NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		113DFM01		
SUIT PRESSURE REGULATOR, ITEM 113D --- SV778873-15 (1)	2/1R	Fails open, internal gas leakage. Contamination, bellows failure, spring fracture, stem jamming, external leakage in the reference cavity, ball actuator or return plunger jams, 0-seal leakage, balance stem leakage.	END ITEM: High 02 delivery rate to the suit. The flow into the suit is restricted by the Item 113B to 7.5 lbs./hr max. Bellows leakage to ambient is restricted to 6 lbs./hr. GFE INTERFACE: Increase in suit pressure above 4.55 psid (5.5 psid max). Suit venting (via Item 146) starts to occur at 4.7 psid. SOP provides 02 backup. MISSION: Terminate EVA. Loss of use of one EMU. CREW/VEHICLE: None for single failure. Possible loss of crewman with loss of Item 146 or SOP. TIME TO EFFECT /ACTIONS: Immediate. TIME	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 25 micron upstream and downstream filters. Bellows operates with 4.3 psi differential pressure and it is rated for 84 psi proof. The sensing orifice downstream limits an external leak to 6 lbs/hr should a leakage failure occur across the bellows. Springs operate at a stress below yielding. Leakage paths are through two silicone lip seals on the seat assembly, a static radial o-seal on the balance stem, a dynamic radial o-seal on the balance stem and through the ball and seat interface. The lip seals have metal to metal loaded fit downstream of the seal and the lip is configured so that pressure forces the lip against the adjacent parts. The o-ring seals design configuration, dimensions and rigidness of assembly provide squeeze under all load conditions. B. Test - Vendor Component Acceptance Test - 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 the requirement. PDA Test - Regulator performance tests verify the ability of the regulator to control the outlet pressure. In the IV mode, at 850-950 psia inlet, flows of .31-.35 lb/hr and .04-.06 lb/hr, the regulator must maintain the outlet pressure of 0.4-1.4 psig. At an inlet pressure of 75-85 psia and a flow of .31-.35 lb/hr it must maintain the outlet at 0.4 - 1.4 psig. In the EVA and PRESS modes at 850-950 psia inlet and flows of .31-.35 lb/hr and .04-.06 lb/hr the regulator must regulate the outlet pressure to 4.2-4.4 psig. At 75-85 psia inlet and a flow of .31-.35 lb/hr it must regulate to 4.2-4.4 psig. Internal leakage tests are performed per SEMU-60-010 with the regulator in the IV and EVA modes. In the IV mode the inlet to the regulator is set at 850-950 psia and the outlet is maintained at 1.5-1.7 psig. Leakage through the regulator must not exceed 20 scc/minute. Certification Test Certified for a useful life of 20 years (Ref. EMUM-0083). C. Inspection - All details, gases and test facilities are cleaned and inpected to HS3150 EM50A to preclude contamination clogging. Details, including the O-ring, O-ring grooves and sealing surfaces, are 100% inspected per drawing dimensions and surface finish characteristics. Details are manufactured from material with certified physical and chemical properties. 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 and balance stem is manually depressed to assure free motion.

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		113DFM01		
			AVAILABLE: Minutes. TIME REQUIRED: Minutes. REDUNDANCY SCREENS: A-PASS B-PASS C-PASS	D. Failure History - H-EMU-115-D001 (12-23-81) Valve stem clearance too small causing jamming. Open steam clearance by EC 42803-667. E. Ground Turnaround - Tested for EET and non-EET processing per FEMU-R-001, V1103 Performance Data and Item 113 Regulator Check. F. Operational Use - Crew Response - PreEVA: Trouble-shoot problem, if no success, consider EMU 3 if available. EMU no go for EVA. PostEVA: N/A EVA: When CWS data confirms loss of suit pressure regulation coupled with an accelerated primary O2 use rate, terminate EVA. Training - Standard EMU training covers this failure mode. Operational Considerations - Flight rule A15.1.2-2 of "Space Shuttle Operational Flight Rules", NSTS-12820, defines go/no-go criteria related to EMU suit pressure regulation. Generic EVA Checklist, JSC-48023, procedures Section 3 (EMU Checkout) and 4 (EVA prep) verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.

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: _____ 3/27/02
HS - Project Engineering

_____
HS - Reliability

_____
HS - Engineering Manager

Approved by: _____ 6/25/02
NASA - SSA/SSM
LSS

_____
NASA - EMU/SSM

_____ 6/26/02
NASA - S & MA

_____ 6/27/02
NASA - MOD

_____ 7/1/02
NASA - Crew

_____ 7-1-02
NASA - Program Manager