

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0101 -3 REV:08/23/
 ASSEMBLY : FREON PUMP ASSEMBLY CRIT. FUNC: :
 P/N RI : MC250-0C11-0436 CRIT. HDW:
 P/N VENDOR: SV729707 VEHICLE 102 103 104
 QUANTITY : 4 EFFECTIVITY: X X X
 : FOUR, TWO PER LOOP PHASE(S): PL LO X OO X DO X LS
 :

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

ITEM:
 PUMP, FREON COOLANT LOOP.

FUNCTION:
 PROVIDES FLOW CAPABILITY FOR THE FREON COOLANT LOOPS. TWO FREON PUMPS ARE IN OPERATION (ONE IN EACH LOOP) DURING NORMAL MODES.

FAILURE MODE:
 EXTERNAL LEAKAGE.

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

EFFECT(S) ON:
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
 (A,B) LOSS OF ONE FREON COOLANT LOOP FOR VEHICLE COOLING.
 (C) POSSIBLE LOSS OF MISSION. EARLY MISSION TERMINATION MAY BE REQUIRED 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
 PUMP PACKAGE PROOF PRESSURE OF 1.5 AND BURST PRESSURE OF 2.0 TIMES MAXIMUM EXPECTED OPERATING PRESSURE. SEALS ARE MADE OF KALREZ, WHICH IS COMPATIBLE WITH FREON 21. MATERIALS ARE STAINLESS STEEL AND ANODIZED ALUMINUM, WHICH ARE CORROSION RESISTANT AND COMPATIBLE WITH FREON 21.

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(B) TEST

QUALIFICATION TEST - PUMP PACKAGE IS QUALIFICATION TESTED FOR 100 MISSION LIFE. ACTUAL ACCUMULATOR RUPTURE PRESSURE OF 576 PSIG. PUMP PACKAGE VIBRATION TESTED AT 0.023 G²/HZ FOR 84 MIN/AXIS, SHOCK TESTED AT +/- 20 G EAC AXIS.

ACCEPTANCE TEST - PROOF AND LEAK TESTS DURING ATP WILL DETECT ANY MATERIAL DEFECTS.

QMRSD - PRE- AND POST-FLIGHT CHECKOUT USING QUANTITY MEASUREMENT TO DETECT LEAKAGE. FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIALS ARE VERIFIED BY INSPECTION. VISUAL INSPECTION/ID PERFORMED. PARTS PROTECTION VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

FORMAL CONTAMINATION CONTROL PLAN IS VERIFIED BY INSPECTION. SYSTEM FLUID PERIODICALLY ANALYZED FOR CONTAMINATION. CONTAMINATION CONTROL PROCESSES AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION

ASSEMBLY/INSTALLATION

MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY SHOP TRAVELER MIPS.

CRITICAL PROCESSES

ANODIZATION IS VERIFIED BY INSPECTION.

TESTING

WHERE ACCESSIBLE, INSPECTION VISUALLY INSPECTS FOR DAMAGE, EXTERNAL LEAKAGE. INSPECTION MONITORS FUNCTIONAL TEST TO VERIFY FLOW RATE IS WITHIN SPECIFIED LIMITS.

HANDLING/PACKAGING

PROPERLY MONITORED HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(E) OPERATIONAL USE

ON-BOARD ALARMS, FREON FLOW 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.