

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :AUXILIARY POWER (APUS) FMEA NO 04-2 -TK11 -11 REV:02/88

ASSEMBLY :FUEL SUPPLY CRIT. FUNC:
P/N RI :MC282-0084-0100 CRIT. HDW:
P/N VENDOR:PSI P/N 80228-1 VEHICLE 102 103 104
QUANTITY :3 EFFECTIVITY: X X X
:1 PER APU PHASE(S): PL X LO X CO X DO X IS

REDUNDANCY SCREEN: A- B- C-
PREPARED BY: APPROVED BY: APPROVED BY (NASA):
DES J R MUNROE DES SSM Walt Scott
REL T R BOLTZ REL [Signature]
QE W J SMITH QE [Signature]

ITEM: 3-16-88
TANK, FUEL - POSITIVE EXPULSION (DIAPHRAGM).

FUNCTION:
(1) TO PROVIDE STORAGE AND CONTAINMENT OF MONOPROPELLANT HYDRAZINE AT PRESSURES BETWEEN 50 AND 370 PSIA. (2) TO EXPEL LIQUID HYDRAZINE UNDER ALL OPERATING CONDITIONS.

FAILURE MODE:
RUPTURE, AT 370 PSIA OR LESS, INCLUDING LEAKAGE.

CAUSE(S):
MATERIAL DEFECT

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE
(A) LOSS OF ONE APU SYSTEM. POSSIBLE LOSS OF ADJACENT EQUIPMENT IN AFT COMPARTMENT.
(B) LOSS OF SHAFT POWER TO ONE HYDRAULIC PUMP.
(C) ABORT DECISION IS REQUIRED, IF FAILURE OCCURS PRIOR TO ENTRY COMMITMENT.
(D) LOSS OF CREW/VEHICLE IF EXPELLED FUEL IGNITED.

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

(A) DESIGN
CONTINUALLY DECREASING SYSTEM PRESSURE - BLOWDOWN SYSTEM. TITANIUM 6. TANK IS SIMILAR IN DESIGN TO THE JPL MJS 1977, PROGRAM WHICH USED 450 PSIG WORKING PRESSURE COMPARED TO 355 PSIG FOR ORBITER.
REQUIREMENTS OF MC999-0097 PRESSURE VESSELS, SPACE SHUTTLE ORBITER, ALSO IMPOSED ON THIS TANK.

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(B) TEST

ACCEPTANCE TEST PROOF PRESSURE AT 970 PSIG IS 2.73 TIMES MAXIMUM WORKING PRESSURE. FUNCTIONAL VERIFICATION AT ACCEPTANCE PER ATP.

QUALIFICATION TEST SPECIMEN BURST AT 1,321 PSIG (ACTUAL) AND HAD 200 EXPULSION CYCLES.

INTEGRATED TEST ARTICLE TANK HAS BEEN EXPOSED TO HYDRAZINE FOR 120 MONTHS AND 206 EXPULSION CYCLES.

PRE- AND POSTFLIGHT INSPECTION PER APPLICABLE TMO/TCP REQUIREMENTS.

OMRSD: FUEL TANK SERVICING IS PERFORMED EVERY FLOW.

(C) INSPECTION

RECEIVING INSPECTION

MATERIAL AND PROCESSES CERTIFICATIONS ARE VERIFIED BY INSPECTION. ELASTOMER COMPONENTS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

MOLD CLEANLINESS IS VERIFIED BY INSPECTION. CLEANLINESS TO LEVEL 100 IS VERIFIED BY INSPECTION. CORROSION PROTECTION IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

CRITICAL DIMENSIONS AND SURFACE FINISHES ARE VERIFIED BY INSPECTION. MANUFACTURING, ASSEMBLY, AND INSTALLATION PROVISIONS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

BACKLIGHTING AND X-RAY OF DIAPHRAGM ARE VERIFIED BY INSPECTION. PENETRANT AND RADIOGRAPHIC INSPECTIONS OF WELDS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

WELDING PER SPECIFICATION REQUIREMENTS IS VERIFIED BY INSPECTION.

TESTING

PRESSURE TEST OF DIAPHRAGM PRIOR TO INSTALLATION INTO TANK HEMISPHERE IS VERIFIED BY INSPECTION. TEST EQUIPMENT AND TOOL CALIBRATION ARE VERIFIED BY INSPECTION. ATP IS WITNESSED AND VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING, PACKAGING, STORAGE, AND SHIPPING PROCEDURES ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NONE

(E) OPERATIONAL USE

NONE