SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1B -0572 -3 REV:05/03/88

ASSEMBLY :WATER COOLANT LOOPS
P/N RI :MC276-0020-1191
P/N VENDOR:502060-1191 SYMETRICS
QUANTITY :8
:4 PER COOLANT LOOP
:

CRIT. FUNC: 1R
CRIT. HDW: 3

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

PHASE(S): PL LO X OC X DC X LS

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

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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:
INTERNAL LEAKAGE

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

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

(A,B,C,D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - FIRST FAILURE, OF QD, IS UNDETECTED. SECOND FAILURE, CAP LEAKAGE, RESULTS IN LOSS OF A COOLANT LOOP. THIRD FAILURE, IN REMAINING COOLANT LOOP, MAY RESULT IN LOSS OF CREW/VEHICLE. SCREEN A FAILS BECAUSE THE CAP CANNOT BE LEAK TESTED. SCREEN B FAILS BECAUSE LEAKAGE OF QD OR CAP IS NOT DETECTABLE UNLESS THE REDUNDANT SEAL FAILS.

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 CLOSES. EPR O-RING AND TEFLON BACK-UP RING FORM DOUBLE SEAL BETWEEN POPPET AND HOUSING.

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(B) TEST

ACCEPTANCE TEST - PROOF PRESSURE 90 PSIG WITH DEIONIZED WATER. LEAK TES WITH GHE (1 X 10 EXP -4 SCCS MAX, FOR UNCOUPLED CONFIGURATION AND COUPLE 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: 8-100%. 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 H AT AN ACCELERATION AMPLITUDE OF PLUS AND MINUS 0.25 G, ONE OCTAVE/MINUT SWEEP RATE. RANDOM VIBRATION TEST: ACCELERATION SPECTRAL DENSITY INCREASING AT 6 DB/OCTAVE FROM 20 TO 70 HZ, CONSTANT AT 0.1 G**2/HZ FRO 70 TO A POINT WHERE INCREASING AT 6 DB/OCTAVE WILL ACHIEVE .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 5 DB/OCTAVE FROM 1000-2000 HZ. THE UNITS ARE PRESSURIZED TO 10 AND 90 PSI 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, WHICH WOULD REVEAL QD INTERNAL LEAKAGE.

OMRSD - CAP SEAL AND MATING SURFACES ARE VISUALLY INSPECTED WHENEVER CA IS REMOVED. DURING TURNAROUND THE WATER COOLANT LOOPS ARE USED TO SUPPORT VEHICLE COOLING AND THE LOOP PRESSURES AND QUANTITIES ARE MONITORED VIA THE VEHICLE PERFORMANCE MONITORING SYSTEM.

(C) INSPECTION

RECEIVING INSPECTION
RAW MATERIAL CERTIFICATIONS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
CONTAMINATION CONTROL VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
RAW MATERIAL INSPECTED PRIOR TO MACHINING. DIMENSIONS AND SURFACE FINISHES VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
PENETRANT INSPECTIONS VERIFIED.

CRITICAL PROCESSES
HEAT TREAT IS VERIFIED BY INSPECTION.

TESTING
ACCEPTANCE TEST VERIFIED BY INSPECTION.

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION.

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(D) FAILURE HISTORY
NO FAILURE HISTORY APPLICABLE TO INTERNAL LEAKAGE FAILURE MODE. TH
DISCONNECTS HAVE SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH TH
DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE
1. CREW ACTION
NONE TO THE INITIAL FAILURE.

2. TRAINING
CURRENT ECLSS TRAINING COVERS THE LOSS OF LOOP EFFECT OF THIS FAILURE
COOLANT LOOP RECONFIGURATION AND NECESSARY FOLLOW-ON ACTIONS.

3. OPERATIONAL CONSIDERATIONS
A. FIRST FAILURE IS UNDETECTABLE.
B. MISSION TERMINATION AFTER LOSS OF FIRST LOOP.
C. REAL TIME DATA SYSTEM ALLOWS FOR GROUND MONITORING.
D. REFERENCE LOSS/FAILURE FLIGHT RULES.