# SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3B -0416 -2 REV:03/09/88

ASSEMBLY :AMMONIA BOILER SUBSYSTEM
P/N RI :MC250-0005-0007
P/N VENDOR:74716000
QUANTITY :1
:ONE INLET FOR BOTH
: AMMONIA TANKS

ABORT, AOA, RTLS,& TAL

| VEHICLE EFFECTIVITY: | 102 | 103 | 104 |
|---|---|---|---|
| | X | X | X |

PHASE(S): PL LO OO DO X LS

CRIT. FUNC: 1
CRIT. HDW: 1

REDUNDANCY SCREEN: A- B- C-

| PREPARED BY: | | APPROVED BY: | APPROVED BY (NASA): |
|---|---|---|---|
| DES | J. MORGAN | DES | SSM |
| REL | D. RISING | REL | REL |
| QE | W. SMITH | QE | QE |

**ITEM:**
LINES AND FITTINGS, AMMONIA SYSTEM.

**FUNCTION:**
PROVIDES FLOW PATH FOR AMMONIA FROM THE TWO AMMONIA TANKS TO A SINGLE AMMONIA BOILER INLET AND OVERBOARD VENT. THE AMMONIA BOILER SYSTEM IS USED DURING POSTLANDING OPERATIONS, LAUNCH ABORTS, AND AS A BACKUP SYST DURING NORMAL DEORBITS.

**FAILURE MODE:**
EXTERNAL LEAKAGE - BETWEEN ISOLATION VALVES & BOILER INLET.

**CAUSE(S):**
MECHANICAL SHOCK, VIBRATION, CORROSION, STRUCTURAL DAMAGE.

**EFFECT(S) ON:**
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE:

(A) LOSS OF AMMONIA. LEAK CAN NOT BE ISOLATED WHEN EITHER SYSTEM "A" C "B" IS ACTIVATED.

(B) LOSS OF FREON COOLANT LOOP HEAT REJECTION BY THE AMMONIA BOILER.

(C) LOSS OF AMMONIA BOILER DURING POSTLANDING MAY CAUSE LOSS OF PAYLOAD COOLING.

(D) LOSS OF AMMONIA BOILER WHEN REQUIRED DURING DEORBIT WILL RESULT IN LOSS OF VEHICLE COOLING WHICH MAY CAUSE LOSS OF CREW/VEHICLE.

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

**(A) DESIGN**
PROOF PRESSURE FACTOR OF 2.0 AND BURST PRESSURE OF 4.0 TIMES MAXIMUM EXPECTED OPERATING PRESSURE. LINE WALL THICKNESS IS .020, 304L AND 21-6-9 CRES STAINLESS STEEL. MATERIALS ARE 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 $G^2$/HZ FOR 48 MIN/AXIS AND SHOCK TESTED AT +/- 20 G/AXIS.

ACCEPTANCE TEST - $NH_3$ SYSTEM JOINT LEAKAGE TEST AFTER ASSEMBLY.

OMRSD - EXTERNAL LEAKAGE IS CHECKED USING A HELIUM MASS SPECTROMETER FOR LEAKAGE NOT TO EXCEED 1X10-4 SCCS GHE AT 50 PSIG. $NH_3$ SYSTEM FUNCTIONAL VERIFICATION WITH AMMONIA DURING TURNAROUND. AMMONIA SAMPLE VERIFIED TO MEET SE-S-0073 REQUIREMENTS PRIOR TO LOADING.

(C) INSPECTION

RECEIVING INSPECTION
DAMAGE AND LEAKAGE ARE INSPECTED VISUALLY BY INSPECTION. RAW MATERIAL AND PROCESS CERTIFICATIONS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
CLEANLINESS OF INTERNAL SURFACES TO LEVEL 300 IS VERIFIED BY INSPECTION. CONTAMINATION CONTROL PROCESSES AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS VERIFIED BY SHOP TRAVELER MIPS.

CRITICAL PROCESSES
PARTS HEAT TREATMENT AND PASSIVATION ARE VERIFIED BY INSPECTION.. WELDS AND BRAZE JOINTS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
PENETRANT INSPECTION OF WELDS VERIFIED BY INSPECTION.

TESTING
INSPECTION MONITORS TESTS TO VERIFY PROPER SUBSYSTEM OPERATION. ANALYSI OF FLUID SAMPLES ARE VERIFIED BY INSPECTION PRIOR TO SERVICING.

HANDLING/PACKAGING
HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY
NO APPLICABLE FAILURE HISTORY.

(E) OPERATIONAL USE
IF LEAKAGE IS SMALL AND SOME AMMONIA COOLING CAPABILITY IS AVAILABLE, CONTINUE TO USE AMMONIA BOILER SYSTEM. IF LEAKAGE IS LARGE, PERFORM VEHICLE PRIORITY POWERDOWN.