SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :CREW MODULE SEALS FMEA NO 01-4 -CS13 -1 REV:03/29/

ASSEMBLY :MANUFACTURING ACCESS PANEL
P/N RI :V070-332365-001, -002
P/N VENDOR:
QUANTITY :2
:1 EACH PART NUMBER

CRIT. FUNC:
CRIT. HDW:

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

PHASE(S): PL LO X OO X DO X

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

PREPARED BY:			APPROVED BY:	APPROVED BY (NASA):
DES	W.	HENRY	DES	SSM
REL	D.	MAYNE	REL	REL
QE	W.	SMITH	QE	QE

ITEM:
SEALS, MANUFACTURING ACCESS PANEL

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. THE REDUNDANT SEAL WOULD PREVENT LOSS OF CREW MODULE CONSUMABLES INTO PAYLOAD BAY.

(B) FAILURE OF SINGLE SEAL HAS NO EFFECT. THE REDUNDANT SEAL WOULD PREVENT LOSS OF CREW MODULE CONSUMABLES.

(C) FAILURE OF A SINGLE SEAL HAS NO EFFECT. FAILURE OF THE REDUNDANT SEAL WOULD RESULT IN LOSS OF CREW MODULE CONSUMABLES, HOWEVER, THIS WO NOT EXCEED THE MAKEUP CAPABILITY OF THE ARPCS BUT WOULD POSSIBLY RESUL IN EARLY TERMINATION OF MISSION.

(D) FAILURE OF A SINGLE SEAL HAS NO EFFECT. FAILURE OF THE REDUNDANT SEAL AND AN ADDITIONAL SEAL FAILURE WITHIN THE CREW MODULE COULD RESUL IN A LEAK RATE EXCEEDING THE ARPCS MAKEUP CAPABILITY RESULTING IN LOSS CREW/VEHICLE.

REDUNDANCY SCREENS: SEAL FAILS SCREENS "A" AND "B" BECAUSE LEAK TEST EACH SEAL INDIVIDUALLY IS NOT FEASIBLE.

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SUBSYSTEM :CREW MODULE SEALS FMEA NO 01-4 -CS13 -1 REV:03/29/8

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

(A) DESIGN
THE SEALS ARE O-RING FACE SEALS INSTALLED IN DOVETAIL GROOVES IN THE PANEL ADJACENT TO PRIMARY STRUCTURAL ATTACH BOLTS WITH METAL TO METAL CONTACT AT THE SEALED INTERFACE. A TEST PORT BETWEEN SEALS ALLOWS MANUFACTURING CHECK OF BOTH SEALS, AND THE DIRECTION OF PRESSURE DIFFERENTIAL ASSISTS SEALS. SEAL MATERIAL IS SILICONE RUBBER.

(B) TEST
ACCEPTANCE TESTS: MANUFACTURING LEAK TEST OF BOTH SEALS IS PERFORMED BY PRESSURIZING CAVITY BETWEEN SEALS TO 15 PSIG USING TEST KIT C70-0749. STRUCTURAL INTERFACE IS VERIFIED IN MANUFACTURING PRESSURE/LEAK TEST OF CREW MODULE TO 14.7 PSID AND LEAK TEST TO 3.2 PSID.

QUALIFICATION TESTS: QUALIFICATION TESTS WERE NOT PERFORMED - CERTIFICATION BASED ON ACCEPTANCE TESTS AND SEAL MATERIALS DATA.

OMRSD: PRESSURE TEST TO 15 PSID +/- 1.0 PSI BETWEEN SEALS AFTER REMOVAL AND REINSTALLATION OF MANUFACTURING ACCESS PANEL. CREW MODULE LEAK TES AT 2 PSID IS PERFORMED EACH FLIGHT PRIOR TO LIFTOFF BUT IS 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
THE INSPECTOR VERIFIES, BEFORE INSTALLATION, THAT THE SEALING SURFACE A SILICONE RUBBER SEAL ARE CLEAN, PER MA0106-328.

ASSEMBLY/INSTALLATION
SEALS ARE INSTALLED PER MA0106-328. PRIOR TO INSTALLATION AN INSPECTIC IS PERFORMED TO VERIFY THAT THE SEALING SURFACE AND THE VITON SEAL ARE UNDAMAGED. IT IS ALSO VERIFIED THROUGH INSPECTION THAT THE SILICONE SE SURFACE IS FREE OF DEFECTS, BLEMISHES AND IRREGULARITIES PER DRAWING REQUIREMENTS BEFORE INSTALLATION. IT IS VERIFIED THROUGH AN INSPECTION THAT THE SEALING SURFACES ARE PROTECTED PER MA0106-328.

TESTING
THE LEAK TEST, AT 15 +/-1 PSID, BETWEEN SEALS, USING TEST KIT C70-0749 EQUIVALENT PER V070-332875 DRAWING REQUIREMENTS AT EACH INSTALLATION/ RE-INSTALLATION OF PANEL IS VERIFIED THROUGH INSPECTION. THE PRESSURE/LEAK TEST OF CREW MODULE TO 14.7 PSID AND LEAK TEST TO 3.2 PSI ARE ALSO VERIFIED THROUGH INSPECTION.

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

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(D) FAILURE HISTORY

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

(E) OPERATIONAL USE

IF INTERFACE LEAKAGE OCCURS, LOSS OF CREW MODULE CONSUMABLES CAN BE MONITORED AND ASSESSED FOR FEASIBILITY OF CONTINUING MISSION PER CABI LEAK PROCEDURES AND FLIGHT RULES.