

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
 NUMBER: M7-3A-E4-Y

SUBSYSTEM NAME: TUNNEL ADAPTER - ECLSS

REVISION : 0 01/13/94 W

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	EQUALIZATION VALVE CARLETON TECHNOLOGIES	MC250-0004-0012 2763-0001-9

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
 EQUALIZATION VALVE, TUNNEL ADAPTER/SPACELAB HATCH "D".

QUANTITY OF LIKE ITEMS: 2
 TWO ON HATCH "D"

FUNCTION:
 PROVIDES PRESSURE EQUALIZATION ACROSS THE TUNNEL ADAPTER AND SPACELAB HATCH. EACH VALVE OPERATES INDEPENDENTLY WITH POSITIVE DETENTS AT TWO FLOW POSITIONS. VALVE CAN BE ACTUATED FROM EITHER SIDE OF HATCH.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: M7-3A-E4-03

REVISION# 1 10/22/92 R

SUBSYSTEM: TUNNEL ADAPTER - ECLSS
LRU :EQUALIZATION VALVE
ITEM NAME: EQUALIZATION VALVE

CRITICALITY OF THIS
FAILURE MODE:1/1

■ FAILURE MODE:
EXTERNAL LEAKAGE

MISSION PHASE:
00 ON-ORBIT

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

■ CAUSE:
MECHANICAL SHOCK, VIBRATION, CORROSION, POROSITY

■ CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

■ REDUNDANCY SCREEN A) N/A
 ■ B) N/A
 ■ C) N/A

PASS/FAIL RATIONALE:

- A)
- B)
- C)

- FAILURE EFFECTS -

■ (A) SUBSYSTEM:
INABILITY TO ISOLATE SPACELAB FROM TUNNEL ADAPTER.

■ (B) INTERFACING SUBSYSTEM(S):
POSSIBLE EXCESSIVE LOSS OF CONSUMABLES IF EVA IS CONDUCTED.

■ (C) MISSION:
POSSIBLE EARLY MISSION TERMINATION DUE TO EXCESSIVE LOSS OF CONSUMABLES.

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- (D) CREW, VEHICLE, AND ELEMENT(S):
POSSIBLE LOSS OF EVA CREWMAN IF CONTINGENCY EVA IS REQUIRED AND TUNNEL ADAPTER CANNOT BE REPRESSURIZED FOR RETURN TO CABIN; EVA CREWMEN MUST REMAIN IN AIRLOCK UNTIL LANDING.
- (E) FUNCTIONAL CRITICALITY EFFECTS:
NONE.

- DISPOSITION RATIONALE -

- (A) DESIGN:
UNIT IS FLANGE MOUNTED WITH A SINGLE SILASTIC-675 SILICONE RUBBER O-RING WHICH COMPENSATES FOR ROUGHNESS OF FLANGE, PREVENTING EXTERNAL LEAKAGE. HOUSING IS FABRICATED OF A356.0-T61 ALUMINUM ALLOY AND IS X-RAYED TO DETECT CRACKS.
- (B) TEST:
QUALIFICATION TEST FOR 100 MISSION LIFE: ACCELERATION OF 5 G FOR FIVE 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 TEMP CYCLE - HELD AT -40 TO -50 F FOR 3 HOURS AND AT +120 TO 130 F FOR 3 HOURS. OPERATING LIFE - OPERATED OFF/NORMAL/EMERGENCY POSITIONS WITH 15 PSIG APPLIED FOR 800 CYCLES. LEAKAGE MONITORED DURING OR AFTER THESE TESTS LIMITED TO 5 SCCM MAX.

ACCEPTANCE TEST - PROOF PRESSURE 25 PSIG GN2, WITH VALVE OPEN AND CLOSED. LEAK CHECK AT 15 PSIG, 5 SCCM MAX - VALVE OPEN AND CLOSED AND REVERSE LEAKAGE.

OMRSD - 3.2 PSID LEAK CHECK PERFORMED AT OPF AFTER TUNNEL ADAPTER INSTALLATION. GROSS LEAKAGE TEST AT 2 PSID BEFORE EACH FLIGHT.

- (C) INSPECTION:
RECEIVING INSPECTION
MATERIALS VERIFIED AT RECEIVING INSPECTION. ALUMINUM HOUSING CASTINGS ARE HYDROSTATIC PROOF PRESSURE TESTED AT 32 PSID.

CONTAMINATION CONTROL
CORROSION PROTECTION PROVISIONS AND CONTAMINATION CONTROL PLAN VERIFIED BY INSPECTION. CLEANLINESS LEVELS AND 100 ML RINSE TESTS VERIFIED.

