

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : CREW MODULE SEALS FMEA NO 01-4-CS48-1 REV: 03/29/88

ASSEMBLY : CREW HATCH, AIRLOCK
P/N RI :
P/N VENDOR: 1000-0040-20, 1000-0040-40 VEHICLE 102 103 104
QUANTITY : 8 EFFECTIVITY: X X X
: TWO EACH, HATCH 'A' PHASE(S): PL LO OO X DO LS
: TWO EACH, HATCH 'B'

CRIT. FUNC: 1R
CRIT. HDW: 2

PREPARED BY: REDUNDANCY SCREEN: A-FAIL B-FAIL C-PAS
DES M. FULLER APPROVED BY: APPROVED BY (NASA):
REL G. PIKUS DES *W.A. Thompson 7/2/88* SSM *DE J.A. Smith 8/12*
QE W. SMITH REL *D.M. Moore 5/20/88* REL *W.B. Jones 8/22/88*
DE J. Lawson 7-25-88 QE *M.L. John 2/1/88*

ITEM:
SEAL, AIR EQUALIZATION VALVES AND PRESSURE GAUGE TO HATCH STRUCTURE, AIRLOCK HATCHES

FUNCTION:
THESES PREVENT LEAKAGE OF CREW MODULE ATMOSPHERE THROUGH INTERFACE BETWEEN TWO (2) AIR EQUALIZATION VALVES PER HATCH AND TWO (2) PRESSURE GAUGES PER HATCH AND AIRLOCK HATCH STRUCTURE.

FAILURE MODE:
LEAKAGE

CAUSE(S):
SEAL DAMAGE, LOW TEMPERATURE, MATERIAL DEGRADATION, INTERFACE WAVINESS

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A) FAILURE OF SINGLE SEAL WOULD RESULT IN THE LOSS OF CREW MODULE CONSUMABLES.
(B) FAILURE OF A SINGLE SEAL WOULD RESULT IN THE LOSS OF CREW MODULE CONSUMABLES.
(C) FAILURE OF A SINGLE SEAL WOULD RESULT IN LOSS OF CREW MODULE CONSUMABLES, HOWEVER, THIS WOULD NOT EXCEED THE MAKEUP CAPABILITY OF THE ARPCS BUT WOULD POSSIBLY RESULT IN EARLY TERMINATION OF MISSION.
(D) FAILURE OF SINGLE SEAL AND AN ADDITIONAL SEAL FAILURE WITHIN THE CREW MODULE COULD RESULT IN A LEAK RATE EXCEEDING THE ARPCS MAKEUP CAPABILITY RESULTING IN LOSS OF CREW/VEHICLE.

REDUNDANCY SCREENS: SEAL FAILS SCREENS "A" AND "B" BECAUSE LEAK TEST OF EACH SEAL INDIVIDUALLY IS NOT FEASIBLE.

DISPOSITION & RATIONALE:
(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE
(A) DESIGN
AIR EQUALIZATION VALVES AND PRESSURE GAUGE MOUNTING FLANGES ARE INSTALLED ON HATCH BASE STRUCTURE WITH 6 AND 4 ATTACH BOLTS, RESPECTIVELY. O-RING

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SEALS IN AIR EQUALIZATION VALVES AND PRESSURE GAUGES FLANGE GROOVES ARE ADJACENT TO ATTACH BOLTS. FLANGE TO HATCH INTERFACE IS METAL TO METAL CONTACT. ALL SEALS ARE FABRICATED FROM SILICONE RUBBER.

(B) TEST

ACCEPTANCE TEST: AIRLOCK STRUCTURAL LEAK TEST TO 14.7 PSID, INTERNAL AND EXTERNAL. PROOF PRESSURE TEST AND LEAK TEST OF HATCH PER MLO206-0089. QUALIFICATION TESTS: QUALIFICATION TESTS WERE NOT PERFORMED CERTIFICATION IS BASED ON ACCEPTANCE TESTS AND SEAL MATERIALS DATA.

OMRSD: GROUND TURNAROUND INCLUDES FUNCTIONAL CHECK OF HATCH OPERATION, VISUAL INSPECTION FOR DAMAGE, PRE-LIFTOFF PRESSURIZATION TEST AT 2 PSID HOWEVER, DETECTION OF INTERFACE SEAL LEAKAGE IS UNLIKELY.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTORS EXAMINE SEALS FOR DAMAGE AND FOR QUALITY OF WORKMANSHIP. THEY ALSO VERIFY THAT SUPPLIER SUBMITTED THE REQUIRED REPORTS.

CONTAMINATION CONTROL

RECEIVING INSPECTORS VISUALLY EXAMINE SEALS FOR ADHERENCE TO CLEANLINESS REQUIREMENTS. INSPECTORS ALSO VERIFY, PRIOR TO INSTALLATION, THAT THE SEAL AND SEALING SURFACE MEET THE CLEANLINESS REQUIREMENTS PER MAO106-328.

ASSEMBLY/INSTALLATION

THE SEALS ARE INSTALLED PER MAO106-328. PRIOR TO INSTALLATION, INSPECTORS VERIFY THAT THE SEAL AND THE SEALING SURFACE ARE NOT DAMAGED.

TESTING

THE INSPECTORS VERIFY THE ACCEPTANCE TEST.

HANDLING/PACKAGING

THE RECEIVING INSPECTORS VERIFY THAT EACH SEAL IS PACKAGED SO AS TO PRECLUDE DAMAGE DURING HANDLING AND STORAGE.

(D) FAILURE HISTORY

THERE HAVE BEEN NO ACCEPTANCE TEST, QUALIFICATION TEST, FIELD OR FLIGHT FAILURES ASSOCIATED WITH THIS FAILURE MODE.

(E) OPERATIONAL USE

IF LEAKAGE OCCURS, LOSS OF CREW MODULE CONSUMABLES CAN BE MONITORED AND ASSESSED FOR FEASIBILITY OF CONTINUING THE MISSION PER CABIN LEAK PROCEDURES AND FLIGHT RULES.