NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
02 PRESSURE REGULATOR 2ND STAGE ITEM 2130 --- SV799042-5 (1)	1/1	2130FM08A: Fails closed. CAUSE: Contamination. Ball return plunger or actuator plunger, or balance stem jams; bellows assembly leakage, spring relaxes or fractures.	END ITEM: Loss of SOP flow. CFE INTERFACE: Unable to supply emergency oxygen when required. MISSION: Abort EVA. CREW/VEHICLE: Possible loss of crewman.	A. Design - If the 17-4PH ON/OFF actuator plunger sticks, the oxygen actuator on the OCM cannot be moved to the EV position. This would be detected before the start of the mission. The second stage 17-4PH springs operate at a stress below yield point. The helical regulating spring has a cycle life of 200,000 cycles, the ON/OFF actuator spring has a cycle life of 20,000,000 cycles. A cycle is defined as stressing the spring from zero to operating load stress and back. The specification requirement is 1525 pressurization cycles. The system is cleaned to MIL-STD-1330 level A/50A before operation which minimizes the amount of contamination initially in the system. Particle generation during operation is minimized by material selection and surface finishes. The second stage regulator is protected by a 25 micron absolute nickel filter to minimize the chance of jamming. The nominal rating of the filter is 10 micron which is equivalent to a particle size of 0.0007 inches. Diametrical clearance between sliding parts is small to minimize cocking. It is 0.0010-0.0015 inch between the Monel demand valve piston and housing, 0.0005-0.0025 inch between the return Monel K500 plunger and Monel housing and 0.0005-0.0025 inch between the Monel 400 stem guide and Monel K500 pressure balance stem. The filter reduces the probability of a particle jamming these details. The housing and stem guide are made of stress relieved Monel 400 and the valve stem, spring seat, and pressure balance stem are made of age hardened Monel K500 to minimize the chance of galling. All sliding surfaces have either a 16 or 32 microinch finish. All edges are either radiused or chamfered. The L/D ratio for the valve stem - housing combination is 7; for the spring seat - housing combination is 1.6; and for the pressure balance stem - stem guide is 7. The bellows is designed for 84 psid. The bellows is proof tested to 25 psid. The operating pressure is 3.9 psid. B. Test - Component Acceptance Test - The vendor, CFE, performs the following tests to assure the second stage regulator does not fail closed. Contamination is reduced/minimized by cleaning all of the regulator internal details and oxygen passageways to MIL-STD-1330

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	1/1	2138FM06A:		EM50A. The test facility hardware and gases also meet this requirement. The regulation band is verified during Acceptance Test by performance tests at sea level with an inlet pressure of 7400 psi and a varying flow rate from 0.06 to 5.3 to 0.06 pph. The performance test is also performed at Vacuum Conditions with inlet pressures of 7600, 5855, 2710 and 350 psi and a varying flow rate from 0.06 to 5.3 to 0.06 pph. PDA Test - Contamination or clogging of the inlet filter is reduced/minimized by cleaning all interfacing inlet test fixtures and hoses to 883150 EM50A. Test gases also meet this requirement. Proper regulator performance is verified in a series of performance and endurance tests. The regulator is performance tested initially at sea level ambient at 7400 psig and 350 psig inlet pressures. At each inlet pressure, the outlet pressure is monitored over the flow ranges of 0-0.2 lbs/hr 02 (max) and 0.2 (max) -0 lbs/hr 02. Initially the end item (SOP) is allowed to blowdown from 7400 psig to 350 psig, while verifying proper regulator function. With the inlet at 7400 psig, the item is endurance flowed at 4.5-5.25 lbs/hr 02 for 5 hours minimum and at 0.5-2.0 lbs/hr 02 for 2.5 hours minimum. Again, the end item (SOP) is allowed to blowdown from 7400 to 350 psig. With the inlet pressure at 350 psig, the item is endurance flowed at 4.5-5.25 lbs/hr 02 for 5 hours minimum, and 0.5-2.0 lbs/hr 02 for 2.5 hours minimum. After the blowdown and endurance testing, the item is performance tested at sea level and vacuum ambient with inlet pressures of 7400 psig and 350 psig. For each configuration the outlet pressure is monitored over the flow ranges of 0-0.2 lbs/hr 02 (max) and 0.2 (max) -0 lbs/hr. 02. An additional blowdown is performed prior to vacuum ambient testing. Certification Test - The item completed the following cycle test during 5/05; On/Off Actual 1025, Spec 1031; No Flow Hours Actual 904, Spec 18; Blowdown Actual 172, Spec 35. No class I Engineering Changes have been incorporated since this configuration was certified.

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	2/1	213BFN06A:		

C. Inspection -
Details are 100% inspected per drawing dimensions and surface finish characteristics. Details are manufactured from material with certified physical and chemical properties. All details, gases, and test facilities are cleaned and inspected to NSS1580 CH50A to preclude contamination clogging. The running and final torque of all threaded connections are verified by Vendor and QCAS inspectors. A trial assembly is run on all details and then they are visually inspected. The demand valve pintle and balance stem are manually depressed during assembly to assure free motion.

D. Failure History -
None.

E. Ground Turnaround -
Ground Turnaround - Tested per PEMU-R-881, SOP Servicing for Flight, Sea Level Regulator Performance.

F. Operational Use -
Crew Response -
EVA: Since EVA termination is required as soon as SOP is flowing, crew would abort EVA when insufficient SOP regulation is detected.
Special Training -
Standard EMU training covers this failure mode.
Operational Considerations -
EVA checklist procedures verify 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.