

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LIFE SUPPORT FMEA NO 06-2C -0444 -2 REV:09/28/87
 ASSEMBLY : URINE COLLECTION EQUIPMENT CRIT. FUNC: 2R
 P/N RI : MC282-0069, MC276-0020-1101/-3102 CRIT. HDW: 3
 P/N VENDOR: 47C265887, 238B5134 VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : PHASE(S): PL LO OO X DO LS
 : ONE PER SUBSYSTEM

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES D. SANDERSFELD DES *[Signature]* SSM *[Signature]* 10/21
 REL L. SCHASCHL REL *[Signature]* REL *[Signature]* 10/28
 QE M. SAVALA QE *[Signature]* QE *[Signature]* 11/10

ITEM:

LINES, FITTINGS AND QUICK DISCONNECT (QD), EMU/WCS QD TO URINE HOSE/EMU CONNECTOR

FUNCTION:

PROVIDES FLOW PATH FROM EMU/WCS INTERFACE QD TO URINE HOSE/EMU CONNECTOR SO THAT EMU WASTE WATER MAY BE TRANSFERRED TO THE WASTE TANK.

FAILURE MODE:

EXTERNAL LEAKAGE

CAUSE(S):

MECHANICAL SHOCK, CORROSION, VIBRATION

EFFECT(S) ON:

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

(A) INABILITY TO PROCESS AND COLLECT EMU/AIRLOCK WASTE WATER THROUGH NORMAL MEANS.

(B) DEGRADED INTERFACES - LOSS OF PRIMARY EMU DRAINING CAPABILITY. EMU DRAIN WATER WOULD LEAK INTO WCS ENCLOSURE AND CABIN.

(C, D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - FREE WATER IN WCS ENCLOSURE COULD CAUSE FAILURE OF WASTE COLLECTOR SYSTEM.

REDUNDANCY SCREEN B FAILS BECAUSE EXTERNAL LEAKAGE OF LINES, FITTINGS AND QD CAN NOT BE DETECTED, VISUALLY OR BY INSTRUMENTATION.

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. HOSE ASSEMBLY IS A RESISTOFLEX FLEX HOSE CONSTRUCTED OF TEFLON TUBING WITH AN OUTER PROTECTIVE CRES BRAID. THE FLEX HOSE HAS A WELDED FITTING WITH AN O-RING SEAL ON ONE END AND A DYNATUBE FITTING ON THE OTHER END, TORQUED TO SPECIFICATIONS AND SAFETY WIRED. THE TUBING IS CONSTRUCTED OF CRES.

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(B) TEST

QUALIFICATION TESTS FOR 100 MISSION LIFE - QD WAS 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 (MAX OPERATION 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. THERMAL TEST AT 250 F FOR 15 MINUTES AND AT -65 F FOR 3 HRS.

LINES AND FITTINGS SUBJECTED TO RANDOM VIBRATION, 48 MINUTES PER AXIS AT A RATE OF PLUS 6 dB/OCTAVE FROM 20 TO 150 HZ; CONSTANT AT 0.03 G SQ/HZ FROM 150 TO 1000 HZ; DECREASING AT THE RATE OF MINUS 6 dB/OCTAVE FROM 1000 TO 2000 HZ. SINUSOIDAL VIBRATION SWEEPS 5 TO 35 HZ AT 1 OCTAVE/MINUTE AT 0.25 G PEAK. SHOCK TEST OF 20 G SAWTOOTH SHOCK IMPULSE - 11 MILLISECOND DURATION.

ACCEPTANCE TEST - QD 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. LINES AND FITTINGS ARE VISUALLY INSPECTED FOR NO LEAKAGE DURING FLOW TEST.

OMRSD: NO EXTERNAL LEAKAGE OF QD, LINES AND FITTINGS IS VERIFIED BEFORE EACH FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

CERTIFICATION OF RAW MATERIALS AND PROCESSES IS VERIFIED.

CONTAMINATION CONTROL

CONTAMINATION CONTROL AND DIMENSIONS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

CORROSION PROTECTION PROVISIONS VERIFIED BY INSPECTION.

CRITICAL PROCESSES

WELDING CERTIFICATION AND HEAT TREATMENT VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

VISUAL INSPECTION FOR DAMAGE DURING INSTALLATION AND ATP.

RADIOGRAPHIC INSPECTION EXAMINATION IS VERIFIED BY SUPPLIER.

HANDLING/PACKAGING

PARTS PROTECTION, HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED.

(D) FAILURE HISTORY

NO EXTERNAL LEAKAGE FAILURE HISTORY OF THESE LINES, FITTINGS AND MATED QD. DURING NORMAL OPERATIONS, QD IS MATED.

TWO INSTANCES WHERE DEMATED QD'S LEAKED DUE TO SCRATCH ON POPPET; PERSONNEL CAUTIONED TO USE APPROVED 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)

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(E) OPERATIONAL USE

IF FAILURE OCCURS IN FLIGHT, USE BACKUP PROCEDURE TO DRAIN EMU WASTE WATER. CREW CAN REMOVE FRONT PANEL OF WCS TO BE ABLE TO CLEAN UP FREE WASTE WATER. CREW IS TRAINED FOR REMOVAL OF FREE WATER IN CABIN.