NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		113EFM01B		
WATER PRESSURE REGULATOR, ITEM 113E ---------- SV778873-14 (1)	2/1R	Fails open. Contamination, spring fracture, external leakage in the reference cavity, ball actuator or return plunger jams.	END ITEM: High O2 delivery rate to the suit. The flow into the suit is restricted by the Item 113B to 7.5 lbs/hr max. GFE INTERFACE: Increase in suit pressure above 8.0 psid. Suit pressure can increase to 13.95 max in 12 seconds. Rapid depressurizatio n of suit can occur. MISSION: IV crewmember must monitor suit pressure (via the BTA Pressure Gauge) to detect and respond to an increase in suit pressure. Inability to do so will result in suit overpressurizat ion and failure. Terminate Bends Treatment procedure. CREW/VEHICLE: Loss of crewmember undergoing Bends	A. Design - Stem clearance is 0.001-0.0015 inch. Material combination resists galling and wear (stem is Inconel 718, body is Al-Bronze). Valve and sense cavity are protected by a 25-micron filter upstream and downstream and a redundant filter in the shutoff valve. Oxygen system cleanliness precludes any significant amount of contamination clogging the filters. A drop in regulator pressure of 9.5 psi results in a 4 lb load to open the valve stem. The springs operate at a stress below yielding. Leakage paths are through two silicone lip seals in the seat assembly, a static radial o-seal on the balance stem, and the ball and seat interface. The lip seals have metal to metal loaded fit downstream and are configured so that pressure increases the sealing load on the lip. The seals have backup rings to prevent extrusion. B. Test - Vendor Component Acceptance:The manufacturer, CTI, performs a sea level performance test to assure that the regulator has not failed open. Contamination is reduced/minimized by cleaning all of the internal details and oxygen passageways to HS3150 EM50A. The test facility and gases also meet this requirement.PDA Test -Regulator performance tests per SEMU-60-010 verify proper feedwater regulator function.. With the oxygen bottles pressurized to 850-950 psia, the regulator must regulate to 14.6-15.7 psig at flowrates of 0.01-0.02 lb/hr and 0.03-0.05 lb/hr O2. With the bottles pressurized to 75-85 psia the regulator must regulate to 14.6-15.7 psig at a flowrate of 0.03-0.05 lb/hr O2. For bottle pressures of 850-950 psia and 75-85 psia, the regulator must regulate to 13.6-16.7 as monitored on the Item 132A transducer. An internal leakage test is performed on the feedwater regulator per SEMU-60-010. With the oxygen bottles pressurized to 850-950 psia and the pressure downstream of the regulator maintained at 15.8-16.0 psig, the maximum internal leakage shall be from 20-23 scc/minute oxygen depending on actual bottle pressure. All rig lines and test fixtures are cleaned to HS3150 EM150A to prevent contamination from entering the item. Certification Test -The item completed twenty years worth (13.370 cycles) of its cycle certification requirement in 02/99 (ref. EMUM1-0083). C. Inspection - Details are 100% inspected per drawing dimensions and surface characteristics. Details are manufactured from material with certified physical and chemical properties. All details, gases and test facilities are cleaned and inspected to HS3150 EM50A to preclude contamination clogging. The running and final torque of all threaded connections are verified by Vendor and DCAS inspection. A trial assembly is run on all details and then they are visually inspected. The demand valve pintle is manually depressed to assure motion. D. Failure History - EMU-113-H004 (01/02/80). High feedwater pressure due to leaking Demand Valve seal. The seal was redesigned to allow sufficient volume for the elastomeric material when it is squeezed. E. Ground Turnaround - Tested per FEMU-R-001, V1103 Performance Data and Item 113 Regulator Check. F. Operational Use -

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		113EFM01B		
			Treatment with suit failure due to overpressurization resulting in rapid suit depressurization. Rapid depressurization of the suit may result in FOD generation (over-pressurization of the Item 480 CCC may result in the release of LiOH dust which is an eye and lung irritant) and/or injury to IV crewmembers and damage to the vehicle. TIME TO EFFECT /ACTIONS: Immediate. TIME AVAILABLE: Minutes. TIME REQUIRED: Minutes. REDUNDANCY SCREENS: A-PASS B-PASS C-PASS	Crew Response - Bends Treatment: IV crewmember will terminate the Bends Treatment procedure (In-Suit) if the pressure on the BTA Gauge increases while the O2 Actuator is in the PRESS position. The IV crewmember has 10 seconds to detect and react in order to keep suit pressure below 11 psid. 11 psid is the max cert. vent loop burst pressure. Consider use of another suit to continue Bends Treatment procedure.Training - Standard EMU training covers this failure mode.Operational Considerations - Prior to EVA, EMU pressurization functions are verified. EMU function for nominal operation is also monitored during EVA. IV crewmember must monitor suit pressure to detect and respond to an increase in suit pressure. Inability to do so will result in suit overpressurization, suit failure, rapid suit depressurization, and loss of crewmember undergoing Bends Treatment.

EXTRAVEHICULAR MOBILITY UNIT

SYSTEMS SAFETY REVIEW PANEL REVIEW

FOR THE

I-113 PRIMARY PRESSURE CONTROL MODULE

CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

Prepared by: _____
HS - Project Engineering

_____
HS - Reliability

_____
HS - Engineering Manager

Approved by: _____
NASA - SA/SSM
LSS

_____
NASA - EMU/SSM

_____
NASA - S&MA

_____
NASA - MOD

_____
NASA - Crew

_____
NASA - Program Manager