

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, S.11
 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: Flange Mating Surface Defects
 D: Fracture of One Adapter Plate Bolt
 REDUNDANCY SCREENS: Not Applicable
 FUNCTIONAL DESCRIPTION: Prevents leakage of GHe/GH2 during prelaunch and GH2 during ascent between the diffuser mounting plate and manhole cover.

<u>FMEA ITEM CODE(S)</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY</u>	<u>EFFECTIVITY</u>
2.10.1.1	55L2-9	Raco Seal	1	LWT-54 & Up

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

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RATIONALE FOR RETENTION

DESIGN:

The Raco seal is installed between the GH2 diffuser mounting plate and the LH2 tank forward manhole cover. The seal is fabricated by Furon and is similar to seals that were qualified and used on Atlas, Centaur, and Saturn IC, II and IVB vehicles. The design consists of a U shaped circular spring with a teflon jacket. The spring force assisted by media pressure is adequate to provide a seal between the teflon jacket and adjacent mating surfaces.

- A: Improper handling and installation leads only to leakage which is detected by test. If the flange joint is disassembled, seal replacement is specified and controlled by STP2012.
- B: Procurement of seals is governed by material, fabrication, processing, test and inspection specifications per MMC Standard drawing 55L2.
- C: Mating surface flatness, waviness, and finish are specified on engineering drawings to assure performance within the capability of the seal.
- D: Attachment fasteners were selected from the Approved Standard Parts List (ASPL 826-3500), installed per STP2014 and torqued using values specified on Engineering drawings.

TEST:

The Raco Seal is certified. Reference HCS MMC-ET-TM08-L-P007.

Qualification: Thirty Raco seals, six samples of five different sizes ranging from 4 inches to 17 inches diameter, were leakage tested after being subjected to pressure temperature cycling, vibration, proof pressure and burst pressure. Testing included two samples that were subjected to 62 psig at LH2 temperature without degradation of performance.

The tests show that the seals are capable of preventing major leakage under ET operating conditions. Leakage measured during exposure was significantly less than allowable (MMC-ET-RA09-4).

Acceptance:

Vendor:

- A, C: Perform dimensional fit and leakage tests (ATP004, Furon).
- D: Attachment bolts are procured and tested to Standard drawing 26L2.

MAF:

- A-D: Perform leakage test after installation (MMC-ET-TM04k).

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INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

- B, D: Verify materials selection and verification controls (MMC-ET-SE16 and standard drawings 55L2 and 26L2).
- C: Inspect surface flatness, finish and dimension, (drawing 80921021047 and 80914081488).

Lockheed Martin Procurement Quality Representative:

- A, C: Witness dimensional fit and leakage test (ATP004, Furon).

MAF Quality Inspection:

- A: Inspect (visually) seal surfaces for freedom of nicks, radial scratches or other imperfections during installation and torque (drawing 80924061009).
- A, C, D: Verify installation and witness torque (drawing 80924061009).
- C: Inspect sealing surfaces for freedom of nicks, radial scratches or other imperfections during installation (acceptance drawing 82620000001).
- A-C: Verify leak test ports clear prior to assembly (STP2012).
- A-D: Witness seal leakage test (MMC-ET-TM04k).

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.