

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : CREW MODULE SEALS FMEA NO 01-4 -CS32 -1 REV:03/29/88

ASSEMBLY : CREW HATCHES, INGRESS/EGRESS & AIRLOCK CRIT. FUNC: 1R
 P/N RI : CRIT. HDW: 3
 P/N VENDOR:M83248/1-241, M83248/1-245 VEHICLE 102 103 104
 QUANTITY : 6 EFFECTIVITY: X X X
 : ONE EACH PER HATCH PHASE(S): PL LO X 00 X DO X LS

PREPARED BY: REDUNDANCY SCREEN: A-FAIL B-FAIL C-PASS
 DES W. HENRY APPROVED BY: APPROVED BY (NASA)
 REL D. MAYNE DES W. A. Henry 7/25/88 SSM W. Smith 8/22/88
 QE W. SMITH REL D. H. Mayne 8/22/88 REL W. E. Smith 8/22/88
 QE W. A. Henry 7-25-88 QE W. Smith 3/10/89

ITEM:

SEAL, LATCH ACTUATOR TO HATCH STRUCTURE

FUNCTION:

SEALS PREVENT LEAKAGE OF CREW MODULE ATMOSPHERE.

FAILURE MODE:

LEAKAGE

CAUSE(S):

SEAL DAMAGE, MATERIAL DEGRADATION, ACTUATOR OPERATING LOADS

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A) NO EFFECT IF SINGLE SEAL FAILS. INCREASED USE OF CREW MODULE CONSUMABLES O2/N2 IF BOTH SEALS FAIL.

(B) SAME AS (A)

(C) NO EFFECT IF SINGLE SEAL FAILS. POSSIBLE EARLY TERMINATION OF MISSION IF BOTH SEALS FAIL.

(D) NO EFFECT ON CREW OR VEHICLE IF SINGLE SEAL FAILS. POSSIBLE LOSS OF CREW/VEHICLE IF BOTH SEALS FAIL AND AN ADDITIONAL SEAL FAILS AND LEAK RATE EXCEEDS MAKEUP CAPABILITY OF ATMOSPHERIC REVITALIZATION PRESSURE CONTROL SYSTEM (ARPCS).

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

ACTUATOR MOUNTING FLANGE IS INSTALLED ON HATCH BASE STRUCTURE WITH 12 ATTACH BOLTS. DUAL CONCENTRIC O-RING FACE SEALS IN ACTUATOR FLANGE GROOVES ARE ADJACENT TO ATTACH BOLTS. O-RINGS ARE LUBRICATED WITH MB0140-010 TYPE II GREASE PER MA0112-303. EITHER O-RING CAN PREVENT LEAKAGE THROUGH HATCH. FLANGE TO HATCH INTERFACE IS METAL TO METAL CONTACT. SEAL MATERIAL IS FLUOROCARBON ELASTOMER (VITON).

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(B) TEST

ACCEPTANCE TESTS: CREW MODULE MANUFACTURING PRESSURE TEST TO 14.7 PSIG AND LEAKAGE TEST TO 3.2 PSIG.

QUALIFICATION TESTS: QUALIFICATION TESTS OF ACTUATOR INCLUDED LIMIT LOAD TEST (10 CYCLES), 2,000 OPERATING CYCLES AT 30 INCH-LB INPUT TORQUE, THERMAL CYCLING BETWEEN -65 DEG F AND +250 DEG F. SIDE HATCH QUALIFICATION TESTS INCLUDED 2,000 OPERATING CYCLES.

OMRSD: GROUND TURNAROUND INCLUDES A FUNCTIONAL CHECK OF HATCH OPERATION AND A VISUAL INSPECTION FOR DAMAGE.

(C) INSPECTION**RECEIVING INSPECTION**

RECEIVING INSPECTION INSPECTS FOR DAMAGE AND WORKMANSHIP AND THAT IT IS OF SINGLE PIECE MOLDED CONSTRUCTION. RECEIVING INSPECTION CHECKS IDENTIFICATION AND CROSS-SECTIONAL DIAMETER ON A S-3 SAMPLING BASIS. RECEIVING INSPECTION VERIFIES THAT SUPPLIER SUBMITTED REQUIRED REPORTS

CONTAMINATION CONTROL

RECEIVING INSPECTION VISUALLY INSPECTS SEAL FOR CLEANLINESS. INSPECTION VERIFIES, BEFORE INSTALLATION THAT THE SEAL AND SEALING SURFACE ARE CLEAN.

ASSEMBLY/INSTALLATION

THE SEALS ARE INSTALLED PER MA0106-328. INSPECTION VERIFIES THAT THE SEAL AND THE SEALING SURFACE ARE NOT DAMAGED BEFORE INSTALLATION. INSPECTION VERIFIES MB0140-010 TYPE II GREASE WAS APPLIED TO "O" RINGS AND "O" RING GROOVES PRIOR TO ASSEMBLY PER MA0112-303. INSPECTION VERIFIES DIMENSIONS OF DETAIL PARTS.

TESTING

INSPECTION VERIFIES CREW MODULE PROOF MANUFACTURING PRESSURE TEST TO 14 PSIG AND LEAKAGE TEST TO 3.2 PSIG.

HANDLING/PACKAGING

RECEIVING INSPECTION VERIFIES THAT THE SEAL IS INDIVIDUALLY PACKAGED WITH PART NUMBER, MANUFACTURE NAME, COMPOUND NUMBER AND CURE DATE. RECEIVING INSPECTION VERIFIES THAT THE SEAL IS PACKAGED IN A WAY THAT WILL PROTECT IT DURING STORAGE.

(D) FAILURE HISTORY

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

(E) OPERATIONAL USE

NO ACTION REQUIRED FOR SINGLE SEAL FAILURE. IF DUAL SEAL FAILURES OCCUR LOSS OF CREW MODULE CONSUMABLES CAN BE MONITORED AND ASSESSED FOR FEASIBILITY OF CONTINUING THE MISSION PER CABIN LEAK PROCEDURES AND FLIGHT RULES.