

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ATMOSPHERIC REVIT. FMEA NO 06-1B -0572 -1 REV:08/22/
 ASSEMBLY : WATER COOLANT LOOPS CRIT. FUNC: 1R
 P/N RI : MC276-0020-1191 CRIT. HDW: 2
 P/N VENDOR: 502060-1191 SYMETRICS VEHICLE 102
 QUANTITY : 8 EFFECTIVITY: X X X
 : 4 PER COOLANT LOOP PHASE(S): PL LO X OO X DO X LS

PREPARED BY: DES N. K. DUONG
 REL N. L. STEISSLINGER
 QE D. STOICA
 REDUNDANCY SCREEN: A-PASS B-PASS C-PASS
 APPROVED BY: *[Signature]* APPROVED BY (NASA): *[Signature]*
 REL *[Signature]* SSM
 QE *[Signature]* REL *[Signature]*
OR SQE *[Signature]* *[Signature]* *[Signature]*

ITEM:
 TEST PORTS (QD'S WITH SEALING CAPS)

FUNCTION:
 PROVIDES ACCESS TO WATER COOLANT LOOP FLUIDS FOR VARIOUS TESTS AND SERVICING FUNCTIONS INCLUDING HIGH POINT BLEED, FLOW SPLIT TESTS AND FLUID SAMPLING. CIL APPLICABLE TO TP'S 56, 57, 58, 59, 60, 61, 62, 63

FAILURE MODE:
 EXTERNAL LEAKAGE (THROUGH QD HOUSING)

CAUSE(S):
 MECHANICAL SHOCK, VIBRATION, CORROSION

EFFECT(S) ON:
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
 (A) LOSS OF REDUNDANCY - LOSS OF ONE WATER COOLANT LOOP.
 (B) LOSS OF COOLING OF AFFECTED WATER COOLANT LOOP. FREE WATER IN CASE:
 (C) POSSIBLE EARLY MISSION TERMINATION FOR LOSS OF ONE WATER COOLANT LOOP FOR CABIN AND AVIONICS COOLING.
 (D) POTENTIAL LOSS OF CREW/VEHICLE UPON SUBSEQUENT LOSS OF REDUNDANT WATER COOLANT LOOP.

DISPOSITION & RATIONALE:
 (A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN
 MALE AIRBORNE QD IS A 3/8 INCH PUSH-PULL QUICK DISCONNECT COUPLING, OF STAINLESS STEEL CONSTRUCTION (CRES 15-5 PH AND 17-7 PH), AND HAS A SCREW-ON PRESSURE CAP ATTACHED WITH LANYARD. PRESSURE CAP SEAL IS ETHYLENE PROPYLENE RUBBER (EPR). SPRING LOADED STAINLESS STEEL POPPET. WHEN DISCONNECTED, THE POPPET CLOSSES. EPR O-RING AND TEFLON BACK-UP RIFORM DOUBLE SEAL BETWEEN POPPET AND HOUSING.

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(B) TEST

ACCEPTANCE TEST - PROOF PRESSURE 90 PSIG WITH DEIONIZED WATER. LEAK TEST WITH GHE (1 X 10 EXP -4 SCCS MAX) FOR UNCOUPLED CONFIGURATION AND COUPLED CONFIGURATION (WITH THE USE OF A GSE TOOL). CAP IS ALSO LEAK TESTED USING A HOLLOWED MALE HALF. FLUID LOSS TEST - 0.22 CC MAX PER CYCLE.

QUALIFICATION TEST - TEMP: CYCLED THREE TIMES BETWEEN -65 AND +160 F. HUMIDITY: 7-100%. SALINITY: 1% BY WEIGHT. ACCELERATION 5 G IN ALL AXES. CRASH LOADS: 20 G IN ALL AXES. SIDE LOADS: 200 INCH-LB. TRANSIENT VIBRATION TEST: ONE SWEEP OF SINUSOIDAL VIBRATION FROM 5-35 HZ AT AN ACCELERATION AMPLITUDE OF PLUS AND MINUS 0.25 G, ONE OCTAVE/MINUTE SWEEP RATE. RANDOM VIBRATION TEST: ACCELERATION SPECTRAL DENSITY INCREASING 6 DB/OCTAVE FROM 20 TO 70 HZ, CONSTANT AT 0.1 G**2/HZ FROM 70 TO A POINT WHERE INCREASING AT 6 DB/OCTAVE WILL ACHIEVE 0.2 G**2/HZ AT 150 HZ, CONSTANT AT 0.2 G**2/HZ FROM 150 TO 300 HZ, DECREASING AT 6 DB/OCTAVE TO 0.12 G**2/HZ AND THEN CONSTANT TO 1000 HZ, DECREASING AT 9 DB/OCTAVE FROM 1000-2000 HZ. THE UNITS ARE PRESSURIZED TO 10 AND 90 PSIG WHILE VIBRATED FOR 48 MINUTES IN EACH AXIS: NO VISIBLE LIQUID LEAKAGE ALLOWED. BURST PRESSURE: 180 PSIG.

IN-VEHICLE TESTING - SYSTEM DECAY TEST IS PERFORMED AT 85 - 95 PSIG, 5 CC/MIN MAX LEAKAGE. PUMP OUT PRESSURE AND ACCUMULATOR QUANTITY ARE CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP AND SERVE AS AN INDICATION OF EXTERNAL LEAKAGE.

OMRSD - PUMP ACCUMULATOR QUANTITY AND OUTLET PRESSURE ARE CONTINUOUSLY MONITORED WHILE THE VEHICLE IS POWERED UP DURING EACH TURNAROUND AND SERVE AS AN INDICATION OF EXTERNAL LEAKAGE. WATER IS SAMPLED PER SPEC SE-S-0073 DURING SERVICING.

(C) INSPECTION

RECEIVING INSPECTION

MATERIAL AND EQUIPMENT CONFORMANCE TO SPECIFICATION IS VERIFIED BY INSPECTION. RAW MATERIALS ARE SENT TO A TEST LAB FOR MATERIAL/CHEMICAL ANALYSIS/CERTIFICATION. SHOP TRAVELER INSPECTION IS PERFORMED FOR CORRECT RAW MATERIAL PRIOR TO MACHINING. IN-PROCESS INSPECTION IS REQUIRED FOR CRITICAL DIMENSIONS CERTIFICATIONS. PARTS PROTECTION VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

SYSTEM FLUID SAMPLE ANALYSIS FOR CONTAMINATION IS VERIFIED BY INSPECTION. CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. CONTAMINATION CONTROL IS VERIFIED BY INSPECTION ON SHOP TRAVELERS.

ASSEMBLY/INSTALLATION

MANUFACTURING INSTALLATION, AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION. CRITICAL DIMENSIONS AND FINISH OF SEALING SURFACES ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

HEAT TREATMENT, INCLUDING ROCKWELL HARDNESS TEST, IS VERIFIED BY INSPECTION. PASSIVATION IS VERIFIED BY INSPECTION.

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ATTACHMENT -
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TESTING

PROOF PRESSURE AND HELIUM LEAK TESTS ARE VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PROPER HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY APPLICABLE TO EXTERNAL LEAKAGE FAILURE MODE. THE TEST PORT QD'S HAVE SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE

TBS.