

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LIFE SUPPORT FMEA NO 06-2E -0311 -3 REV:12/08  
 ASSEMBLY : WASTE LIQUID STORAGE CRIT. FUNC:  
 P/N RI : ME284-0518-0021 CRIT. HDW:  
 P/N VENDOR: 75790-0021 VEHICLE 102 103 104  
 QUANTITY : 1 EFFECTIVITY: X X X  
 : PHASE(S): PL LO X OO X DO LS  
 : ONE PER TANK

PREPARED BY: DES S. CASTILLO DES L. SCHASCHL REL M. SAVALA MS QE  
 REDUNDANCY SCREEN: A- B- C-  
 APPROVED BY: APPROVED BY (NASA):  
 SSM REL QE

ITEM:

VALVE, WASTE WATER STORAGE TANK INLET SOLENOID

FUNCTION:

PROVIDES CONTROL OF WASTE WATER FLOW INTO AND FROM THE WASTE STORAGE TANK.

FAILURE MODE:

EXTERNAL LEAKAGE

CAUSE(S):

MECHANICAL SHOCK, VIBRATION, CORROSION

EFFECT(S) ON:

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

(A, B) FREE WASTE WATER IN THE LOWER ECLSS EQUIPMENT BAY AND CABIN.

(C) LOSS OF WASTE WATER STORAGE CAPACITY MAY LIMIT MISSION DURATION. FREE WASTE WATER IN CABIN MAY ALSO LEAD TO EARLY MISSION TERMINATION.

(D) NO EFFECT.

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. MATERIAL 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 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.

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ACCEPTANCE TEST - PROOF PRESSURE TEST AT 73 PSIG He FOR 5 MINUTES.  
EXTERNAL LEAKAGE TESTED AT 73 PSIG He FOR 5 MINUTES. BURST PRESSURE  
TESTED AT 90 PSIG APPLIED SIMULTANEOUSLY TO INLET AND OUTLET PORTS.

OMRSD: VERIFIES NO EXTERNAL LEAKAGE PRIOR TO EACH FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

MATERIAL AND PROCESS CERTIFICATION IS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

ALL DETAIL PARTS ARE CLEANED PER RI APPROVED SUPPLIER. 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

ALL CRES DETAILS ARE PASSIVATED TO PRECLUDE CORROSION. WELDING AND  
PASSIVATION PROCESSES ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

ALL DETAIL PARTS ARE INSPECTED UNDER 40X MAGNIFICATION FOR SURFACE  
FINISH, BURRS, DAMAGE AND CONTAMINATION. SUBASSEMBLY LEVEL VERIFICATION  
FOR INSULATION RESISTANCE, DIELECTRIC STRENGTH, AND POLARITY ARE  
VERIFIED BY INSPECTION. ALL CRITICAL POPPET AND SLEEVE SURFACES ARE  
LAPPED AND INSPECTED WITH 40X MAGNIFICATION. MANUFACTURING PROCESSES,  
INSTALLATION AND ASSEMBLY ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION IS VERIFIED.

TESTING

WELDS ARE VERIFIED BY PROOF PRESSURE TESTING WHICH IS WITNESSED BY  
INSPECTION. OPERATING VOLTAGES AND LATCH FORCES ARE CALIBRATED AND  
VERIFIED BY INSPECTION DURING FINAL ACCEPTANCE OF MAGNETIC LATCH.  
EXTERNAL LEAKAGE TEST IS PERFORMED DURING ACCEPTANCE TEST AND IS  
VERIFIED BY INSPECTION.

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

CREW WOULD PERFORM THE WASTE WATER LEAK ISOLATION PROCEDURE, WHICH IS  
PART OF NORMAL CREW TRAINING.