

CRITICAL ITEMS LIST (CIL)

SYSTEM:	Propulsion/Mechanical	FUNCTIONAL CRIT:	1
SUBSYSTEM:	GH2 Pressurization	PHASE(S):	a, 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: 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
C: Flange Mating Surface Defects
D: Fracture of One Flange Bolt

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Prevents leakage of GH2 between flange joints of the pressurization line.

<u>FMEA ITEM CODE(S)</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY</u>	<u>EFFECTIVITY</u>
2.7.9.1	55L11-5T	Naflex Seal	8	LWT-54 & Up

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

SYSTEM: Propulsion/Mechanical
SUBSYSTEM: GH2 Pressurization
FMEA ITEM CODE(S): 2.7.9.1

REV & DATE: J, 12-19-97
DCN & DATE: 004, 6-30-99

RATIONALE FOR RETENTION

DESIGN:

A, C: The Naflex seal has been used on Saturn IC, II, and IVB vehicles and meets ET pressurization system operating requirements. The configuration utilizes a cantilevered levered deflection-loaded primary seal and a simple gasket type secondary seal. Deflection of the primary seal provides the initial contact load to accomplish sealing at the primary seal-flange interface. The secondary seal provides a barrier and means for measuring leakage across the primary seal.

Seal 55L11-5T is made from ring forged Inconel. The seal is coated with teflon to provide optimum sealing and prevent leakage attributed by flange surface finish imperfections. Tighter dimensional tolerances were imposed on 55L11 sealing surfaces to reduce rejection rate during flange joint acceptance leak test. Internal fluid pressure assists in maintaining seal joint contact under operating conditions.

A: Improper handling and installation leads only 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 55L11.

C: Flange seal leakage monitoring is accomplished by a detection port incorporated on each flanged joint. Seal mating surface flatness, waviness and finish are specified on Engineering drawings to assure performance within the capability of the seal.

D: Flange bolts were selected from the approved standard parts list (ASPL 826-3500), installed per STP2014 and torqued using values specified on engineering drawings. Procurement of fasteners is by material, fabrication, processing, test and inspection specification per MMC Standard 26L2.

TEST:

The Naflex Seal is certified. Reference HCS MMC-ET-TM08-L-P011.

Qualification: MMA conducted a study that compared the naflex 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.

The 55L11 was qualified by analysis and similarity to the 55L6.

MPTA Firings/Tankings: Seals have been used in 6 locations in the GH2 pressurization subsystem with no evidence of leakage. Three of these seals have been used throughout the test program without joint disassembly and have been exposed to 62.5 minutes of firing time and 47 pressurization cycles. Leakage test prior to all static firings and after SF-12 was within acceptable limits of .67 SCIM helium at 6 psig.

Acceptance:

MAF - (Total Installation):

A-C: Perform leakage test at each joint after seal installation (MMC-ET-TM04K).

D: Attachment bolts are procured and tested to the applicable standard drawing.

Launch Site:

A-D: Perform leakage test within the ET Intertank (OMRSD File IV for LWT-54 thru 84, 89 thru 93).

A-D: Perform seal leakage test on joint at station XT1082 after final assembly to flight configuration (OMRSD File IV and OMI T1402).

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RATIONALE FOR RETENTION

INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

- B, D: Verify materials selection and verification controls (MMC-ET-SE16 and Standard drawings 55L11 and 26L2).
- C: Inspect mating surface flatness, finish and dimensions (drawing 80921021047).

MAF Quality Inspection:

- A: Inspect seal surfaces for freedom of nicks, radial scratches or other imperfections during installation (drawing 80921021009 and STP2012).
- C: Inspect diffuser mounting plate sealing surface areas for freedom of nicks, radial scratches or other imperfections during installation (acceptance drawing 82620000001).
- D: Verify installation and witness torque (drawing 80921021009).
- A, C, D: Verify leak test ports clear prior to assembly (STP2012).
- A, C, D: Witness leakage tests (MMC-ET-TM04k).

Launch Site:

- A-D: Witness leakage test within ET Intertank (OMRSD File IV for LWT-54 thru 84, 89 thru 93).
- A-D: Witness seal leakage test on joint at station XT1082 (OMRSD File IV and OMI T1402).

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.