

CRITICAL ITEMS LIST (CIL)

SYSTEM: Propulsion/Mechanical
 SUBSYSTEM: LO2 Propellant Feed
 REV & DATE: J, 12-19-97
 DCN & DATE: 001, 6-15-98
 ANALYSTS: Schnackel/H. Claybrook

FUNCTIONAL CRIT: 1
 PHASE(S): a, b
 HAZARD REF: P.09, P.10,
 S.07

FAILURE MODE: Leakage

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

TIME TO EFFECT: Seconds

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

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: The seal prevents leakage where direct helium inject provision is available on the LO2 feedline.

<u>FMEA ITEM CODE(S)</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY</u>	<u>EFFECTIVITY</u>
2.1.17.1	55L5-4R	K-Seal	1	LWT-54 & Up

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

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SUBSYSTEM: LQ2 Propellant Feed
FMEA ITEM CODE(S): 2.1.17.1

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RATIONALE FOR RETENTION

DESIGN:

- A, B, D: A Harrison K-Seal is installed where direct helium inject provision is available on the LQ2 feedline flange. 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 Dupont TFE primer followed by Dupont Black TFE Enamel.
- 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, test and inspection specifications per MMC Standard 55L5. Coating material compatibility testing is specified for oxygen service (NHB 8060.1).
- D: Mating surface flatness, waviness, and finish are specified on engineering drawings to assure performance within the capability of the seal.

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 designed is qualified by similarity for all ET environments.

Acceptance:

MAF - (Total Installation):

- A, D: Perform leakage test on seals (MMC-ET-TM04k).

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INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

- B: Verify materials selection and verification controls (MMC-ET-SE16 and Standard drawings 55L5 and 57L7).
- D: Inspect sealing surface finish (Standard drawing 57L7).

MAF Quality Inspection:

- A, D: Inspect (visually) seal surfaces for freedom of nicks, scratches or other imperfections during installation (drawing 80921011930).
- A, D: Verify installation (drawing 80921011930).
- A, B, D: Witness seal leakage tests (MMC-ET-TM04k).

Launch Site:

- B: Visually monitor LO2 feedline system for no leakage (OMRSD File II).

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.