

CRITICAL ITEMS LIST (CIL)

SYSTEM: Propulsion/Mechanical FUNCTIONAL CRIT: 1
 SUBSYSTEM: GH2 Vent/Relief PHASE(S): b
 REV & DATE: J, 12-19-97 HAZARD REF: S.06, S.11
 DCN & DATE:
 ANALYSTS: J. Schnackel/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 Flange Bolt

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Raco seal is installed between vent/relief valve and LH2 tank dome cap penetration to prevent GH2 leakage into the intertank.

<u>FMEA ITEM CODE(S)</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY</u>	<u>EFFECTIVITY</u>
2.8.13.1	55L2-3	Raco Seal	1	LWT-54 & Up

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

SYSTEM: Propulsion/Mechanical
SUBSYSTEM: GH2 Vent/Relief
FMEA ITEM CODE(S): 2.8.13.1

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RATIONALE FOR RETENTION

DESIGN:

The Raco 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 by Standard drawing 55L2 and controlled by STP2012.
- B: Procurement of seals is governed by material, fabrications, processing, test and inspection specifications per MMC Standard drawing 55L2.
- C: Flange Mating surface flatness, waviness, and finish are specified on Engineering drawings to assure performance within the capability of the seal. Joint fastener torques are specified and controlled per STP2014.
- D: Attachment fasteners were selected from the Approval 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.

- A-C: Qualification: Thirty Raco seals, six samples of five different sizes ranging from 4 inch to 17 inches in diameter, were leakage tested after being subjected to pressure temperatures cycling, vibration, proof pressure and burst pressure. Testing included 2 samples that were subjected to 62 psig at LH2 temperature without degradation of performance.

The tests showed that the seals are capable of preventing leakage under ET operating conditions. Leakage measured during exposure was less than allowable (MMC-ET-RA09-4).
- B: MPTA Firing/Tanking: Two seals have been installed for both primary and auxiliary V/R Valves on MPTA. The seals in each location have accumulated 62.5 minutes of firing time, 23 cryogenic cycles, and 47 pressurization cycles. Leakage test prior to all static firings and after SF-12 was within acceptable limits of 1.34 SCIM helium at 6 psig.
- A, B: Component Acceptance: Acceptance is contingent upon inspection to prove compliance with Specification Requirements - 100% visual, dimensional, cleaning, surface roughness and workmanship. A dimensional fit check and leak test are performed (ATP004, Furon).
- A-C: ET Acceptance: Leakage testing is performed on the seal after installation (MMC-ET-TM04K).
- A: Attachment bolts are procured and tested to Standard drawing 26L2.

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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).

Lockheed Martin Procurement Quality Representative:

A, B: Witness dimensional fit and leakage tests (ATP004, Furon).

MAF Quality Inspection:

A: Inspect seal surfaces for freedom of nicks, radial scratches or other imperfections during installation (drawing 80921021309).

A-C: Verify leak test ports clear prior to assembly (STP2012).

A, C,
D: Witness seal flange leakage tests (MMC-ET-TH04k).

C: Inspect sealing surfaces for freedom of nicks, radial scratches or other imperfections (Acceptance drawing 82620000001)

C: Inspect sealing surface flatness, finish and dimensions (drawings 80914110990).

C, D: Verify installation and witness torque (drawing 80921021309).

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.