

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3D -0520 -1 REV:08/29/81

ASSEMBLY : RADIATOR & FLOW CONTROL CRIT. FUNC: 1R
P/N RI : MC203-0002 CRIT. HDW: 2
P/N VENDOR: VEHICLE 102 103 104
QUANTITY : 2 EFFECTIVITY: X X X
: ONE PER LOOP PHASE(S): PL LO X OO X DO X LS
: TWO PER VEHICLE

REDUNDANCY SCREEN: A-PASS B-PASS C-PAS.

PREPARED BY: DES APPROVED BY: APPROVED BY (NASA):
REL D. RISING REL SSM
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ITEM:

LINES AND FITTINGS, RADIATOR COMPONENTS & INTERPANEL PLUMBING FLEX HOSE AND QUICK DISCONNECT.

FUNCTION:

PROVIDE FLOW OF FREON THROUGH THE SPACE RADIATORS.

FAILURE MODE:

EXTERNAL LEAKAGE

CAUSE(S):

MECHANICAL SHOCK, VIBRATION, CORROSION, POROSITY.

EFFECT(S) ON:

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

(A,B) POSSIBLE LOSS OF ONE FREON COOLANT LOOP FOR VEHICLE COOLING.

(C) POSSIBLE LOSS OF MISSION. EARLY MISSION TERMINATION FOR FIRST FAILURE.

(D) SECOND ASSOCIATED FAILURE (LOSS OF REDUNDANT FREON COOLANT LOOP) WILL CAUSE LOSS OF ALL VEHICLE COOLING AND MAY RESULT IN LOSS OF CREW/VEHICLE

DISPOSITION & RATIONALE:

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

(A) DESIGN

DESIGN SAFETY FACTOR - FOR THE RADIATOR COMPONENTS, PROOF PRESSURE IS 1 AND BURST PRESSURE IS 2.0 TIMES MAXIMUM OPERATING PRESSURE. FOR THE LINES, FITTINGS AND INTERPANEL PLUMBING FLEX HOSES, PROOF PRESSURE IS 2 AND BURST PRESSURE IS 4.0 TIMES THE MAXIMUM OPERATING PRESSURE. ALL TUBES TO MANIFOLD ARE WELDED. VALVES HAVE WELDED CONSTRUCTION WITH STAINLESS STEEL BELLOWS FOR DYNAMIC SEALS. THE SEALS ARE TEFLON, THE TUBING, FITTINGS AND FLEXHOSES ARE ALUMINUM AND STAINLESS STEEL. ALL THESE MATERIALS ARE CORROSION RESISTANT AND COMPATIBLE WITH FREON 21.

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(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT +/- 0.1 G²/HZ FOR 48 MIN/AXIS. SHOCK TESTED AT +/- 0.25 G/AXIS. THE RESULTS OF THE QUALIFICATION ACOUSTIC TEST ON THE PAN VERIFIED DESIGN LIFE OF 400 MISSIONS.

ACCEPTANCE TEST - ALL WELDS ARE X-RAYED THEN PROOF TESTED AND LEAK TEST IN ATP.

CMRSD - FCL'S ARE LEAK CHECKED PRIOR TO EACH FLIGHT. VEHICLE INSTRUMENTATION WILL DETECT FAILURE. FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL IS VERIFIED BY INSPECTION. VISUAL INSPECTION/ID PERFORMED. PARTS PROTECTION, COATING AND PLATING PROCESSES ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

SYSTEM FLUID SAMPLES PERIODICALLY ANALYZED FOR CONTAMINATION AND VERIFIED BY INSPECTION. FORMAL CONTAMINATION CONTROL PLAN IS VERIFIED BY INSPECTION. CONTAMINATION CONTROL PROCESSES AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. CLEANLINESS TO LEVEL 300 PER SPECIFICATION IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION ON SHOP TRAVELER MIPS. PROCESSING EQUIPMENT CONTROLS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

WELDING IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

X-RAY EXAMINATION OF WELDS IS VERIFIED BY INSPECTION.

TESTING

ATP IS VERIFIED BY INSPECTION, INCLUDING LEAK AND PROOF TEST.

HANDLING/PACKAGING

PROPERLY MONITORED HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

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(E) OPERATIONAL USE

ON-BOARD ALARMS, FREON INLET PRESSURE AND ACCUMULATOR QUANTITY, WILL PROVIDE INDICATION OF HARDWARE FAILURE. FREON PUMP WILL BE TURNED OFF AND LOSS OF ONE FREON LOOP POWERDOWN WILL BE PERFORMED. ENTRY AT NEXT PRIMARY LANDING SITE.