

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3B -0413 -2 REV:08/29/8
ASSEMBLY : AMMONIA BOILER SUBSYSTEM CRIT. FUNC: 1
P/N RI : MC250-0005-0007 CRIT. HDW:
P/N VENDOR: 75375000 VEHICLE 102 103 104
QUANTITY : 2 EFFECTIVITY: X X X
: ONE PER SYSTEM PHASE(S): PL LO OO OO X LS
:

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REUNDANCY SCREEN: A-PASS B-PASS C-PAS
APPROVED BY: DES REL QE
SSM REL QE

ITEM:
RELIEF VALVE, AMMONIA SUPPLY TANK.

FUNCTION:
VENTS AMMONIA OVERBOARD IN CASE OF TANK OVERPRESSURIZATION (PRESSURE GREATER THAN 550 PSIG). THE AMMONIA BOILER SYSTEM IS USED DURING POSTLANDING OPERATIONS, LAUNCH ABORTS, AND AS A BACKUP SYSTEM DURING NORMAL DEORBITS.

FAILURE MODE:
FAILS OPEN, INTERNAL LEAKAGE.

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

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A) ONE AMMONIA TANK WOULD COMPLETELY EMPTY.
(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) CAN CAUSE LOSS OF VEHICLE COOLING AND RESULT IN LOSS OF CREW/VEHICLE.

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

(A) DESIGN
GSE HAS A 15 MICRON ABSOLUTE FILTER TO PROTECT AGAINST CONTAMINATION. SPRING DESIGNED TO RESEAT POPPET AT 450 PSIG MINIMUM. SPRING IS MADE OF 17-7 PH CRES STEEL WHICH IS COMPATIBLE WITH AMMONIA.

(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.

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ACCEPTANCE TEST - PERFORMANCE VERIFIED BEFORE AND AFTER INSTALLATION INTO THE BOILER ASSEMBLY.

OMRSD - RELIEF VALVE CRACK, RESEAT, AND RESEAT INTERNAL LEAKAGE CHECKED EVERY TEN FLIGHTS. AMMONIA SAMPLE VERIFIED TO MEET SE-S-0073 REQUIREMENTS PRIOR TO SERVICING. AMMONIA TANK SYSTEM 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 SAMPLES ANALYZED PRIOR TO SERVICING FOR CONTAMINATION AND VERIFIED BY INSPECTION. CONTAMINATION CONTROL PROCESSES AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. FORMAL CONTAMINATION CONTROL PLAN IS VERIFIED BY INSPECTION. CLEANLINESS VERIFIED DURING ATP IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION, AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION ON SHOP TRAVELER MIPS. PROCESSING EQUIPMENT CONFORMANCE TO REQUIREMENTS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES
WELDING, BRAZING AND PASSIVATION ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
RADIOGRAPHIC INSPECTION IS VERIFIED BY INSPECTION.

TESTING
FUNCTIONAL TEST IS MONITORED BY INSPECTION TO VERIFY CRACKING AND RESEAT PRESSURE IS WITHIN SPECIFIED LIMITS. VISUAL INSPECTION FOR DAMAGE IF COVER BLANKETS ARE REMOVED.

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

(D) FAILURE HISTORY
NO FAILURE HISTORY.

(E) OPERATIONAL USE
GROUND CONTROLLER WILL IDENTIFY AMMONIA LEAKAGE. IF AMMONIA BOILER IS USED, ACTUATE ABS SYSTEM WITH FULL NH3 TANK.