SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3C -0201 -6 REV:08/23/

ASSEMBLY :FREON THERMAL LOOP
P/N RI :MC250-0001-0040/0540
P/N VENDOR:SV755517
QUANTITY :1
:ONE PER VEHICLE
:

CRIT. FUNC:
CRIT. HDW:

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X

PHASE(S): PL LO X OO X DO X LS

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

PREPARED BY:
DES O. TRAN
REL D. RISING
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APPROVED BY:
DES
REL
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APPROVED BY (NASA):
SSM
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ITEM:
INTERCHANGER, WATER/FREON INTERFACE.

FUNCTION:
THE INTERCHANGER TRANSFERS CABIN WASTE HEAT FROM EITHER THE PRIMARY OR SECONDARY WATER COOLANT LOOPS TO THE FREON COOLANT LOOPS.

FAILURE MODE:
RESTRICTED FLOW, WATER.

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

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE

(A,B) POSSIBLE LOSS OF ONE WATER COOLANT LOOP FOR CABIN COOLING. LOSS COOLING UNTIL IMPLEMENTATION OF CORRECTING ACTION.

(C) POSSIBLE LOSS OF MISSION. EARLY MISSION TERMINATION FOR LOSS OF ON WATER COOLANT LOOP.

(D) SECOND ASSOCIATE FAILURE (LOSS OF REDUNDANT WATER COOLANT LOOP) WIL CAUSE LOSS OF ALL CABIN 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 INTERCHANGER IS MADE FROM STAINLESS STEEL AND NICKEL BRONZE ALLOYS, WHICH ARE CORROSION RESISTANT AND COMPATIBLE WITH FREON 21 AND WATER, A CONTAINS NO MOVING PARTS SUBJECT TO WEAR. THE FLOW HEADERS ARE MACHINE FROM A SINGLE PIECE STAINLESS STEEL BAR. THE HEADERS ARE WELDED TO THE CORE, WHICH CONTAINS 77 STACKED FIN LAYERS. ALL FINS ARE 0.020 INCHES HIGH AND ARE MADE OF 0.002 INCH THICK STAINLESS STEEL SHEET STOCK. THE FINS ARE RUFFLED AND HAVE A DENSITY OF 32 FLOW PATHS PER INCH. PUMP INLET FILTERS (25 MICRON) PROTECT AGAINST CONTAMINATION.

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(B) TEST
QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.075 G^2/HZ FOR 52 MIN/AXIS, SHOCK TESTED AT +/- 20 EACH AXIS.

ACCEPTANCE TEST - WATER COOLANT LOOPS ARE LEAK CHECKED PRIOR TO EACH FLIGHT. ATP PRESSURE DROP TEST WILL VERIFY THAT PASSAGES ARE NOT OBSTRUCTED.

ONRSD - WATER IS SERVICED THROUGH A 10 MICRON GSE FILTER AND IS ANALYZE PER SE-S-0073

(C) INSPECTION

RECEIVING INSPECTION
RAW MATERIAL AND PURCHASED COMPONENTS REQUIREMENTS ARE VERIFIED BY INSPECTION. PARTS PROTECTION IS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
SYSTEMS FLUID ANALYSES FOR CONTAMINATION ARE VERIFIED BY INSPECTION. CONTAMINATION CONTROL PLAN IS VERIFIED BY INSPECTION. CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION, AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION. SHEET METAL PARTS ARE INSPECTED AND VERIFIED BY INSPECTION SURFACE FINISHES VERIFIED BY INSPECTION. DIMENSIONS VERIFIED BY INSPECTION.

CRITICAL PROCESSES
WELDING IS VERIFIED BY INSPECTION. ALL WELDS ARE STRESS RELIEVED AFTER WELDING, VERIFIED BY INSPECTION. BRAZING IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
HEADER WELDS TO THE TUBES ARE PENETRANT AND X-RAY INSPECTED. OTHER WELDS (MOUNTING PADS AND HEADER WELDS TO THE CORES) ARE PENETRANT AND 10X MAGNIFICATION VISUALLY INSPECTED. BRAZES ARE VERIFIED BY PROOF AND LEAK TESTS.

TESTING
INSPECTION VERIFIES THAT RESULTS OF ACCEPTANCE TESTING AND FLOWRATES AR WITHIN SPECIFIED LIMITS.

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY
NO FAILURE HISTORY.

(E) OPERATIONAL USE
ON-BOARD ALARM, WATER PUMP DELTA PRESSURE, WILL PROVIDE INDICATION OF HARDWARE FAILURE. ACTIVATE REDUNDANT WATER LOOP PUMP. ENTRY AT NEXT PLS.