPD, are capped with the appropriate flight cap and torqued to 30-40 in-lbs. The item is tested in chamber vacuum and leakage must not exceed 5.5 x 10⁻⁵ cc/psia O₂. This value represents total SOP leakage.</p> <p>Certification Test - During 3/89 the SV799045 SOP completed 5000 ON/OFF cycles and 100 press cycles which is four times the 15 year expected use cycles. During the flow testing phase, the SOP completed 325 total hours of regulation at 5 pph or 0.18. The SOP assembly also completed the 15 year random vibration, sinusoidal vibration, design shock and bench shock testing.</p> <p>During 8/82 SV767718 SOP completed 112 blowdown cycles which</p>

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NAME P/N OFF	ENIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
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1/1 213DFM04A:

is 3 times the cycle certification requirement of 35 to satisfy the 80799045 certification requirements.

C. Inspection -

The O-Ring sealing surfaces are 100% inspected for dimensions and surface finish requirements. O-Ring surfaces are 100% inspected for surface characteristics per SVHS 3432 Class II.

The backup ring and Delta ring are 100% inspected for dimensions and surface characteristics per SVHS 8522. The oxygen manifold fitting is trial assembled, removed, and inspected (NIP) for evidence of damage or particles caused by the assembly process. The O-Ring is lubricated with Braycote (SVP 213) prior to final assembly.

D. Failure History -

H-EMU-200-A081 (11-6-79) External leakage due to scratches on the O-Seal area of the SOP outlet tube which occurred during a PLES fit check because the O-seal was omitted. External leakage also due to porosity in the high pressure oxygen manifold fitting material. Fittings were scrapped and replaced.

H-EMU-213-A082 (8-20-88) External leakage from manifold/regulator connection due to omitted one seal from the dual seal connector; and a large gap between sealing surfaces. Redesign manifold now incorporates a single seal with a small gap between sealing surfaces. These changes were made prior to certification.

E. Ground Turnaround -

Tested per SEMU-R-001, External Leakage, SOP Servicing for Flight.

F. Operational Use -

Crew Response -

EVA: since EVA termination is required as soon as SOP is flaming, crew would abort EVA when excessive SOP rate is detected.

Special Training - Standard EMU training covers this failure mode.

Operational Considerations - EVA checklist procedures verify

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WAKE P/N DIV	ENT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
	1/1	Z138FNU4A1		hardware integrity and systems operational status prior to EVA. Flight rules define go/no go criteria related to EMU pressure integrity and regulation. Flight rules define EMU as lost for loss of operational SOP. Real time Data System allows ground monitoring of EMU systems.

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