

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LIFE SUPPORT FMEA NO 06-2E -0432 -1 REV:12/08/E  
 ASSEMBLY : WASTE WATER STORAGE CRIT. FUNC: 2  
 P/N RI : MC276-0020-1351 CRIT. HDW:  
 P/N VENDOR: VEHICLE 102 103 104  
 QUANTITY : 1 EFFECTIVITY: X X X  
 : PHASE(S): PL LO OO X DO LS  
 : ONE PER SUBSYSTEM

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

ITEM:

QUICK DISCONNECT (QD) AND CAP, WASTE WATER TANK DRAIN QD, 90V62TP100

FUNCTION:

THE QD PROVIDES THE WASTE TANK DRAIN INTERFACE FOR GSE SERVICING. CAP PROVIDES A BACKUP SEAL FOR QD POPPET.

FAILURE MODE:

FAILS OPEN, INTERNAL LEAKAGE OF POPPET/CAP

CAUSE(S):

VIBRATION, CORROSION, CONTAMINATION, MECHANICAL SHOCK

EFFECT(S) ON:

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

(A) LOSS OF ONE REDUNDANT SEAL IN WASTE WATER SYSTEM.

(B) NO EFFECT. REDUNDANT SEAL PROVIDED.

(C) NO EFFECT FOR FIRST FAILURE.

(D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - LOSS OF ALL WASTE WATER LEAK ISOLATION CAPABILITY (LOSS OF REDUNDANT SEAL AND DRAIN VALVE) WILL RESULT IN LOSS OF WASTE WATER STORAGE CAPABILITY WHICH MAY LIMIT MISSION DURATION.

REDUNDANCY SCREEN A FAILS BECAUSE CAP SEAL CAN NOT BE VERIFIED DURING GROUND TURNAROUND.

REDUNDANCY SCREEN B IS NOT APPLICABLE BECAUSE QD AND CAP ARE NON-OPERATIVE UNTIL WASTE TANK OUTLET VALVE LEAKS INTERNALLY.

DISPOSITION & RATIONALE:

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

(A) DESIGN

QD IS ALL STAINLESS STEEL CONSTRUCTION WITH AN ETHYLENE-PROPYLENE (EPR) O-RING SEAL AND A TEFLON BACKUP RING SEAL. CAP IS STAINLESS STEEL WITH EPR O-RING SEAL. CAP IS INSTALLED BEFORE FLIGHT AND PROVIDES REDUNDANT SEAL TO QD POPPET. POPPET IS SPRING-LOADED CLOSED.

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(B) TEST

QUALIFICATION TESTS FOR 100 MISSION LIFE INCLUDE: SHOCK TESTED AT 20 G OPERATION TEST OF 5 CYCLES AT 0 PSIG AND AT 55 PSIG, BURST-TESTED AT 180 PSIG FOR 5 MINUTES (MAXIMUM OPERATING PRESSURE OF 22 PSIG), RANDOM VIBRATION - 0.2 G SQ/HZ AT 10 PSIG FOR FIRST 24 MINUTES/AXIS, FOLLOWED AT 90 PSIG FOR 24 MINUTES/AXIS, 5% SALT/85% RH FOR 50 HOURS, AND THERMAL TEST AT 250 F FOR 15 MINUTES AND AT -65 F FOR 3 HRS.

ACCEPTANCE TESTS - LEAKAGE AND PROOF PRESSURE - PRESSURIZED AT 10, 55 AND 90 PSIG IN THE MATED, DEMATED, AND CAPPED CONFIGURATIONS. LEAKAGE WILL NOT EXCEED 0.0001 SCCS He. CAP LEAK-TESTED WHILE MATED TO TOOLS MAXIMUM AND MINIMUM DIMENSIONS TO ASSURE A PROPER FIT TO ALL QD'S.

OMRSD: LEAK CHECK OF QD IS CONDUCTED AFTER GSE DEMATING AND PRIOR TO CAP INSTALLATION. VISUAL INSPECTION OF CAP, INCLUDING O-RING SEAL, PRIOR TO INSTALLATION.

(C) INSPECTION

RECEIVING INSPECTION

CERTIFICATION OF RAW MATERIALS AND PROCESSES IS VERIFIED.

CONTAMINATION CONTROL

CONTAMINATION CONTROL PLAN AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

VISUAL INSPECTION FOR DAMAGE DURING INSTALLATION AND ASSEMBLY IS VERIFIED BY INSPECTION. DIMENSIONS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

WELDING CERTIFICATION AND HEAT TREATMENT ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

WELD X-RAYS ARE VERIFIED BY INSPECTION.

TESTING

ACCEPTANCE TEST PROCEDURE IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PARTS PROTECTION, HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED.

(D) FAILURE HISTORY

POPPET FAILED OPEN ON WCS CAUSED BY BUILDUP OF URINE SOLIDS; URINE LEAK IS NOW FLUSHED PRIOR TO WCS REMOVAL TO CONTROL SOLIDS BUILDUP.

(CAR #AC5096)

TWO INSTANCES WHERE DEMATED QD'S LEAKED DUE TO SCRATCH ON POPPET; PERSONNEL CAUTIONED TO USE APPROVED TOOLS DURING QD INSTALLATION.

(CAR #AC2552, AB2840)

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TWO INSTANCES OF A METAL SLIVER LODGED BETWEEN PCPPET AND SEAL;  
IMPROVED ASSEMBLY PROCEDURES (CLEANING, WORKMANSHIP). (CAR #AB5643,  
AB5921)

(E) OPERATIONAL USE

NO CREW ACTION REQUIRED FOR FIRST FAILURE.