

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LIFE SUPPORT FMEA NO 06-2D -1101 -4 REV:10/20/87

ASSEMBLY : WATER COLLECTION CRIT. FUNC: 1R
P/N RI : MC250-0009-0001 CRIT. HDW: 2
P/N VENDOR: ITEM 4.15 VEHICLE 102 103 104
QUANTITY : 2 EFFECTIVITY: X X X
: PHASE(S): PL LO X OO X DO X LS
: TWO IN SERIES

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

PREPARED BY: APPROVED BY: APPROVED BY (NASA):
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ITEM:
SEPARATOR, HYDROGEN/WATER 90V62AB1, 90V62AB2

FUNCTION:
PROVIDES FOR REMOVAL OF FREE AND DISSOLVED HYDROGEN FROM FUEL CELL WATER PRIOR TO STORAGE IN SUPPLY WATER TANKS.

FAILURE MODE:
EXTERNAL LEAKAGE, CABIN TO VACUUM

CAUSE(S):
CORROSION, VIBRATION, STRUCTURAL FAILURE, MECHANICAL SHOCK

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE

(A) NO EFFECT. HYDROGEN WILL CONTINUE TO BE REMOVED FROM THE WATER.
(B) LOSS OF CABIN AIR THROUGH 1/4 INCH DIAMETER LINE.
(C) LOSS OF CABIN CONSUMABLES OVERBOARD WILL SHORTEN MISSION DURATION.
(D) SECOND ASSOCIATED FAILURE (VACUUM VENT ISOLATION VALVE FAILED OPEN) WILL CAUSE EXCESSIVE LOSS OF CABIN AIR OVERBOARD AND MAY CAUSE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:
(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A) DESIGN
INCLUDES ANODIZED ALUMINUM HOUSING. ELASTOMER SEALS PRECLUDE EXTERNAL LEAKAGE. INTERIOR AND MATING SURFACES OF THE HOUSING ARE COATED WITH SUPER KOROPON TO PROVIDE HIGH CORROSION RESISTANCE. CORROSION RESISTANCE MATERIALS ARE: TURBULATOR (NICKEL 200, FULLY ANNEALED), MANIFOLD END PLATE (316L SS), SEPARATOR TUBE (75% PD/25% AG), HEADER PLATE (NICKEL 200), CRES WASHERS AND SCREWS. HARDWARE MEETS STRESS SAFETY FACTOR OF 2.0 MINIMUM PER ANALYSIS CERTIFICATION FOR THE HEADER PLATE, MANIFOLD PLATE, HOUSING CAP PLATE AND HOUSING ASSEMBLY.

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HYDROGEN OUTLET LINE (0.25 INCH OUTER DIAMETER) WILL LIMIT CABIN LEAK TO 5 LB/HR AND THE BACKUP VACUUM VENT ISOLATION VALVE (0.06 INCH OUTER DIAMETER BLEED HOLE) WILL LIMIT LEAK TO LESS THAN 4 LB/HR AND WILL ALLOW SUFFICIENT TIME FOR A SAFE ABORT.

) TEST

QUALIFICATION TESTS FOR 100 MISSION LIFE INCLUDE: SHOCK TEST - 20 G PER AXIS, SINUSOIDAL VIBRATION - 5 TO 35 HZ AT +/- 0.25 G PEAKS PER AXIS, AND RANDOM VIBRATION - 0.09 G SQ/HZ FOR 48 MINUTES PER AXIS.

ACCEPTANCE TESTS - PROOF PRESSURE TEST OF SEPARATOR HOUSING AT EXTERNAL PRESSURE OF 22 PSID FOR A MINIMUM OF 5 MINUTES. LEAKAGE TESTS - LEAKAGE RATE OF THE CABIN ATMOSPHERE AT 16 PSIG TO VACUUM SIDE OF THE SEPARATOR DOES NOT EXCEED 1 X 10 NEG 4 SCCS He.

MRSD: VACUUM DECAY TEST AND 2 PSID CABIN LEAK CHECK ARE CONDUCTED BEFORE EACH FLIGHT.

) INSPECTION

RECEIVING INSPECTION

RAW MATERIALS ARE VERIFIED. HOUSING ASSEMBLY HOLES AND SURFACE FLATNESS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CLEANING FOR SHIPMENT, PACKAGING AND FINAL ASSEMBLY ARE VERIFIED BY INSPECTION. CORROSION PROTECTION PROVISIONS AND CONTAMINATION CONTROL PLAN ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

WELDING IS VERIFIED BY RADIOGRAPHIC INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING PROCESSES, INSTALLATION, ASSEMBLY AND TORQUING ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

WELDING SEPARATOR TUBES INTO HEADER ARE VERIFIED BY INSPECTION.

TESTING

ACCEPTANCE TEST VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PARTS PROTECTION IS VERIFIED BY INSPECTION.

) FAILURE HISTORY

NO FAILURES.

E) OPERATIONAL USE

CLOSE VACUUM VENT ISOLATION VALVE TO LIMIT CABIN GAS OVERBOARD TO LESS THAN 4 LB/HR.