

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0220 -2 REV:08/26,

ASSEMBLY : FREON THERMAL LOOP	CRIT. FUNC:	
P/N RI : MC250-0001-0270	CRIT. HDW:	
P/N VENDOR: SV729792-2	VEHICLE	102 103 104
QUANTITY : 2	EFFECTIVITY:	X X X
: TWO, ONE PER LOOP	PHASE(S):	PL LD X OC X DO X LS

PREPARED BY:	DES	D. TRAN	DES	REL	D. RISING	QE	W. SMITH	REDUNDANCY SCREEN:	A-PASS	B-PASS	C-PASS	APPROVED BY (NASA):

ITEM:
VALVE MODULE, FLOW PROPORTIONAL.

FUNCTION:
THE VALVE MODULE PROPORTIONS THE FLOW OF FREON TO THE PAYLOAD HEAT EXCHANGER AND THE WATER/FREON INTERCHANGER.

FAILURE MODE:
RESTRICTED FLOW, FAILS IN MID-POSITION.

CAUSE(S):
CONTAMINATION, CORROSION, VIBRATION, MECHANICAL SHOCK, PHYSICAL BINDING/JAMMING.

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
THE VALVE CONSISTS OF A STAINLESS STEEL HOUSING, SPOOL AND TWO POSITION ELECTRIC ACTUATOR. THE CLEARANCE BETWEEN THE SPOOL AND HOUSING IS 0.01 INCH. THE SPOOL IS CONNECTED TO THE ACTUATOR WITH A SPLINED SHAFT TO AVOID ANY PHYSICAL JAMMING/BINDING. THERE ARE 8 DIFFERENT SIZED ORIFICES ON THE SPOOL WALL. THE SMALLEST IS 0.062 INCH. 25 MICRON ABSOLUTE FILTERS AT THE INLET AND OUTLET OF THE VALVE PROTECT AGAINST CONTAMINATION. MATERIALS USED ARE CORROSION RESISTANT AND COMPATIBLE WITH FREON 21. ACTUATOR GEAR TEETH ARE LUBRICATED WITH GREASE PER MIL-G-21164.

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(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 2.0 G²/HZ FOR 84 MIN/AXIS, SHOCK TESTED AT +/- 20 G EACH AXIS. THE VALVE WAS CYCLED 1000 TIMES WITH NO FAILURES OF THIS TYPE.

ACCEPTANCE TEST - COMPONENT ATP VERIFIES CLEANLINESS LEVEL AND PROPER FLOW.

OMRSD - FCL FLOW RATES ARE VERIFIED IN BOTH PPV POSITIONS PRIOR TO EACH FLIGHT. FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING. VEHICLE FREON IS SERVICED THROUGH A 10 MICRON ABSOLUTE GSE FILTER.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL AND PURCHASED COMPONENTS REQUIREMENTS ARE VERIFIED BY RECEIVING INSPECTION. COATING AND PLATING MATERIALS AND PROCESSES 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 ARE PERIODICALLY ANALYZED FOR CONTAMINATION AND VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

PARTS PROTECTION, MANUFACTURING PROCESSES, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION ON SHOP TRAVELERS. MEASUREMENT STANDARDS AND TEST EQUIPMENT IMPLEMENTATION PER REQUIREMENTS OF MIL SPECIFICATIONS ARE VERIFIED BY INSPECTION. TORQUE CERTIFICATION IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

LEAK TEST IS VERIFIED BY INSPECTION.

TESTING

FUNCTIONAL TEST IS MONITORED BY INSPECTION TO VERIFY FLOWRATE IS WITHIN SPECIFIED LIMITS.

HANDLING/PACKAGING

HANDLING, PACKAGING, AND STORAGE REQUIREMENTS ARE VERIFIED BY INSPECTION.

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(D) FAILURE HISTORY
NO FAILURE HISTORY.

(E) OPERATIONAL USE
ON-BOARD ALARM, FREON FLOW, WILL INDICATE HARDWARE FAILURE. FREON PUM:
WILL BE TURNED OFF AND LOSS OF ONE FREON LOOP POWERDOWN WILL BE
PERFORMED. ENTRY AT NEXT PRIMARY LANDING SITE.

06-3C-75