

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE
NUMBER: 06-1A-1630-X

SUBSYSTEM NAME: ARS - AIRLOCK

REVISION: 4 01/12/94

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: COUPLING, AIRLOCK UNION	ME277-0024-0001
LRU	: COUPLING, AIRLOCK UNION	ME277-0024-0002
LRU	: COUPLING, AIRLOCK UNION	ME277-0024-0003
LRU	: COUPLING, AIRLOCK UNION	ME277-0024-0004
LRU	: COUPLING, AIRLOCK UNION	ME277-0024-0005
LRU	: LINES, FITTINGS, DISCONNECTS	V070-623002
LRU	: LINES AND FITTINGS	V075-643900

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**QUANTITY OF LIKE ITEMS: 1**

1 SET

FUNCTION:

2 INCH DEPRESSURIZATION LINES AND FITTINGS

PROVIDES AIR FLOW PATH FROM THE AIRLOCK DEPRESSURIZATION VALVE TO SPACE VACUUM. ALSO PROVIDES VENTING FROM THE WASTE MANAGEMENT (WCS), ARPCS, REGENERABLE CO2 REMOVAL SYSTEM (RCRS), AND HYDROGEN SEPARATOR.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL FAILURE MODE
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REVISION# 4 01/12/94 R

SUBSYSTEM NAME: ARS - AIRLOCK
LRU: COUPLING, AIRLOCK UNION
ITEM NAME: LINES AND FITTINGS

CRITICALITY OF THIS
FAILURE MODE: 1R2

FAILURE MODE:
EXTERNAL LEAKAGE

MISSION PHASE:
LO LIFT-OFF
OO ON-ORBIT
DO DE-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) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)
B)
C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
EXCESSIVE LOSS OF CABIN AIR UNTIL THE VACUUM VENT ISOLATION VALVE IS CLOSED WHICH WILL LIMIT LEAK TO LESS THAN THREE LB/HR.

(B) INTERFACING SUBSYSTEM(S):
POSSIBLE BUILDUP OF H₂/AIR MIXTURE IN THE VACUUM VENT DUCT. IF THE RCRS IS INSTALLED, THE ABILITY TO REGENERATE ADSORBANT BED WILL DECREASE.

(C) MISSION:
ABORT DECISION FOR CABIN LEAK RATE.

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(D) CREW, VEHICLE, AND ELEMENT(S):

A SECOND ASSOCIATED FAILURE (RESTRICTED FLOW OF THE VACUUM BLEED ORIFICE) WILL RESULT IN AN EXPLOSIVE MIXTURE OF H₂/O₂; POSSIBLE LOSS OF CREW OR VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

-DISPOSITION RATIONALE-

(A) DESIGN:

LINES ARE FABRICATED OF 304L CRES CONDITION B WITH A THICKNESS OF 0.035 INCH. FLANGES ARE FABRICATED FROM 0.75 INCH CRES 304L BAR. FITTINGS ARE GAMAH FABRICATED AND ARE CAPABLE OF TORSIONAL MOVEMENT UP TO A FULL 360 DEGREES ROTATION AND EXPANSION/CONTRACTION MOVEMENT OF PLUS OR MINUS 0.25 INCHES. O-RINGS ARE MADE OF FLUOROCARBON ELASTOMER PER MIL-R-83248 TYPE I CLASS I. NEGATIVE BURST FACTOR IS GREATER THAN FOUR TIMES OPERATING PRESSURE OF -16 PSI (-64 PSI).

(B) TEST:

QUALIFICATION TEST FOR 100 MISSION LIFE: CERTIFICATION BY ANALYSIS FOR PRESSURE, HUMIDITY/SALT FOG/CABIN ATMOSPHERE, TEMPERATURE ENVIRONMENT, FUNGUS, ACCELERATION, SHOCK, VIBRATION.

IN-VEHICLE TESTING - GROSS LEAKAGE TEST (VACUUM DECAY) AT 1 PSIA MAX, 25 SCCM MAX LEAKAGE.

OMRSD - VACUUM DECAY AT 1 PSIA MAX, LEAKAGE 0.05 PSI/MINUTE MAX PRIOR TO EACH FLIGHT. N₂ PURGE OF DUCT (POST AND PRE-MISSION) VERIFIES BLEED PORT NOT BLOCKED.

(C) INSPECTION:

RECEIVING INSPECTION

MATERIAL INSPECTION AND RECEIVING REPORT (CERTIFICATIONS) ARE PERFORMED AT SUPPLIER.

CONTAMINATION CONTROL

VAPOR DEGREASE VERIFIED BY INSPECTION. CLEANLINESS AND CORROSION CONTROL REQUIREMENTS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

FABRICATION PROCESSES, SURFACE TREATMENT, AND DIMENSIONAL INSPECTION ARE PERFORMED AND VERIFIED BY INSPECTION. DEBURRING VERIFIED BY INSPECTION. O-RINGS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

FLOURESCENT PENETRANT INSPECTION OF LINE ASSEMBLY PER MTO501-504 VERIFIED BY INSPECTION.

CRITICAL PROCESSES

PARTS PASSIVATION VERIFIED BY INSPECTION. BUTT WELDING OF FLANGE VERIFIED BY INSPECTION. SWAGING OF GAMAH FITTING VERIFIED BY INSPECTION.

TESTING

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LEAK TESTS ARE PERFORMED AT SUBSYSTEM LEVEL. PRESSURE LEAK TEST PERFORMED BY ROCKWELL AFTER SEAL MATING. TESTING IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PARTS PROTECTION VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:
NO FAILURES.

(E) OPERATIONAL USE:
CREW WOULD CLOSE VACUUM VENT ISOLATION VALVE TO LIMIT CABIN AIR OVERBOARD TO LESS THAN FOUR LB/HR.

- APPROVALS -

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

Handwritten signature and date: 1/12/94
Handwritten number: 5502604