

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE**  
NUMBER: 06-1A-1201-X

SUBSYSTEM NAME: ARS - AIRLOCK

REVISION : 2 06/15/90

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	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	VALVE, O2 SUPPLY CARLETON TECHNOLOGIES	MC250-0004-0006 1-4-00-51-27

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**PART DATA**

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- EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
SHUTOFF VALVE, MANUAL OXYGEN

QUANTITY OF LIKE ITEMS: 2

**FUNCTION:**  
PROVIDES FOR ON-OFF CONTROL OF OXYGEN SUPPLY IN THE AIRLOCK TO THE TWO  
SCU'S FOR EMU OXYGEN RECHARGE.

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NUMBER: 06-1A-1201-03

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SUBSYSTEM: ARS - AIRLOCK  
LRU : VALVE, O2 SUPPLY  
ITEM NAME: VALVE, O2 SUPPLY

CRITICALITY OF THIS  
FAILURE MODE: 1/1

FAILURE MODE:  
EXTERNAL LEAKAGE

MISSION PHASE:  
LO LIFT-OFF  
OO ON-ORBIT  
OO DE-ORBIT

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

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:  
CONTINUED LOSS OF OXYGEN WHETHER VALVE IS OPEN OR CLOSED.

(B) INTERFACING SUBSYSTEM(S):  
LOSS OF EMERGENCY O2 SUPPLY TO LEH'S.

(C) MISSION:  
ABORT DECISION - FOR LOSS OF EMERGENCY O2 SUPPLY TO LEH'S.

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(D) CREW, VEHICLE, AND ELEMENT(S):  
LOSS OF EMERGENCY O2 SUPPLY TO LEH'S CAN CAUSE LOSS OF CREW/VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

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- DISPOSITION RATIONALE -  
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(A) DESIGN:

DYNAMIC SEALS ARE MADE OF SILASTIC 675 SILICONE RUBBER WHICH SLIDES ON THE VALVE STEM'S 16K GOLD FINISH. VALVE STEM IS MADE OF 17-7 PH CRES. BACK UP TEFLON RING LOCKS O-RING SEAL IN PLACE AND CAN LIMIT LEAK RATE.

■ (B) TEST:

CERTIFICATION FOR 100 MISSION LIFE - ANALYSIS FOR SHOCK, VIBRATION AND CABIN ATMOSPHERE - SAME TYPE VALVES WERE FULLY QUALIFIED TO MORE SEVERE REQUIREMENTS FOR APOLLO PROGRAM. OPERATING LIFE - VALVE IS SAME DESIGN AS ONE WHICH HAS BEEN SUBJECTED TO A 1000 CYCLE OPERATING LIFE TEST.

ACCEPTANCE TEST - PROOF PRESSURE 1875 PSIG, EXTERNAL LEAK 0.2 SCCM MAX AT 1250 PSIG.

IN-VEHICLE TEST - AFTER INSTALLATION AIRLOCK O2 SYSTEM IS OVERPRESSURE AND LEAK TESTED.

OMRSD - GROSS EXTERNAL SYSTEM LEAK TEST PERFORMED EVERY FIFTH FLIGHT. INFLIGHT CHECKOUT EACH MISSION VERIFIES NO DETECTABLE LEAKAGE.

(C) INSPECTION:

RECEIVING INSPECTION

MATERIAL VERIFIED BY PHYSICAL - CHEMICAL REPORTS AT RECEIVING INSPECTION.

CONTAMINATION CONTROL

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

ASSEMBLY/INSTALLATION

MANUFACTURING PROCESSES, INSTALLATION AND ASSEMBLY VERIFIED BY INSPECTION. BELLEVILLE SPRING FORCES ARE RECORDED AND VERIFIED AT FINAL INSPECTION. INSPECTION PERFORMS MIPS FOR CONCENTRICITY AND PERPENDICULARITY. DIMENSIONAL CHECKS ARE PERFORMED BY INSPECTION. VISUAL INSPECTION UNDER 10X MAGNIFICATION ON SEAL RING, VERIFIED BY INSPECTION. LUBRICANT APPLICATION ON SEAL RING IS VERIFIED BY

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INSPECTION. TORQUE VALUES SPECIFIED ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

PASSIVATED PARTS AND HEAT TREATMENT IS VERIFIED BY INSPECTION. GOLD PLATING VERIFIED BY INSPECTION. ANODIZATION IS VERIFIED BY INSPECTION.

TESTING

ATP VERIFIED BY INSPECTION. VESPEL TESTED FOR OXYGEN COMPATIBILITY, VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PARTS PROTECTION VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:

NO FAILURES.

(E) OPERATIONAL USE:

CREW WILL PERFORM THE PPO2 HIGH/LOW PROCEDURE WHICH WILL ISOLATE THE LEH O2 MANIFOLD. PROCEDURE IS PART OF NORMAL CREW TRAINING.

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- APPROVALS -  
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RELIABILITY ENGINEERING:	D. R. RISING	DRR	:	<u>[Signature]</u>
DESIGN ENGINEERING	: K. KELLY	KK	:	<u>[Signature]</u>
QUALITY ENGINEERING	: M. SAVALA		:	<u>[Signature]</u>
NASA RELIABILITY	:		:	<u>[Signature]</u>
NASA SUBSYSTEM MANAGER	:		:	<u>[Signature]</u> 7/17/90
NASA QUALITY ASSURANCE	:		:	<u>[Signature]</u> 7-7-90