

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : CREW MODULE SEALS FMEA NO 01-4 -CS35 -1 REV: 03/29/

ASSEMBLY : CREW MODULE/OVERHEAD PANEL CRIT. FUNC: 1
P/N RI : V070-331145 CRIT. HDW:
P/N VENDOR: VEHICLE 102 103 104
QUANTITY : 4 EFFECTIVITY: X
:TWO PER OVERHEAD PANEL PHASE(S): PL LO OO X DO LS

REDUNDANCY SCREEN: A-FAIL B-FAIL C-PA
PREPARED BY: APPROVED BY: APPROVED BY (NASA):
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ITEM:

SEAL, CREW MODULE, FLIGHT DECK "BEANIE CAP" OVERHEAD PANEL (OV-102 ONL

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

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SUBSYSTEM : CREW MODULE SEALS

FMEA NO 01-4 -CS35 -1

REV:03/29/86

(A) DESIGN

DUAL O-RING FACE SEALS ARE INSTALLED IN SEPARATE GROOVES IN THE FLIGHT DECK OVERHEAD "BEANIE CAP" PANEL ADJACENT TO PRIMARY STRUCTURAL ATTACH BOLTS, WITH METAL TO METAL CONTACT AT SEALED INTERFACE. EITHER SEAL CAN PREVENT LEAKAGE. DIRECTION OF PRESSURE DIFFERENTIAL ASSISTS SEALS. SEAL MATERIAL IS SILICONE RUBBER.

(B) TEST

ACCEPTANCE TESTS: CERTIFICATION OF OV-102 ORBITER FLIGHT TEST (OFT) EJECTION PANELS IS BASED ON ACCEPTANCE TESTS. ACCEPTANCE TESTS INCLUDE: CREW MODULE HIGH PRESSURE TEST TO 14.7 PSID, AND LOW PRESSURE TEST TO 3 PSID.

QUALIFICATION TESTS: CERTIFICATION BASED ON SIMILARITY WITH OV102 ORBITER FLIGHT TEST (OFT) EJECTION PANELS.

OMRSD: CREW MODULE LEAK TEST AT 2 PSID UNLIKELY TO DETECT DUAL SEAL LEAKAGE.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTORS CHECK FOR CORRECT IDENTITY AND FOR DAMAGE, VERIFY THAT SUPPLIER SUBMITTED REQUIRED REPORTS, AND VERIFY PARTS ARE PROPERLY PACKAGED TO PREVENT DAMAGE DURING STORAGE.

CONTAMINATION CONTROL

INSPECTORS VERIFY CLEANLINESS REQUIREMENTS ARE MET.

ASSEMBLY/INSTALLATION

INSPECTORS VERIFY SILICONE RUBBER SEAL SURFACE TO BE FREE OF DEFECTS, BLEMISHES AND IRREGULARITIES PER DRAWING REQUIREMENTS, BEFORE INSTALLATION.

TESTING

INSPECTION VERIFIES OV-102 CREW MODULE HIGH PRESSURE TEST TO 14.7 PSID AND LEAK TEST TO 3.2 PSID.

HANDLING/PACKAGING

THE SUPPLIER PACKAGES DETAIL SEALS PER MK0116-001 REQUIREMENTS AND IDENTIFIES THEM BY PART NUMBER.

(D) FAILURE HISTORY

SIMILAR SILICONE RUBBER AND VITON SEALS USED IN SPACE AND COMMERCIAL APPLICATIONS HAVE NO HISTORY OF LEAKAGE FAILURES. SIMILAR SEALS EXHIBITED NO FLIGHT FAILURES DURING APOLLO CSM PROGRAM.

(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.