

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3E -0311 -4 REV:08/29/8

ASSEMBLY : FLASH EVAPORATOR ASSY CRIT. FUNC: 1R
P/N RI : MC250-0017-0970 CRIT. HDW: 2
P/N VENDOR: SV764170 VEHICLE 102 103 104
QUANTITY : 1 EFFECTIVITY: X X X
: ONE REQUIRED PHASE(S): PL LO X OO X DO X LS
:

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

ITEM:

FLASH EVAPORATOR, WATER.

FUNCTION:

REMOVES WASTE HEAT FROM THE FREON COOLANT LOOPS BY THE EVAPORATION OF SUPPLY WATER. THE ASSEMBLY CONSISTS OF A HIGH LOAD AND A TOPPING EVAPORATOR. THE HIGH LOAD AND TOPPING BOTH OPERATE DURING LAUNCH AND REENTRY PHASES. THE TOPPING OPERATES ALONE DURING THE ON-ORBIT PHASE TO SUPPLEMENT RADIATOR COOLING.

FAILURE MODE:

EXTERNAL LEAKAGE, FREON 21 INTO APT COMPARTMENT.

CAUSE(S):

CORROSION, VIBRATION, MECHANICAL SHOCK.

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A,B) POSSIBLE LOSS FREON FROM 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

PROOF PRESSURE OF 1.5 AND BURST OF 2.0 TIMES MAXIMUM OPERATING PRESSURE OF 120 PSI. OUTSIDE PARTING SHEET THICKNESS IS 0.012 INCHES. MATERIAL IS ANODIZED ALUMINUM WHICH IS COMPATIBLE WITH FR-21. PROTECTIVE COVER GUARDS AGAINST STRUCTURAL DAMAGE DURING GROUND TURNAROUND.

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(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR A 100 MISSION LIFE.
VIBRATION TESTED AT 0.3 G²/HZ FOR 60 MIN/AXIS AND SHOCK TESTED AT +/-
20 G/AXIS.

ACCEPTANCE TEST - PRE-ASSEMBLY AND ATP LEAK CHECKS ARE PERFORMED. CORE
LEAK INTEGRITY IS VERIFIED DURING ATP VACUUM TESTING.

OMRSD - FREON COOLANT LOOPS ARE LEAK CHECKED PRIOR TO EACH FLIGHT. FMEA
USE CONTROLLED TO SE-S-0073.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL AND PROCESS CERTIFICATIONS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

INTERNAL CLEANLINESS OF EACH LOOP IS VERIFIED BY INSPECTION. ANALYSES
OF SYSTEMS FLUID SAMPLES FOR CONTAMINATION ARE VERIFIED BY INSPECTION.
CONTAMINATION CONTROL PROCESSES AND CORROSION PROTECTION PROVISIONS
VERIFIED.

ASSEMBLY/INSTALLATION

MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY
INSPECTION. MATERIAL AND HANDLING EQUIPMENT CONFORMANCE TO REQUIREMENTS
ARE VERIFIED BY INSPECTION. THREADED INSERTS ARE INSTALLED WITH KORCO
COATING AND VERIFIED BY INSPECTION.

CRITICAL PROCESSES

ANODIZING AND WELDING REQUIREMENTS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

WELDS ARE PENETRANT INSPECTED. X-RAY INSPECTION OF CYLINDRICAL CORE-R
AND CORE-INLET, VERIFIED BY INSPECTION.

TESTING

SYSTEM PROOF PRESSURE TEST USING FREON IS VERIFIED BY INSPECTION.
ACCEPTANCE TEST INSPECTION POINTS INCLUDED EXAMINATION OF MECHANICAL AND
FLUID INTERFACE, FINAL TUBE LOCATION, EXAMINATION OF ALL EXTERNAL OR
VISIBLE INTERNAL SURFACES, AND MONITOR TO DETECT LEAKS. FUNCTIONAL TEST
IS MONITORED FOR LEAKAGE BY INSPECTION.

HANDLING/PACKAGING

HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(E) OPERATIONAL USE

ON-BOARD ALARMS, FREON INLET PRESSURE AND ACCUMULATOR QUANTITIES WILL
INDICATE HARDWARE FAILURE. FREON PUMP WILL BE TURNED OFF AND LOSS OF
FREON LOOP POWERDOWN WILL BE PERFORMED. ENTRY AT NEXT PRIMARY LANDING
SITE.