

CRITICAL ITEMS LIST (CIL)

SYSTEM:	Propulsion/Mechanical	FUNCTIONAL CRIT:	1
SUBSYSTEM:	LH2 Penetrations	PHASE(S):	b
REV & DATE:	J, 12-19-97	HAZARD REF:	S.06
DCN & DATE:			
ANALYSTS:	J. Attar/H. Claybrook		

FAILURE MODE: Leakage

FAILURE EFFECT: b) Loss of mission and vehicle/crew due to fire/explosion.

TIME TO EFFECT: Seconds

FAILURE CAUSE(S):
 A: Scratched/Nicked/Misaligned
 B: Deterioration
 C: Boss Mating Surface Defects

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Prevents leakage of GHe/GH2 during prelaunch and GH2 during ascent between ullage pressure transducer mounting plates and adapter.

FMEA ITEM CODE(S)	PART NO.	PART NAME	QTY	EFFECTIVITY
2.10.8.1	55L5-4L	K-Seal	4	LWT-54 & Up

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

SYSTEM: Propulsion/Mechanical
SUBSYSTEM: LH2 Penetrations
FMEA ITEM CODE(S): 2.10.8.1
REV & DATE: J, 12-19-97
DCN & DATE: 004, 6-30-99

RATIONALE FOR RETENTION

DESIGN:

- A-C: The K-seals are installed between the LH2 tank ullage sense pressure ports on the electrical feedthru cover and the adapters. These Harrison K-Seals have been used on various space vehicles where cryogenic propellant sealing was required. Design features that aid in sealing are: dual sealing surfaces, heel seal (provides mechanical stop and carries hoop tension), soft coating on the seals (seals surface finish imperfections) and flexible tapered lips (maintains uniform stress levels). Seals are manufactured from A-286 CRES and coated with K-6 lead alloy plate.
- A: Improper handling and installation leads to leakage which is detected by test. If the flange joint is disassembled, seal reuse/replacement is specified and controlled by STP2012.
- B: Procurement of seals is governed by material, fabrication, processing and inspection specifications per MMC Standard 55L5.
- C: Mating surface flatness, waviness, and finish are specified on engineering drawings to assure performance within the capability of the seal. Fitting torque requirement is specified on the Engineering installation drawing and is lockwired to preclude disengagement.

TEST:

The K-Seal is certified. Reference HCS MMC-ET-TM08-L-P008.

Qualification: MMA conducted a study that compared the K-seal performance at ET environments with past usage environments experienced by the seal. The study concluded that the seal design is qualified by similarity for all ET environments.

MPTA Firings/Tankings: Seals have been used between the electrical feedthru cover and ullage pressure transducers adapter (4 places) throughout the test program that included 62.5 minutes of firing time, 23 cryogenic cycles and 47 pressurization cycles. There was no evidence of leakage due to operation or environment.

Acceptance:

MAE:

- A-C: Perform seal leakage test (MMC-ET-TM04k).

Launch Site:

- A-C: Perform seal leakage test (OMRSD File IV for LWT-54 thru 84, 89 thru 93).

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INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

- B: Verify material selection and verification controls (MMC-ET-SE16 and standard drawing 55L5).
- C: Inspect boss surface finish (drawing 80931003717).

MAF Quality Inspection:

- A: Inspect (visually) seal surfaces for freedom of nicks, radial scratches or other imperfections during installation (drawing 80931003779).
- A, C: Verify installation and witness torque (drawing 80931003779).
- C: Inspect sealing surfaces for freedom of nicks, radial scratches or other imperfections during installation (acceptance drawing 82620000001).
- A-C: Witness seal leakage test (MMC-ET-TM04k).

Launch Site:

- A-C: Witness seal leakage test (OMRSD File IV for LWT-54 thru 84, 89 thru 93).

FAILURE HISTORY:

Current data on test failures, unexplained anomalies and other failures experienced during ground processing activity can be found in the PRACA data base.