

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : CREW MODULE SEALS FMEA NO 01-4 -CS44 -1 REV: 03/29/1

ASSEMBLY : CREW MODULE ARPCS CRIT. FUNC: 11
P/N RI : CRIT. HDW: :
P/N VENDOR: MS9068-158, -033, -160 VEHICLE 102 103 104
QUANTITY : 2 P/N -158 EFFECTIVITY: X X X
: 1 P/N -033 PHASE(S): PL LO X OO X DO X LS
: 2 P/N -160

PREPARED BY: REDUNDANCY SCREEN: A-FAIL B-FAIL C-PASS
DES R. KOTLER APPROVED BY: APPROVED BY (NASA):
REL D. MAYNE DES *W.A. Wrenn 7/28/88* SSM *Dr. R.L. Smith 8/22*
QE W. SMITH REL *D.M. Mayne 8/10/88* REL *NS/RE Laws 8/22/88*
QE *DRS J. Comack 7-25-88* QE *W.L. Johnson 7/14/89*

ITEM:
SEAL, AFT BULKHEAD - POSITIVE PRESSURE RELIEF VALVES, BLEED VALVES AND LEFT HAND SIDE - NEGATIVE PRESSURE RELIEF VALVES.

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 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.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : CREW MODULE SEALS

FMEA NO 01-4 -CS44 -1

REV:03/29/9

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN

THESE SEALS PREVENT LEAKAGE OF CREW MODULE ATMOSPHERE AT THE MOUNTING INTERFACES OF THE TWO POSITIVE PRESSURE RELIEF VALVES AND ONE BLEED VALVE IN THE AFT BULKHEAD, AND THE TWO NEGATIVE PRESSURE RELIEF VALVES IN THE CREW MODULE LEFT SIDE. THE SEALS ARE STANDARD O-RING FACE SEALS IN CAPTIVE GROOVE IN THE MOUNTING FLANGE OF THE VALVE. SEAL IS ADJACENT TO STRUCTURAL ATTACH BOLTS OF VALVE TO BULKHEAD AND IS COMPRESSED UNTIL METAL TO METAL CONTACT IS OBTAINED AT BULKHEAD TO VALVE INTERFACE. SEAL MATERIAL IS SILICONE RUBBER.

(B) TEST

ACCEPTANCE TESTS: TESTS CONSIST OF CREW HIGH PRESSURE TEST TO 14.7 PSID AND LOWPRESSURE TEST TO 3.2 PSID.

QUALIFICATION TESTS: QUALIFICATION TESTS WERE NOT PERFORMED - CERTIFICATION IS BASED ON ACCEPTANCE TESTS AND SEAL MATERIALS DATA. OMRSD: GROUND TURNAROUND INCLUDES PRE-LIFTOFF PRESSURIZATION TEST AT 2 PSID; HOWEVER, IT IS UNLIKELY TO DETECT INTERFACE SEAL LEAKAGE.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTION CHECKS IDENTITY AND DAMAGE AND VERIFIES THAT SUPPLIER SUBMITTED REQUIRED REPORTS.

CONTAMINATION CONTROL

INSPECTORS VERIFY CLEANLINESS REQUIREMENTS.

ASSEMBLY/INSTALLATION

INSPECTORS VERIFY ARPCS SYSTEM IS INSTALLED PER MO301-0014 REQUIREMENTS. CARLETON CONTROLS INSPECTORS VERIFY 32 RMS OF FINISH ON MOUNTING FLANGE INTERFACING MC250-0002-0075 NEGATIVE PRESSURE RELIEF VALVE.

TESTING

INSPECTORS VERIFY CREW MODULE PROOF PRESSURE TEST TO 14.7 PSID AND LOW PRESSURE TEST TO 3.2 PSID.

HANDLING/PACKAGING

RECEIVING INSPECTORS VERIFY THAT THE SEAL IS PACKAGED IN A WAY THAT WILL PROTECT IT DURING STORAGE.

(D) FAILURE HISTORY

STANDARD PRESSURE BULKHEAD SEALS 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.