

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3D -0504 -5 REV:08/29/88

ASSEMBLY : RADIATOR & FLOW CONTROL CRIT. FUNC: 1R
P/N RI : MC203-0002-0050 CRIT. HDW: 2
P/N VENDOR: 224-00050 VEHICLE 102 103 104
QUANTITY : 2 EFFECTIVITY: X X X
: TWO, ONE PER LOOP PHASE(S): PL L3 X 00 X 00 X L5

PREPARED BY: DES O. TRAN *OT* APPROVED BY: DES *Michael J. Fisher* REDUNDANCY SCREEN: A-PASS B-PASS C-PASS
REL D. RISING *DR* REL *[Signature]* APPROVED BY (NASA): SSM *[Signature]*
QE W. SMITH *WS* QE *[Signature]* REL *[Signature]*
QE *[Signature]* QE *[Signature]*

ITEM:
VALVE, BYPASS, RADIATOR.

FUNCTION:
PROVIDES COMPLETE BYPASS OF RADIATORS FOR UNDER TEMPERATURE PROTECTION OF THE FREON COOLANT LOOPS TO PREVENT THE FREEZING OF THE CABIN WATER COOLANT LOOPS.

FAILURE MODE:
EXTERNAL LEAKAGE.

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

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A,B) LOSS OF FREON FROM ONE FREON COOLANT LOOP.
(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
WELDED CONSTRUCTION WITH BELLOWS FOR DYNAMIC SEALS. THE FLOW CONTROL ASSEMBLY IS MOUNTED ON VIBRATION ISOLATORS. VALVE HOUSING AND SEAT ARE MADE OF STAINLESS STEEL, WHICH IS COMPATIBLE WITH FREON 21. THERE IS A 65 MICRON FILTER IN THE FLOW CONTROL ASSEMBLY.
(B) TEST
QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.1 G²/HZ FOR 48 MIN/AXIS, SHOCK TESTED AT +/- 20 G EACH AXIS, AND 3500 CYCLE VALVE LIFE TEST.

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ACCEPTANCE TEST - VALVE FUNCTION'L TEST IS PERFORMED DURING ATP. AVT IS DONE AT COMPONENT LEVEL AND AT A HIGHER ASSEMBLY (FLOW CONTROL ASSEMBLY).

OMRSD - FCL'S ARE LEAK CHECKED PRIOR TO EACH FLIGHT. FREON COOLANT LOOP 1 AND 2 RADIATOR FLOW CONTROL CHECKOUT (MANUAL AND AUTO) DURING GROUND TURNAROUND. FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING. FREON IS SERVICED THROUGH A FINAL FILTER OF 25 MICRON SIZE.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL CERTIFICATIONS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CONTAMINATION CONTROL PROCESSES, CONTAMINATION CONTROL PLAN AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. FLUID SYSTEM IS VERIFIED BY INSPECTION TO BE FREE OF CONTAMINATION.

ASSEMBLY/INSTALLATION

MANUFACTURING, INSTALLATION AND ASSEMBLY ARE VERIFIED BY INSPECTION. DIMENSIONS AND SURFACE FINISHES VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

X-RAY EXAMINATION OF FUSION WELDS IS VERIFIED BY INSPECTION. ULTRASONIC INSPECTION OF RAW MATERIAL VERIFIED. DYE PENETRANT EVALUATION OF MACHINED PARTS VERIFIED.

CRITICAL PROCESSES

PASSIVATION, HEAT TREATING, WELDING AND BRAZING ARE VERIFIED BY INSPECTION.

TESTING

VIBRATION, FLOW RATE AND PRESSURE DROP REQUIREMENTS ARE VERIFIED BY INSPECTION DURING ATP. LEAKAGE DURING PROOF PRESSURE AND HELIUM LEAK CHECK TESTS IS VERIFIED BY INSPECTION. INSULATION RESISTANCE AND DIELECTRIC STRENGTH TEST ARE VERIFIED BY INSPECTION DURING ATP.

HANDLING/PACKAGING

HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION. PARTS PROTECTION VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(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.