

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0223 -1 REV:08/29/86
 ASSEMBLY : FREON THERMAL LOOP CRIT. FUNC: 2
 P/N RI : MC250-0001-0120 CRIT. HDW: 2
 P/N VENDOR: SV755512-2 VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : ONE WITH DUAL LOOP PHASE(S): PL X LO X OO X DO X LS X
 : OPERATION

PREPARED BY: DES O. TRAN *O. Tran* APPROVED BY: DES *Richard James Fallon* REDUNDANCY SCREEN: A- B- C-
 REL D. RISING *D. Rising* APPROVED BY (NASA): SSM *Richard James Fallon*
 CE W. SMITH *W. Smith* REL *J.P.R. [Signature]* CE *[Signature]*

ITEM:
 HEAT EXCHANGER, PAYLOAD (FREON/PAYLOAD INTERFACE).

FUNCTION:
 THE PAYLOAD HEAT EXCHANGER TRANSFERS WASTE HEAT FROM TWO PAYLOAD COOLANT LOOPS TO THE FREON COOLANT LOOPS.

FAILURE MODE:
 RESTRICTED FLOW, PAYLOAD COOLANT.

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

EFFECT(S) ON:
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
 (A) NO EFFECT.
 (B,C) LOSS OF FLOW THROUGH ONE PAYLOAD COOLANT LOOP WOULD CAUSE INABILITY TO PROVIDE NORMAL THERMAL CONTROL FOR PAYLOAD, RESULTING IN POSSIBLE LOS. OF MISSION OBJECTIVE.
 (D) NO EFFECT.

DISPOSITION & RATIONALE:
 (A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN
 THE HEAT EXCHANGER IS MADE FROM STAINLESS STEEL AND NICKEL BRONZE ALLOYS, WHICH ARE CORROSION RESISTANT AND COMPATIBLE WITH FREON 21 AND PAYLOAD COOLANTS (FREON 21, FREON 114 OR 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 116 STACKED PLATE-FIN STAINLESS STEEL PARTING SHEETS. ALL FINS ARE 0.02 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. FILTRATION PROVISIONS IN THE PAYLOAD LOOP MINIMIZE CONTAMINATION. THE PAYLOAD IS REQUIRED TO PROVIDE A PAYLOAD FLUID LINE SYSTEM WHICH IS COMPATIBLE WITH PAYLOAD COOLANTS AND IS CORROSION RESISTANT.

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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 G EACH AXIS.

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

OMRSD - FLUID USE CONTROLLED TO SE-5-0073. PAYLOAD FLOW RATES ARE
VERIFIED PRIOR TO EACH FLIGHT. PAYLOAD COOLANT SERVICED THROUGH A 10
MICRON 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

PERFORM PAYLOAD POWERDOWN TO A LEVEL THAT CAN BE ADEQUATELY CONTROLLED BY
THE RESTRICTED PAYLOAD COOLING FLOWRATE.