

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : CREW MODULE SEALS FMEA NO 01-4-CS31-1 REV: 03/29/81

ASSEMBLY : WINDOW CONDITIONING SYSTEM CRIT. FUNC: 1R
P/N RI : CRIT. HDW: 3
P/N VENDOR: M83248/1-224, 1-215 VEHICLE 102 103 104
QUANTITY : 8 EFFECTIVITY: X X X
PHASE(S): PL LO X OO X DO X LS

REDUNDANCY SCREEN: A-FAIL B-FAIL C-PASS

PREPARED BY: APPROVED BY: APPROVED BY (NASA)

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ITEM:
SEAL, BULKHEAD FEEDTHROUGH, WCCS LINES

FUNCTION:
THESE SEALS PREVENT LEAKAGE OF CREW MODULE ATMOSPHERE.

FAILURE MODE:
LEAKAGE

CAUSE(S):
CRACKS, LOW TEMPERATURE, MATERIAL DEGRADATION

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

- (A) FAILURE OF SINGLE SEAL HAS NO EFFECT. LOSS OF REDUNDANT SEAL WOULD RESULT IN THE LOSS OF CREW MODULE CONSUMABLES.
- (B) FAILURE OF A SINGLE SEAL HAS NO EFFECT. LOSS OF REDUNDANT SEAL WOULD RESULT IN THE LOSS OF CREW MODULE CONSUMABLES.
- (C) FAILURE OF A SINGLE SEAL HAS NO EFFECT. LOSS OF THE REDUNDANT 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 HAS NO EFFECT. LOSS OF THE REDUNDANT 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
LINE FITTINGS ARE INSTALLED ON BULKHEAD WITH DUAL CONCENTRIC O-RING FACE SEALS. FITTING TO BULKHEAD INTERFACE IS METAL TO METAL CONTACT. EITHER O-RING WILL PREVENT LEAKAGE OF CREW MODULE ATMOSPHERE AT FORWARD

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BULKHEAD FEEDTHROUGH FITTINGS FOR WINDOW CAVITY CONDITIONING SYSTEM VENT LINES AND PURGE LINES. FOUR ATTACH BOLTS PER FITTING ARE INSTALLED PER MA0101-301. SEAL MATERIAL (FLUOROCARBON ELASTOMER [VITON]) IS RESISTANT TO FLUID CONTACT.

(B) TEST

ACCEPTANCE TESTS: CREW MODULE INTEGRITY IS VERIFIED IN MANUFACTURING PROOF PRESSURE TESTS TO 14.7 PSID AND LEAK TESTS PER MLO206-0015.

QUALIFICATION TESTS: QUALIFICATION TESTS WERE NOT PERFORMED CERTIFICATION IS BASED ON ACCEPTANCE TESTS AND SEAL MATERIALS DATA. OMRSD: CREW MODULE LEAK TEST AT 2 PSID UNLIKELY TO DETECT MULTIPLE SEAL LEAKAGE.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTORS INSPECT FOR DAMAGE AND WORKMANSHIP AND VERIFY SINGLE PIECE MOLDED CONSTRUCTION. RECEIVING INSPECTORS CHECK IDENTIFICATION A WALL CROSS-SECTIONAL DIAMETER ON A S-3 SAMPLING BASIS. IT IS ALSO VERIFIED THAT THE SUPPLIER SUBMITTED REQUIRED REPORTS.

CONTAMINATION CONTROL

RECEIVING INSPECTORS VISUALLY INSPECT SEAL FOR CLEANLINESS. INSPECTORS ALSO VERIFY, BEFORE INSTALLATION, THAT THE SEAL AND SEALING SURFACE ARE CLEAN.

ASSEMBLY/INSTALLATION

THE SEALS ARE INSTALLED PER MA0106-328. INSPECTORS VERIFY THAT THE SEAL AND THE SEALING SURFACE ARE NOT DAMAGED BEFORE INSTALLATION.

TESTING

CREW MODULE INTEGRITY IS VERIFIED IN MANUFACTURING PROOF PRESSURE TESTS TO 14.7 PSID AND LEAK TESTS PER MLO206-0015.

HANDLING/PACKAGING

RECEIVING INSPECTORS VERIFY THAT THE SEAL IS INDIVIDUALLY PACKAGED WITH PART NUMBER, MANUFACTURER NAME, COMPOUND NUMBER AND CURE DATE. RECEIVING INSPECTORS ALSO VERIFY THAT THE SEAL IS PACKAGED IN A WAY THAT WILL PROTECT IT DURING STORAGE.

(D) FAILURE HISTORY

STANDARD BOSS SEAL AND BONDED ELASTOMER SEAL HAVE EXTENSIVE USE IN AEROSPACE APPLICATIONS WITH NO FAILURE HISTORY.

(E) OPERATIONAL USE

IF INTERFACE 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.