

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3B -0410 -2 REV:08/25/96

ASSEMBLY : AMMONIA BOILER SUBSYSTEM CRIT. FUNC: 13
P/N RI : MC250-0005-0007 CRIT. HDW: 1
P/N VENDOR: 76733000-117,119,121,123 VEHICLE 102 103 104
QUANTITY : 4 EFFECTIVITY: X X X
: FOUR, TWO PER LOOP PHASE(S): PL LO CO DO X LS
:

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

ITEM:
VALVE, AMMONIA FLOW CONTROL.

FUNCTION:
CONTROLS THE FLOW OF AMMONIA TO THE AMMONIA BOILER BY COMMAND FROM THE FLOW CONTROLLER. THE AMMONIA BOILER SYSTEM IS USED DURING POSTLANDING OPERATIONS, LAUNCH ABORTS, AND AS A BACKUP SYSTEM DURING NORMAL DEorbit

FAILURE MODE:
FAILS CLOSED.

CAUSE(S):
MECHANICAL SHOCK, CONTAMINATION, CORROSION, PHYSICAL BINDING/JAMMING.

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A, B) LOSS OF ONE OF TWO AMMONIA SYSTEMS FOR VEHICLE COOLING.
(C) REDUCED LENGTH OF PAYLOAD POSTLANDING COOLING.
(D) SECOND ASSOCIATED FAILURE (LOSS OF REDUNDANT AMMONIA SUPPLY SYSTEM) CAN CAUSE LOSS OF VEHICLE COOLING AND RESULT IN LOSS OF CREW/VEHICLE. SCREEN "B" IS N/A BECAUSE THE AMMONIA BOILER SYSTEM AND THE FLOW CONTROL VALVES ARE IN STANDBY.

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

(A) DESIGN
DESIGN SAFETY FEATURE REQUIRES THAT TORQUE MOTOR NOT CLOSE COMPLETELY. BUILT-IN FILTER (50 MICRONS ABSOLUTE) PREVENTS VALVE FROM ANY ABNORMAL CONTAMINATION. MECHANICAL CLEARANCES MAKE THE VALVE INSENSITIVE TO CONTAMINANTS. THE MOTOR COILS ARE PAIRED AND MATCHED ELECTRICALLY WITH 6 OHMS OF EACH OTHER. GSE HAS A 15 MICRON ABSOLUTE FILTER TO PROTECT AGAINST CONTAMINATION. MATERIAL IS CLASS B STAINLESS STEEL WHICH IS CORROSION RESISTANT AND COMPATIBLE WITH AMMONIA.

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(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE.
VIBRATION TESTED AT 0.01 G²/HZ FOR 48 MIN/AXIS AND SHOCK TESTED AT
+/- 20 G/AXIS. LIFE CYCLE TESTED FOR 100,000 CYCLES.

ACCEPTANCE TEST - OPERATION OF VALVE, FLOWRATE, AND CLEANLINESS ARE
VERIFIED BEFORE AND AFTER INSTALLATION INTO THE BOILER ASSEMBLY.

OMRSD - AMMONIA SAMPLE VERIFIED TO MEET SE-S-0073 REQUIREMENTS PRIOR TO
SERVICING. VALVES ARE VERIFIED EVERY FOUR FLIGHTS FOR PROPER OPERATION.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL AND PROCESS CERTIFICATIONS ARE VERIFIED BY INSPECTION

CONTAMINATION CONTROL

ANALYZE SYSTEM FLUID SAMPLES PRIOR TO SERVICING FOR CONTAMINATION.
CLEANLINESS IS VERIFIED BY INSPECTION DURING ATP.

ASSEMBLY/INSTALLATION

MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY
INSPECTION. SEALS ARE VISUALLY INSPECTED AT 10X AND 20X MAGNIFICATION.

CRITICAL PROCESSES

WELDING, BRAZING AND PASSIVATION ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

RADIOGRAPHIC INSPECTION IS VERIFIED BY INSPECTION.

TESTING

TEST IS MONITORED TO VERIFY FUNCTIONAL OPERATION IS WITHIN SPECIFIED
LIMITS.

HANDLING/PACKAGING

HANDLING, PACKAGING AND STORAGE REQUIREMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(E) OPERATIONAL USE

FAILURE IS NOT DETECTABLE UNTIL AMMONIA BOILER IS REQUIRED. RECONFIGURE
AMMONIA BOILER TO THE REDUNDANT AMMONIA SYSTEM.