

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : CREW MODULE SEALS FMEA NO 01-4 -CS52 -1 REV:03/29/81

ASSEMBLY : AIRLOCK					CRIT. FUNC: 11
P/N RI :					CRIT. HDW: :
P/N VENDOR: M83248/1-381		VEHICLE	102	103	104
QUANTITY : 6		EFFECTIVITY:	X	X	X
: 1 PER FEEDTHRU PLATE		PHASE(S):	PL	LO	OO X DO LS

PREPARED BY:		REDUNDANCY SCREEN:	A-FAIL	B-FAIL	C-PASS
DES W. HENRY		APPROVED BY:	APPROVED BY (NASA):		
REL D. MAYNE		DES <i>W.A. Johnson 7/21/81</i>	SSM	<i>KSE</i>	<i>D. Smith 8/1</i>
QE W. SMITH		REL <i>D.M. Malone 5 Oct 1981 11/12</i>	REL LNS	<i>R.C. Smith 5/22/81</i>	
		QE <i>W.S. Johnson 7-25-82</i>	QE	<i>m.l. Johnson 3/1/83</i>	

ITEM:  
SEAL, FEEDTHROUGH PLATE, AIRLOCK

FUNCTION:  
SEAL PREVENTS LEAKAGE OF CREW MODULE ATMOSPHERE INTO DEPRESSURIZED AIRLOCK AT INTERFACE BETWEEN FEEDTHROUGH PLATE AND FORWARD FACE OF AIRLOCK.

FAILURE MODE:  
LEAKAGE

CAUSE(S):  
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.

DISPOSITION & RATIONALE:  
(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

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(A) DESIGN

SEALS ARE STANDARD O-RINGS USED AS FACE SEALS WITH PLATE ATTACH BOLTS ADJACENT TO SEAL. MATERIAL FOR SEALS IS FLUOROCARBON ELASTOMER (VITON). DIFFERENTIAL PRESSURE IS IN DIRECTION OF SEAL COMPRESSION.

(B) TEST

ACCEPTANCE TESTS: STRUCTURAL LEAK TEST OF AIRLOCK TO 14.7 PSID, INTERNAL AND EXTERNAL.

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 WOULD NOT DETECT FEEDTHROUGH PLATE SEAL LEAKAGE BECAUSE AIRLOCK PRESSURE IS EQUALIZED DURING TEST.

(C) INSPECTION

RECEIVING INSPECTION

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

CONTAMINATION CONTROL

RECEIVING INSPECTORS VISUALLY INSPECTS SEAL FOR CLEANLINESS. INSPECTORS VERIFY, BEFORE INSTALLATION, THAT THE VITON SEAL AND SEALING SURFACE ARE CLEAN, PER MA0106-328.

ASSEMBLY/INSTALLATION

THE SEALS ARE INSTALLED PER MA0106-328. INSPECTOR VERIFIES THAT THE VITON SEAL AND THE SEALING SURFACE ARE NOT DAMAGED BEFORE INSTALLATION. THREADED FASTENERS ARE INSTALLED PER MA0101-301.

TESTING

INSPECTORS VERIFY AIRLOCK LEAK TEST TO 14.7 PSID, INTERNAL AND EXTERNAL.

HANDLING/PACKAGING

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

(D) FAILURE HISTORY

EXTENSIVE USE OF FLUOROCARBON ELASTOMER SEALS IN AEROSPACE AND COMMERCIAL APPLICATIONS WITH NO FAILURE HISTORY.

(E) OPERATIONAL USE

IF LEAKAGE OCCURS, AIRLOCK HATCH 'B' COULD BE CLOSED OR INCREASED USE OF CONSUMABLES CAN BE MONITORED AND ASSESSED FOR FEASIBILITY OF COMPLETING EVA OPERATIONS.