

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3C -0112 -2 REV:08/23/8
ASSEMBLY :FREON PUMP ASSEMBLY CRIT. FUNC: 1R
P/N RI :MC276-0020-1223, 3224 CRIT. HDW: 2
P/N VENDOR:
QUANTITY :4 VEHICLE 102 103 104
EFFECTIVITY: X X X
:FOUR, TWO PER LOOP PHASE(S): PL LO X OO X DO X LS

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

ITEM:

QUICK DISCONNECTS, PUMP PACKAGE.

FUNCTION:

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

FAILURE MODE:

EXTERNAL LEAKAGE, FREON.

CAUSE(S):

VIBRATION, MECHANICAL SHOCK, CORROSION, CONTAMINATION, SEAL DAMAGE.

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 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

QUICK DISCONNECT IS DESIGNED TO HAVE REDUNDANT SEALS IN THE MATED POSITION. QUICK DISCONNECT IS LOCKED INTO THE MATED POSITION. MATERIALS ARE STAINLESS STEEL AND ANODIZED ALUMINUM WHICH ARE CORROSION RESISTANT AND COMPATIBLE WITH FREON 21. SEALS ARE MADE OF FREON-COMPATIBLE TEFLON

(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED FOR 100 MISSION LIFE AT THE COMPONENT LEVEL TO 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.

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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 PACKAGE INCLUDE PROOF PRESSURE AND LEAKAGE TESTS.

CMRSU - FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING. VEHICLE FREON IS SERVICED THROUGH A 10 MICRON (ABS) GSE FILTER. FREON LOOP LEAK CHECK PRIOR TO EACH FLIGHT.

(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 MAC110-301 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.

(D) FAILURE HISTORY

(AD2006, ACS044) DURING ATP, QD'S LEAKED BECAUSE OF O-RING SEAL IMPERFECTIONS. SEAL REPLACEMENT CORRECTED LEAKAGE. SEALS ARE INSPECTED PRIOR TO ASSEMBLY AND SEAL DEFECTS ARE ATP SCREENABLE.

(CAR AB7560) EXTERNAL LEAKAGE IN THE LIQUID SIDE LEAK TEST AFTER ATP PROOF TEST. CAUSE WAS A SCRATCHED SEALING SURFACE ON THE INLET DISCONNECT, WHICH WAS CORRECTED BY REPLACEMENT. DEFECT IS ATP SCREENABLE.

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(E) OPERATIONAL USE

ON-BOARD ALARMS, FREON FLOW AND ACCUMULATOR QUANTITY 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.