

**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<br>VENDOR NAME                  | PART NUMBER<br>VENDOR NUMBER    |
|-------|-------------------------------------------|---------------------------------|
| LRU : | VALVE, O2 SUPPLY<br>CARLETON TECHNOLOGIES | MC250-0004-0006<br>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.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

*Attachment*  
 750200P N 2

SUBSYSTEM : ATMOSPHERIC REVIT. FMEA NO 06-1A -1201 -2 REV:10/22/87

ASSEMBLY : EVA EQUIPMENT RECHARGE CRIT. FUNC: 1R  
 P/N RI : MC250-00Q4-0006 CRIT. HDW: 2  
 P/N VENDOR: 1-4-00-51-27 CARLETON VEHICLE 102 103 104  
 QUANTITY : 2 EFFECTIVITY: X X X  
 : ONE PER LOOP PHASE(S): PL LO X CO X DO X LS  
 : TWO PER SUBSYSTEM

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS

PREPARED BY: DES D. L. SANDERSFELD DES *[Signature]* APPROVED BY: APPROVED BY (NASA) *[Signature]*  
 REL N. L. STEISSLINGER REL *[Signature]* SSM *[Signature]*  
 QE W. J. SMITH QE *[Signature]* REL *[Signature]* QE *[Signature]*

ITEM:

SHUTOFF VALVE, OXYGEN, MANUAL

FUNCTION:

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

FAILURE MODE:

INABILITY TO CLOSE, INTERNAL LEAKAGE

CAUSE(S):

MECHANICAL SHOCK, VIBRATION, CONTAMINATION, CORROSION

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A) UNABLE TO SHUT OFF OXYGEN SUPPLY TO SCU'S.

(B) LOSS OF SCU LEAK ISOLATION CAPABILITY.

(C) NO EFFECT.

(D) SECOND ASSOCIATED FAILURE (LEAKAGE OF SCU) CAN CAUSE LOSS OF EMERGENCY O2 SUPPLY TO LEH'S AND LOSS OF CREW/VEHICLE. SCREEN B FAILS BECAUSE INTERNAL LEAKAGE THROUGH THE VALVE CANNOT BE DETECTED DOWNSTREAM OF THE VALVE.

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN

CONSTANT SEAT FORCES DUE TO BELLEVILLE CLOSING SPRING. EXCESS SEAL/SEAT WEAR ELIMINATED. POPPET IS PRESSURE COMPENSATED THROUGH THE USE OF DYNAMIC SEALS AT EACH END OF THE POPPET. INLET/OUTLET PORTS ARE FILTER PROTECTED. DYNAMIC SEALS ARE MADE OF SILASTIC 675 SILICONE RUBBER WHICH SLIDES ON THE VALVE STEMS 16K GOLD FINISH. MATERIALS USED - VALVE BODY - 6061-T6 ALUMINUM. VALVE STEM - 17-7 PH CRES. POPPET - 17-7 PH CRES CONDITION C. VALVE SEAT - POLYIMIDE. BACKUP RING - KEL-F-81. O-RING - SILICONE RUBBER.

*attached*

750200p 12722

SHUTTLE CRITICAL ITEMS LIST - ORBITER

UBSYSTEM : ATMOSPHERIC REVIT. FMEA NO 06-1A -1201 -2 REV:10/22/87

**B) TEST**

CERTIFICATION FOR 100 MISSION LIFE - BY 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 TESTING - INTERNAL LEAK TEST AT 925-950 PSIG, 10 SCCM MAX LEAKAGE.

OMRSD - INTERNAL LEAK TEST AT 812-855 PSIA, 10 SCCM MAXIMUM LEAKAGE EVERY FIVE FLIGHTS.

**(C) INSPECTION**

RECEIVING INSPECTION  
MATERIALS VERIFIED AT RECEIVING INSPECTION.

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

ASSEMBLY/INSTALLATION  
PARTS PROTECTION, MANUFACTURING PROCESS, INSTALLATION AND ASSEMBLY VERIFIED BY INSPECTION. BELLEVILLE SPRING FORCES VERIFIED BY INSPECTION. DIMENSIONAL CHECKS PERFORMED BY INSPECTION. INSPECTION PERFORMS MIPs FOR CONCENTRICITY AND PERPENDICULARITY. TORQUES VERIFIED BY INSPECTION.

CRITICAL PROCESSES  
PASSIVATED PARTS AND HEAT TREATMENT VERIFIED BY INSPECTION.

TESTING  
ATP VERIFIED BY INSPECTION.

**(D) FAILURE HISTORY**  
NO FAILURES.

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