

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LIFE SUPPORT

FMEA NO 06-2E -0417 -2

REV:10/29/

ASSEMBLY : VENT AND DUMP EQUIPMENT

P/N RI : ME284-0518-0041

P/N VENDOR:

QUANTITY : 1

: ONE PER SUBSYSTEM

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X
PHASE(S):	PL LO	OO X DO	LS

CRIT. FUNC: 11

CRIT. HDW: 1

PREPARED BY:

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REL L. SCHASCHL

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APPROVED BY:

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ITEM:

VALVE, WASTE WATER DUMP NOZZLE SOLENOID

FUNCTION:

PROVIDES CONTROL FOR DUMPING WASTE WATER OVERBOARD FROM THE WASTE STORAGE TANK.

FAILURE MODE:

INABILITY TO CLOSE, INTERNAL LEAKAGE, EXTERNAL LEAKAGE

CAUSE(S):

CORROSION, VIBRATION, MECHANICAL SHOCK

EFFECT(S) ON:

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

(A) WASTE WATER WILL FREEZE IN DUMP LINE AND VALVE, CAUSING LOSS OF WASTE WATER DUMP CAPABILITY.

(B) NO EFFECT.

(C) LOSS OF WASTE WATER STORAGE CAPACITY WHEN TANK FILLS (LOSS OF CONTINGENCY WATER CONTAINER USE) MAY LIMIT MISSION DURATION.

(D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - LOSS OF ALL SUPPLY WATER DUMP CAPABILITY (SUPPLY WATER DUMP LINE, WASTE WATER DUMP LINE, FLASH EVAPORATOR DUMP MODE, AND FUEL CELL OVERBOARD DUMP NOZZLE) CAN DEAD HEAD THE FUEL CELL WATER OUTPUT LINE AND CAUSE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:

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

(A) DESIGN

EACH HOUSING HALF (INCLUDING THE INLET AND OUTLET TUBES), IS MADE FROM FORGING OF 304L STAINLESS STEEL VACUUM MELT MATERIAL, FORGED PER MIL-F-7190 CLASS C. THE HOUSING HALVES ARE WELDED TOGETHER. THE BELLOWS ASSEMBLY, WHICH INCLUDES THE POPPET AND SHAFT, IS INSTALLED IN THE HOUSING AND WELDED TO FLANGE JOINTS WITHIN THE HOUSING. THE POPPET STROKE AND THE CIRCUMFERENTIAL GAP BETWEEN THE POPPET AND

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SEAT IS 0.051 INCHES. MATERIALS ARE COMPATIBLE WITH WORKING FLUIDS. ALL CRES DETAIL PARTS ARE PASSIVATED PER S-3009.

(B) TEST

QUALIFICATION TESTS FOR 100 MISSION LIFE INCLUDE: SHOCK TESTED AT 20 G PER AXIS, RANDOM VIBRATION TESTS - 48 MINUTES PER AXIS AT THE OF RATE C PLUS 6 db/OCTAVE FROM 20 TO 100 HZ; CONSTANT AT 0.4 G SQ/HZ FROM 100 TO 350 HZ; DECREASING AT THE RATE OF MINUS 6 db/OCTAVE FROM 350 TO 2000 HZ AND SINUSOIDAL VIBRATION TEST - 5 TO 15 HZ AT 0.25 G PEAKS FOR 5 MINUTE PER AXIS.

ACCEPTANCE TESTS - PROOF PRESSURE TEST AT 73 PSIG He FOR 5 MINUTES. EXTERNAL LEAKAGE TESTED AT 73 PSIG He FOR 5 MINUTES. INTERNAL LEAKAGE DETERMINED WITH A DIFFERENTIAL He PRESSURE OF 10 PSIG AND 45 PSIG FROM INLET TO OUTLET AND FROM OUTLET TO INLET - 20 SCCH He MAX IN 15 MINUTES BURST PRESSURE TESTED AT 90 PSIG APPLIED SIMULTANEOUSLY TO INLET AND OUTLET PORTS. CONNECTORS ARE LEAK TESTED TO VERIFY SEAL. PRESSURE DRG TESTED AT 44/55 PSIA. FUNCTIONAL TESTING - MINIMUM OPENING/CLOSING VOLTAGE OF 10-18 VDC; RESPONSE TIME, OPEN/CLOSE 0.2 SEC; MAXIMUM TRANSIENT VOLTAGE OF 50 VDC OPEN/CLOSE COILS.

OMRSD: VERIFIES VALVE OPERATION AND NO LEAKAGE PRIOR TO EACH FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL IS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CORROSION PROTECTION PROVISIONS AND CONTAMINATION CONTROL PLAN ARE VERIFIED BY INSPECTION. ALL CRITICAL POPPET AND SLEEVE SURFACES ARE INSPECTED WITH 40X MAGNIFICATION FOR CONTAMINATION. SEALS ARE EXAMINED FOR DAMAGE AND CLEANLINESS.

CRITICAL PROCESSES

WELDING PROCESS IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

COIL ASSEMBLY OF D.C. SOLENOID VALVE IS INSPECTED FOR DAMAGE AND CHECKED OUT AT SUBASSEMBLY LEVEL FOR INSULATION RESISTANCE, DIELECTRIC STRENGTH, AND POLARITY. MANUFACTURING PROCESSES, INSTALLATION AND ASSEMBLY ARE VERIFIED BY INSPECTION. ALL DETAIL PARTS ARE INSPECTED UNDER 40X MAGNIFICATION FOR SURFACE FINISH, BURRS, DAMAGE AND CONTAMINATION.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION IS VERIFIED.

TESTING

OPERATING VOLTAGES AND LATCH FORCES ARE CALIBRATED AND VERIFIED BY INSPECTION DURING FINAL ACCEPTANCE OF MAGNETIC LATCH. ACCEPTANCE TEST IS VERIFIED BY INSPECTION.

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HANDLING/PACKAGING

PARTS PROTECTION IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

ONE FAILURE OF IDENTICAL VALVE IN SUPPLY WATER SYSTEM. THE BASIC FORGING MATERIAL WAS CONTAMINATED WITH A HIGH CARBON INCLUSION. CORROSION OCCURRED IN THE VALVE HOUSING CAUSING A LEAK RATE OF TWO DROPS PER MINUTE. ALL VALVES MADE FROM THIS FORGING WERE REMOVED (SCRAPPED) FROM THE PROGRAM. (CAR #06F020)

(E) OPERATIONAL USE

THE CREW WOULD RETURN TO THE PRIMARY LANDING SITE BEFORE THE WASTE WATER TANK BECOMES HARD FILLED (PER FLIGHT RULE).