

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0112 -3 REV:08/23/
ASSEMBLY : FREON PUMP ASSEMBLY CRIT. FUNC: 1
P/N RI : MC276-0020-1223, 3224 CRIT. HDW:
P/N VENDOR: VEHICLE 102 103 104
QUANTITY : 4 EFFECTIVITY: X X X
: FOUR, TWO PER LOOP PHASE(S): PL LO X CO X DO X LS

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

ITEM:
QUICK DISCONNECTS, PUMP PACKAGE.

FUNCTION:
PROVIDES FREON FLOW PATH ATTACHMENT POINTS FOR THE FREON PUMP ASSEMBLY
THE FREON COOLANT LOOP.

FAILURE MODE:
RESTRICTED FLOW.

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

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 ON
FREON LOOP.
(D) SECOND ASSOCIATED FAILURE (LOSS OF REDUNDANT FREON COOLANT LOOP) WI
CAUSE LOSS OF ALL VEHICLE COOLING WHICH MAY RESULT IN LOSS OF
CREW/VEHICLE.

DISPOSITION & RATIONALE:
(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE
(A) DESIGN
QUICK DISCONNECT IS DESIGNED TO LOCK IN THE FLOW CONDITION WITH POPPET
OPEN. 25 AND 61 MICRON FILTERS IN THE PUMP PACKAGE WILL PROTECT
DOWNSTREAM COMPONENTS FROM CONTAMINATION. DETENTS IN VARIABLE ORIFICE
ADJUSTMENT PIECE DETER MOVEMENT OF PIN. MATERIALS ARE STAINLESS STEEL
AND ANODIZED ALUMINUM WHICH ARE CORROSION RESISTANT AND COMPATIBLE WITH
FREON 21. SEALS ARE MADE OF FREON COMPATIBLE TEFLON.

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(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED FOR 100 MISSION LIFE AT THE COMPONENT LEVEL AND AT THE HIGHER END ITEM LEVEL OF 0.7 G²/HZ FOR 48 MIN/AXIS. SHOCK TESTED AT +/- 20 G/AXIS. QD'S WERE PRESSURIZED TO 760 PSIG DURING BURST PRESSURE TEST WITH NO EVIDENCE OF FLUID LOSS.

ACCEPTANCE TEST - SPECIAL TOOLING IS USED TO VERIFY EACH OF THE REDUNDANT SEALS INDIVIDUALLY WHEN CONNECTED TO A WORST CASE UNDERSIZED MATING QUICK DISCONNECT. ATP FOR BOTH QUICK DISCONNECT AND PUMP PACKAG INCLUDE PROOF PRESSURE AND LEAKAGE TESTS.

OMRSD - FREON FLOW VERIFIED PRIOR TO EACH FLIGHT. FUNCTIONAL TEST OF PUMP AFTER INSTALLATION WILL VERIFY SYSTEM OPERATION. FREON CHEMICAL ANALYSIS PER SE-8-0073 DURING SERVICING. VEHICLE FREON IS SERVICED THROUGH A 10 MICRON (ABS) GSE FILTER.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL AND PROCESS CERTIFICATIONS ARE VERIFIED BY INSPECTION. VISUAL INSPECTION/ID PERFORMED. PARTS PROTECTION IS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

SYSTEM FLUID SAMPLE PERIODICALLY ANALYZED FOR CONTAMINATION AND VERIFIED BY INSPECTION. CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. CLEANLINESS TO LEVEL 100A PER MA0110-301 IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION ON SHOP TRAVELER MIPs. PROCESSING EQUIPMENT CONTROLS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

HEAT TREATMENT, INCLUDING ROCKWELL HARDNESS TEST, IS VERIFIED BY INSPECTION. ANODIZING AND PASSIVATION ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

LEAK TEST IS VERIFIED BY INSPECTION.

TESTING

VISUALLY INSPECT FOR DAMAGE AND EXTERNAL LEAKAGE. INSPECTION MONITORS TEST TO VERIFY FUNCTIONAL OPERATION 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 PUMP
WILL BE TURNED OFF AND LOSS OF ONE FREON LOOP POWERDOWN WILL BE
PERFORMED. ENTRY AT NEXT PRIMARY LANDING SITE.