

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 06-1A-1128-X

SUBSYSTEM NAME: ARS - AIRLOCK

REVISION : 2 09/21/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	CAP, DEPRESS. VALVE AIRLOCK CARLETON TECHNOLOGIES	MC250-0004-0011 2765-0018-5

PART DATA

QUANTITY OF LIKE ITEMS: 1

FUNCTION:

ATTACHES TO THE DEPRESSURIZATION VALVE TO PREVENT INTERNAL LEAKAGE THROUGH THE VALVE. CAN BE REMOVED BY A CREWMAN IN A PRESSURE GARMENT ASSEMBLY AND IS TETHERED TO PREVENT MOVEMENT AWAY FROM THE VALVE ASSEMBLY.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 06-1A-1128-03

REVISION# 2 09/21/90 R

SUBSYSTEM: ARS - AIRLOCK
LRU :CAP, DEPRESS. VALVE AIRLOCK
ITEM NAME: CAP, DEPRESS. VALVE AIRLOCK

CRITICALITY OF THIS
FAILURE MODE: R3

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

■ CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) FAIL
C) PASS

PASS/FAIL RATIONALE:

A)

B)

SCREEN B FAILS BECAUSE THE CAP IS THE FIRST SEALING COMPONENT AND ITS FAILURE IS NOT DETECTABLE.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF REDUNDANT SEAL TO DEPRESSURIZATION VALVE.

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

(C) MISSION:
NO EFFECT.

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

- (E) FUNCTIONAL CRITICALITY EFFECTS:
LOSS OF LEAK ISOLATION (DEPRESS VALVE AND VACUUM VENT ISOLATION VALVE)
THROUGH VACUUM VENT DUCT CAN CAUSE LOSS OF EMERGENCY EVA CAPABILITY.

- DISPOSITION RATIONALE -

(A) DESIGN:

SEALING CAP IS MADE FROM 6061-T6 ALUMINUM. 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: PERFORMED ON VALVE WITH CAP
INSTALLED. ACCELERATION OF 5G FOR FIVE MINUTES PER AXIS. DESIGN SHOCK
- 20 G 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.
LEAKAGE MONITORED DURING OR AFTER THESE TESTS NOT TO EXCEED 5 SCCM.

ACCEPTANCE TEST - EXTERNAL PROOF WITH VALVE OPEN AND CAP INSTALLED, 25
- 26 PSIG FOR 3 MINUTES. EXTERNAL LEAKAGE - VALVE OPEN AND CAP
INSTALLED, 15 PSIG GN2 APPLIED, 5 SCCM MAXIMUM LEAKAGE.

IN-VEHICLE TESTING - 3.2 PSID CABIN LEAK TEST.

DMRSD - GROSS LEAKAGE TEST AT 2 PSID BEFORE EACH FLIGHT VERIFIES NO
GROSS LEAKAGE THROUGH BOTH THE VALVE AND CAP SIMULTANEOUSLY. CAP AND
O-RINGS 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
LEVELS 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.

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CRITICAL PROCESSES

SPECIAL TEFLON IMPREGNATED ANODIZATION (NITUFF) VERIFIED BY INSPECTION. SEAL MOLDING VERIFIED BY INSPECTION, INCLUDING DOURMETER HARDNESS TEST TO VERIFY CURE.

TESTING

ATP VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PARTS PROTECTION VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:

NO FAILURES.

(E) OPERATIONAL USE:

NO CREW ACTION REQUIRED FOR FIRST FAILURE.

- APPROVALS -

RELIABILITY ENGINEERING:	D. R. RISING	<i>DRR</i>	:	<i>[Signature]</i>
DESIGN ENGINEERING	: K. KELLY	<i>KK</i>	:	<i>[Signature]</i>
QUALITY ENGINEERING	: M. SAVALA	<i>MS</i>	:	<i>[Signature]</i>
NASA RELIABILITY	:		:	<i>[Signature]</i>
NASA SUBSYSTEM MANAGER	:		:	<i>[Signature]</i>
NASA QUALITY ASSURANCE	:		:	<i>[Signature]</i>