

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LIFE SUPPORT FMEA NO 06-2D -1130 -2 REV:10/20/87

ASSEMBLY : SUPPLY WATER STORAGE CRIT. FUNC: 1R
 P/N RI : MC276-0020-1341 CRIT. HDW: 3
 P/N VENDOR: ITEM 4.12A VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : ONE PER SUBSYSTEM PHASE(S): PL LO X OO X DO X LS

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

PREPARED BY: DES S. CASTILLO APPROVED BY: DES *[Signature]* APPROVED BY (NASA): *[Signature]*
 REL L. SCHASCHL REL *[Signature]* REL *[Signature]*
 QE M. SAVALA QE *[Signature]* QE *[Signature]*

ITEM:
 QUICK DISCONNECT (QD) AND CAP GSE SUPPLY WATER FILL, 90V62TP60

FUNCTION:
 PROVIDES ACCESS AND CONTROL OF WATER FROM THE GSE EQUIPMENT DURING GROUND SERVICING OF THE SUPPLY WATER SYSTEM. CAP PROVIDES A BACKUP SEAL FOR QD POPPET.

FAILURE MODE:
 FAILS OPEN, INTERNAL LEAKAGE OF POPPET/CAP

CAUSE(S):
 MECHANICAL SHOCK, CONTAMINATION, CORROSION, VIBRATION

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

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

(B) NO EFFECT AFTER FIRST FAILURE - CAP BECOMES THE ONLY SEAL FOR THE SUPPLY WATER SYSTEM AT THE FUEL CELL WATER INTERFACE TO TANKS A AND B.

(C, D) NO EFFECT FOR FIRST FAILURE.

(E) FUNCTIONAL CRITICALITY EFFECT - SECOND ASSOCIATED FAILURE (REDUNDANT SEAL LEAK), CAN DRAIN ALL FUEL CELL PRODUCED WATER OVERBOARD AND DRAIN TANK A. LOSS OF ALL WATER SUPPLY FOR FES, AND LOSS OF ALL VEHICLE COOLING (RADIATORS OR AMMONIA BOILER SYSTEM) CAN CAUSE LOSS OF CREW/VEHICLE.

REDUNDANCY SCREEN A FAILS BECAUSE CAP SEAL CAN NOT BE VERIFIED DURING GROUND TURNAROUND, AND REDUNDANCY SCREEN B FAILS BECAUSE QD POPPET LEAK IS UNDETECTABLE AFTER CAP IS INSTALLED.

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 TEST OF 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 - 0.2G 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 H₂. CAP LEAK TESTED WHILE MATED TO TOOLS OF MAXIMUM AND MINIMUM DIMENSIONS TO ASSURE A PROPER FIT TO ALL QD'S.

OMRSD: LEAK CHECK OF QD 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 AND DIMENSIONS VERIFIED BY INSPECTION.
CORROSION PROTECTION PROVISIONS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

VISUAL INSPECTION FOR DAMAGE DURING INSTALLATION.
WELDING CERTIFICATION AND HEAT TREATMENT IS VERIFIED BY INSPECTION.

TESTING

ACCEPTANCE TEST IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PARTS PROTECTION, HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

TWO INSTANCES WHERE DEMATED QD'S LEAKED DUE TO SCRATCH ON POPPET;
PERSONNEL ARE INSTRUCTED TO USE ONLY APPROVED AND PROPER TOOLS DURING QD INSTALLATION. (CAR #AC2552, AB2840)
TWO INSTANCES OF A METAL SLIVER LODGED BETWEEN POPPET AND SEAL; IMPROVED ASSEMBLY PROCEDURES (CLEANING, WORKMANSHIP). (CAR #AB5643, AB5921)

(E) OPERATIONAL USE

FIRST FAILURE IS NO EFFECT UNTIL SECOND SEAL LEAKS. DEMATE MICROBIAL FILTER QD TO ISOLATE THE LEAK FROM SUPPLY WATER TANK A (PROCEDURE IS PART OF NORMAL CREW TRAINING).