

## FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: M7-3A-ES-X

SUBSYSTEM NAME: TUNNEL ADAPTER - ECLSS

REVISION : 0 01/13/94 W

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	PRESSURE CAP CARLETON TECHNOLOGIES	MC250-0004-0010 2763-2001-7

## PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
PRESSURE CAPS, EQUALIZATION VALVES ON HATCH "D".

QUANTITY OF LIKE ITEMS: 2  
ONE PER VALVE; TWO PER HATCH.

## FUNCTION:

ATTACHES TO THE EQUALIZATION VALVE TO PROVIDE A SECONDARY PROTECTION TO INTERNAL LEAKAGE. CAN BE REMOVED BY CREWMAN IN A PRESSURE GARMENT ASSEMBLY AND IS TETHERED TO PREVENT MISPLACEMENT. CAP HAS A 0.180 BLEED HOLE TO PERMIT PRESSURE EQUALIZATION WITH A MANUALLY OPERATED SPRING LOADED BLEED VALVE TO VENT THE CAP.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
 NUMBER: M7-3A-E5-01

REVISION: 0 01/13/94 W

SUBSYSTEM: TUNNEL ADAPTER - ECLSS  
 LRU PRESSURE CAP  
 ITEM NAME: PRESSURE CAP

CRITICALITY OF THIS  
 FAILURE MODE: 1R2

FAILURE MODE:  
 INABILITY TO MATE

MISSION PHASE:  
 OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	102	COLUMBIA
	: 103	DISCOVERY
	: 104	ATLANTIS
	: 105	ENDEAVOUR

CAUSE:  
 CONTAMINATION, CORROSION, PHYSICAL BINDING/JAMMING, MECHANICAL SHOCK.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS  
 B) PASS  
 C) PASS

PASS/FAIL RATIONALE:

A)  
 B)  
 C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:  
 LOSS OF SECONDARY SEAL TO EQUALIZATION VALVE.

(B) INTERFACING SUBSYSTEM(S):  
 NO EFFECT - VALVE PROVIDES PRIMARY SEAL.

(C) MISSION:  
 NO EFFECT.

(D) CREW, VEHICLE, AND ELEMENT(S):  
 NO EFFECT.

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**(E) FUNCTIONAL CRITICALITY EFFECTS:**

SECOND ASSOCIATED FAILURE (EQ. VALVE INTERNAL LEAKAGE) MAY RESULT IN LOSS OF EVA CREWMEN IF CONTINGENCY EVA IS REQUIRED AND TUNNEL CANNOT BE REPRESSURIZED FOR RETURN TO CABIN (EVA CREWMEN MUST REMAIN IN AIRLOCK UNTIL LANDING).

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**- DISPOSITION RATIONALE -**  
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**(A) DESIGN:**

CAP IS FABRICATED FROM 6061-T6 ALUMINUM. THE 0.180 INCH DIAMETER BLEED HOLE HAS A SPRING-LOADED SILICONE RUBBER SEAL. CAP IS THREADED TO MATE WITH VALVE AND IS SEALED BY A SILICONE RUBBER O-RING SEAL ON VALVE.

**(B) TEST:**

QUALIFICATION TEST FOR 100 MISSION LIFE: CAP IS INSTALLED ON VALVE FOR VALVE QUALIFICATION TEST. ACCELERATION OF 5 G FOR 5 MINUTES PER AXIS. SINUSOIDAL VIBRATION - 5 TO 35 HZ AT 0.25 G PEAK PER AXIS. RANDOM VIBRATION - 0.09 G\*\*2/HZ FOR 48 MINUTES PER AXIS. DESIGN SHOCK - 20 G PER AXIS. THERMAL VACUUM/THERMAL CYCLE - WITH VALVE CLOSED AND CAP ON, UNIT EXPOSED TO 120 TO 130 F AND VACUUM OF 1 X 10 EXP -6 TORR FOR 24 HOURS. LOW/HIGH TEMPERATURE CYCLE - HELD AT -40 TO -50 F FOR 3 HOURS AND AT +120 TO +130 F FOR 3 HOURS.

ACCEPTANCE TEST - PROOF PRESSURE 25 PSIG GN2. EXTERNAL LEAKAGE 14 - 16 PSIG, 5.0 SCCM MAX LEAKAGE, WITH VALVE OPEN AND CAP INSTALLED.

OMRSD - 3.2 PSID LEAK CHECK PERFORMED AT OPF AFTER TUNNEL ADAPTER INSTALLATION. GROSS LEAKAGE TEST AT 2 PSID BEFORE EACH FLIGHT. CAPS, MATING SURFACES, AND O-RING ARE INSPECTED FOR DAMAGE PRIOR TO INSTALLATION.

**(C) INSPECTION:**

RECEIVING INSPECTION  
MATERIAL VERIFIED BY PHYSICAL-CHEMICAL REPORTS AT RECEIVING INSPECTION.

**CONTAMINATION CONTROL**

CORROSION PROTECTION REQUIREMENTS VERIFIED BY INSPECTION. CLEANLINESS LEVEL OF 200A AND 100 ML RINSE TESTS ARE VERIFIED BY INSPECTION.

**ASSEMBLY/INSTALLATION**

MANUFACTURING PROCESSES, INSTALLATION AND ASSEMBLY VERIFIED BY INSPECTION. DIMENSIONAL CHECKS VERIFIED BY INSPECTION. SEAL INSPECTION AND INSTALLATION VERIFIED BY INSPECTION.

**CRITICAL PROCESSES**

SPECIAL TEFLON IMPREGNATED ANODIZATION (NITUFF) VERIFIED BY INSPECTION. SEAL MOLDING VERIFIED BY INSPECTION, INCLUDING DUROMETER

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HARDNESS TEST TO VERIFY CURE.

TESTING  
ATP VERIFIED BY INSPECTION.

HANDLING/PACKAGING  
PARTS PROTECTION VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:  
NO FAILURE HISTORY.

(E) OPERATIONAL USE:  
NO CREW ACTION REQUIRED FOR FIRST FAILURE.

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- APPROVALS -  
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EDITORIALLY APPROVED : RI  
EDITORIALLY APPROVED : JSC  
TECHNICAL APPROVAL : VIA CR

*[Handwritten signature and date]*  
: *[Signature]* 1/20/94  
: *[Signature]* 5/20/94