

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0201 -1 REV:08/23/
 ASSEMBLY : FREON THERMAL LOOP CRIT. FUNC: 1
 P/N RI : MC250-0001-0040/0540 CRIT. HDW:
 P/N VENDOR: SV755517 VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : ONE PER VEHICLE PHASE(S): PL LO X OO X DO X LS
 :

REDUNDANCY SCREEN: A-PASS B-PASS C-PAS
 PREPARED BY: DES O. TRAN *O. Tran* APPROVED BY *[Signature]* APPROVED BY (NASA) *[Signature]*
 REL D. RISING *D. Rising* REL *[Signature]*
 QE W. SMITH *W. Smith* QE *[Signature]*

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, FREON LOOP.

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

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 LOSS OF ONE 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
 THE INTERCHANGER IS MADE FROM STAINLESS STEEL AND NICKEL BRONZE ALLOYS, WHICH ARE CORROSION RESISTANT AND COMPATIBLE WITH FREON 21 AND WATER, AND CONTAINS NO MOVING PARTS SUBJECT TO WEAR. THE FLOW HEADERS ARE MACHINED FROM A SINGLE PIECE STAINLESS STEEL BAR. THE HEADERS ARE WELDED TO THE CORE, WHICH CONTAINS 77 STACKED PLATE-FIN STAINLESS STEEL PARTING SHEET 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 G²/HZ FOR 52 MIN/AXIS, SHOCK TESTED AT +/- 20
EACH AXIS.

ACCEPTANCE TEST - ATP PRESSURE DROP TEST WILL VERIFY THAT PASSAGES ARE
NOT OBSTRUCTED.

OMRSD - FREON FLOW IS VERIFIED PRIOR TO EACH FLIGHT. 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
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 ARE
WITHIN SPECIFIED LIMITS.

HANDLING/PACKAGING

HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(E) OPERATIONAL USE

ON-BOARD ALARM, FREON FLOW, 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.