

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0108 -2 REV:08/23/8

ASSEMBLY : FREON PUMP ASSEMBLY CRIT. FUNC: 1R  
P/N RI : MC250-0001-0436 CRIT. HDW: 2  
P/N VENDOR: SV729718 VEHICLE 102 103 104  
QUANTITY : 2 EFFECTIVITY: X X X  
: ONE PER LOOP PHASE(S): PL LD X OO X DO X LS  
:

PREPARED BY: DES O. TRAN *O. Tran* APPROVED BY *Michael James Miller* REDUNDANCY SCREEN: A-PASS B-PASS C-PASS  
REL D. RISING *D. Rising* APPROVED BY (NASA) SSM *J. R. Ritten*  
QE W. SMITH *W. Smith* REL *J. R. Ritten* QE *J. R. Ritten*

ITEM:  
CHECK VALVE, PUMP PACKAGE.

FUNCTION:  
PREVENTS BACKFLOW OF COOLANT THROUGH REDUNDANT FREON PUMP.

FAILURE MODE:  
RESTRICTED FLOW OR FAILS OPEN (INTERNAL LEAKAGE).

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

EFFECT(S) ON:  
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE  
(A) UNABLE TO PROVIDE SUFFICIENT FLOW IN ONE FREON COOLANT LOOP.  
(B) POSSIBLE LOSS OF ONE FREON LOOP FOR VEHICLE COOLING.  
(C) POSSIBLE LOSS OF MISSION. EARLY MISSION TERMINATION FOR LOSS OF FREON LOOP.  
(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  
CHECK VALVE BALL IS DESIGNED NOT TO STICK IN THE MID POSITION. THE CHECK VALVE INTERNAL LEAKAGE IS NOT TO EXCEED 1.0 CC/HR AT A PRESSURE OF 85 PSID. PUMP OUTLET FILTER (61U) PROTECTS CHECK VALVE FROM CONTAMINATION. THE BALL AND THE HOUSING ARE MADE OF STAINLESS STEEL, WHICH IS CORROSION RESISTANT AND COMPATIBLE WITH FREON 21.

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(B) TEST

QUALIFICATION TEST - PUMP PACKAGE IS QUALIFICATION TESTED FOR 100 MISSION LIFE. PUMP PACKAGE VIBRATION TESTED AT 0.023 G<sup>2</sup>/HZ FOR 84 MIN/AXIS, SHOCK TESTED AT +/- 20 G EACH AXIS.

ACCEPTANCE TEST - FUNCTIONAL PROOF AND LEAK TESTS DURING ATP WILL VERIFY OPERATION.

OMRSD - FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING. VEHICLE FREON IS SERVICED THROUGH A 10 MICRON (ABS) GSE FILTER.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL AND PURCHASED COMPONENTS REQUIREMENTS ARE VERIFIED BY RECEIVING INSPECTION. ELECTRICAL TERMINATIONS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

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

ASSEMBLY/INSTALLATION

PARTS PROTECTION AND MANUFACTURING PROCESSES ARE VERIFIED BY INSPECTION ON SHOP TRAVELERS.

TESTING

FUNCTIONAL TESTS MONITORED TO VERIFY SYSTEM FLOW RATES ARE WITHIN SPECIFIED LIMITS.

HANDLING/PACKAGING

HANDLING, PACKAGING, AND STORAGE REQUIREMENTS ARE VERIFIED BY INSPECTION

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(E) OPERATIONAL USE

ON-BOARD ALARM, FREON FLOW, WILL INDICATE HARDWARE FAILURE. FREON PUMP WILL BE TURNED OFF AND LOSS OF ONE FREON LOOP POWERDOWN WILL BE PERFORMED. ENTRY AT NEXT PRIMARY LANDING SITE.