

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LIFE SUPPORT FMEA NO 06-2E -0314 -2 REV:10/29,
 ASSEMBLY : WASTE WATER STORAGE CRIT. FUNC:
 P/N RI : ME286-0075-0002 CRIT. HDW:
 P/N VENDOR: 9-839 VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : ON GAS SIDE OF PHASE(S): PL LO X OO X DO X L
 : WASTE TANK

REDUNDANCY SCREEN: A-FAIL B-FAIL C-P
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES S. CASTILLO DES *[Signature]* SSM *[Signature]*
 REL L. SCHASCHL REL *[Signature]* REL *[Signature]*
 QE M. SAVALA QE *[Signature]* QE *[Signature]*

ITEM:

FILTER, WASTE WATER STORAGE TANK HYDROPHOBIC, 90V62FL1

FUNCTION:

PREVENTS MOVEMENT OF WASTE WATER FROM A LEAKING TANK BELLOWS INTO THE NITROGEN PRESSURIZATION SYSTEM.

FAILURE MODE:

CRACKED MEMBRANE

CAUSE(S):

MECHANICAL SHOCK, VIBRATION, CORROSION, STRUCTURAL FAILURE

EFFECT(S) ON:

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

(A) FILTER UNABLE TO CONTAIN WASTE WATER WITHIN TANK IF WASTE TANK BELLOWS LEAKS.

(B) LOSS OF PROTECTION OF NITROGEN SYSTEM SHOULD THE WASTE TANK BELLOWS LEAK (SECOND FAILURE). WASTE WATER WILL BE ABLE TO FLOW THRU FILTER INTO N2 PRESSURIZATION SYSTEM AND MAY RESULT IN FREE WASTE WA IN CABIN.

(C) NO EFFECT FOR FIRST FAILURE.

(D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - SECOND ASSOCIATED FAILURE (WASTE WATER TANK BELLOWS INTERNAL WATER LEAK) MAY RESULT IN FREE WASTE WA IN CREW CABIN AND MAY CAUSE EARLY MISSION TERMINATION. REDUNDANCY SCREENS A AND B FAIL BECAUSE FILTER CAN NOT BE VERIFIED AFTER INSTALLATION.

DISPOSITION & RATIONALE:

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

(A) DESIGN

STAINLESS STEEL WELDED HOUSING; STAINLESS STEEL SUPPORT TUBE AND SCREEN FOR FILTER; MEMBRANE IS 100 PERCENT VIRGIN POLYTETRAFLUORO-ETHYLENE WITH BACKING OF NONWOVEN POLYPROPYLENE; FILTER IS GLASS FIB

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AND ACRYLIC RESIN BINDER; FILTER AND MEMBRANE ENDS OVERLAPPED AND SEALED WITH EPOXY TO PREVENT LEAKAGE PAST MEMBRANE; MEMBRANE, SCREEN AND SUPPORT TUBE EPOXIED, SEALED IN PLACE; MATERIALS COMPATIBLE WITH OPERATING FLUIDS. FACTORS OF SAFETY: EXTERNAL PRESSURE = 5.9, INTERNAL PRESSURE = 4.4. WASTE WATER TANK BELLOWS MUST FAIL BEFORE WATER CAN CONTACT THE HYDROPHOBIC FILTER.

(B) TEST

QUALIFICATION TESTS INCLUDE: SHOCK TESTED AT 20 G AND RANDOM STRUCTURE VIBRATION - 0.1 G SQ/HZ VS 0.09 G SQ/HZ FOR 48 MINUTES/AXIS REQUIREMENT

ACCEPTANCE TESTS - PROOF PRESSURE TEST AT 25.5 PSIG INTERNAL, 22.5 PSIG EXTERNAL COLLAPSING; FILTER BUBBLE POINT TEST FOR 1 MICRON FILTRATION; WATER BREAKTHROUGH TEST TO 5 PSID.

OMRSD: VISUAL INSPECTION (ONLY) FOR EXTERNAL HOUSING DAMAGE.

(C) INSPECTION

RECEIVING INSPECTION

CERTIFICATION OF RAW MATERIALS AND PROCESSES IS VERIFIED.

CONTAMINATION CONTROL

CLEANLINESS OF INTERNAL SURFACES OF FILTER EXPOSED TO SERVICE FLUIDS IS VERIFIED TO LEVEL 200. CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

WELDING PROCESS IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

VISUAL INSPECTION FOR DAMAGE DURING INSTALLATION.

NONDESTRUCTIVE EVALUATION

RADIOGRAPHIC INSPECTION OF WELDS IS VERIFIED BY INSPECTION.

TESTING

ACCEPTANCE TEST PROCEDURE DATA IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PARTS PROTECTION, HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED.

(D) FAILURE HISTORY

NO FAILURES.

(E) OPERATIONAL USE

FIRST FAILURE HAS NO EFFECT UNTIL THE WASTE WATER TANK BELLOWS LEAKS. PERCENTAGE OF THE WASTE WATER CAN BE DUMPED OVERBOARD, AND THE TANK WILL BE ISOLATED. WASTE WATER DUMP SHOULD BE TERMINATED WHEN NITROGEN BEGINS DUMPING OVERBOARD. DUMP PROCEDURE IS PART OF NORMAL CREW TRAINING. CREW IS TRAINED IN FREE WATER DISPOSAL. WATER CAN BE COLLECTED IN THE CONTINGENCY WATER CONTAINER (CWC) FOR ALTERNATE STORAGE CAPABILITY.