

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE

SHEAR PLATE ASSEMBLY, ITEM 115 (PIVOTED, PLANAR) ----- SV778540-56 (1)	2/2	External gas leakage, primary O2 bottles fill circuit.	END ITEM: Oxygen leakage to ambient during recharge and umbilical IVA operations.	A. Design - There are 10 radial silicone seal locations and one metal-to-metal seal (all static) which prevent external leakage in the Primary O2 tank fill circuit. The radial seals which prevent leakage are elastomeric O-seals. The "O" ring seal design deminsions and rigidness of assembly provides squeeze under all loading applications. On the flexible oxygen fill line a metal-to-metal hose fitting seal is used. The metal-to-metal seal contains a flexible lip and a smooth finish on mating surfaces.
OR (ORU) ----- SV824133-8 (1)		Seal failure, dynatube fitting failure, O2 hose swage joint failure, flexible hose tearing.	GFE INTERFACE: Depletion of the vehicle oxygen supply.	The oxygen manifold tube has a minimum wall thickness of 0.014 in. which makes the 0.187 O.D. (Nominal) tube a thick welded cylinder. The maximum operating pressure in the tube is 1050 psi supplied by the primary oxygen bottles. The tube material is Monel K-500. Analysis indicates that the minimum tube factor of safety is 3.97 at a burst pressure of 4200 psi and 15.7 at maximum operating pressure.
			MISSION: Loss of use of one EMU if the leakage is excessive.	B. Test - Component Acceptance Test - None
			CREW/VEHICLE: None.	PDA Test - The O2 fill circuit is leak tested per SEMU-60-010. With the oxygen bottles pressurized to 850-950 psia (with a mixture of 98% H2 and 2% He) a line is attached to the fill side of the check valve and submerged in water. Leakage is monitored for a 10 minute minimum test period and is not to exceed 15 scc/hr. Also, a helium mass spectrometer is used to sniff for evidence of leak.
			TIME TO EFFECT /ACTIONS: Immediate.	Certification Test - Certified for a useful life of 20 years from the date of manufacture. Successful refurbishment will extend useful life to 30 years max. (ref EMUM1-0491, EMUM1-0027).
			TIME AVAILABLE: N/A	C. Inspection - O-ring seal grooves are 100% inspected per drawing dimensions and surface finish. O-rings are inspected for surface characteristics per SVHS3432; 100% for Class I and II, and at least 1.5 AQL for Class III.
			TIME REQUIRED: N/A	The dynatube metal to metal seal is 100% inspected per drawing dimensions and surface finish. During assembly, a double wrench technique is used to prevent relative movement of the two halves of the metal to metal seal to prevent galling of seal surfaces and causing a leakage. The double wrench method also prevents damage to the hose swage joints.
			REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	The tube material is inspected on a lot basis to meet material strength requirements. As a brazed assembly the braze fillets are 100% visually inspected and 100% x-ray inspected for proper coverage. Proof pressure and leakage tests are also performed upon the assembly.
				D. Failure History - J-EMU-115--003 (1/26/83) Excessive check valve leakage. No cause found. Corrective action was that PIA testing would detect leaking check valves. H-EMU-115-D002 (1/23/85) Excessive internal leakage due to excessive parting line projection of the O-seal. No corrective action. This failure is considered to be a detectable

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		115FM13		<p>isolated failure. B-EMU-115-A005 (11/1/99) - Leakage at O2 line elbow on DCM side during full pre-installation assembly (FPIA) variable processing for STS-101 flight. Leak probably caused by housing bore damage which may have occurred during post processing of oxygen housings and testing at HSWL , Mate/Demate of oxygen housing and DCM control housing at USA. Other cause of leak may be due to O-seal failure caused by omission of lubricant or improper installation. Revise current HSWL processing sheets to add steps for verification of the bore diameter and surface finish. Program Memo sent to NASA asking USA to review their assembly techniques and amend procedures to add post assembly/disassembly verifications of the Oxygen housing bore and O-seal.</p> <p>E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001,O2 Fill Line and Item 113C External Leakage. None for EET processing.</p> <p>F. Operational Use - Crew Response - Pre/PostEVA: No response, problem not likely to be detected. If primary O2 tank charge cannot be maintained, consider use of third EMU if available. EMU is no go for EVA. Training - Standard training covers this 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.</p>

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-115 SHEAR PLATE ASSEMBLY
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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