

CRITICAL ITEMS LIST (CIL)

SYSTEM: Propulsion/Mechanical
 SUBSYSTEM: Helium Inject
 REV & DATE: J, 12-19-97
 DCN & DATE:
 ANALYSTS: J. Attar/H. Claybrook

FUNCTIONAL CRIT: 1R
 PHASE(S): a
 HAZARD REF: P.02, P.06

FAILURE MODE: Leakage

FAILURE EFFECT: a) Loss of mission and vehicle/crew due to geysering followed by water hammer effect results in leakage of LO2 feedline and loss due to fire/explosion.

TIME TO EFFECT: Minutes

FAILURE CAUSE(S):
 A: Structural Failure
 B: Disengagement of Adapter

REDUNDANCY SCREENS:
 Screen A: PASS
 Screen B: N/A - Item nonfunctional in flight.
 Screen C: PASS

FUNCTIONAL DESCRIPTION: These adapters provide inlet and outlet paths for the GHe to enter and exit the upstream manifold to the two redundant filter/check valve assemblies.

<u>FMEA ITEM CODE(S)</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY</u>	<u>EFFECTIVITY</u>
2.4.12.1	57L6-6J	Adapter	3	LWT-54 & Up

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

SYSTEM: Propulsion/Mechanical
SUBSYSTEM: Helium Inject
FMEA ITEM CODE(S): 2.4.12.1

REV & DATE: J, 12-19-97
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RATIONALE FOR RETENTION

DESIGN:

The adapters provide inlet and outlet paths for the GHe to enter and exit the manifold upstream of the two redundant filter/check valve assemblies.

- A: The adapters are fabricated from 304 CRES and meet the required ultimate (4.0) and yield (1.25) safety factors for pressure (ET Stress Report 826-2188). Material selected in accordance with MMC-ET-SE16 and controlled per MMMA Approved Vendor Product Assurance Plan assures conformance of composition, material, fabrication, processing, and inspection specification per MMC standard 57L6. The adapters were selected based on operational experience and their capability to meet ET requirements for Class 3 threads and leakage performance. Installation loads are sufficient to provide screening for major flaws.
- B: The adapters are installed and torqued as specified on the engineering installation drawing and are lockwired to preclude disengagement.

Redundancy Description:

The helium inject system on the ET and Orbiter SSME bleed provide LO2 conditioning that will prevent geysering. The systems are considered to be redundant and loss of helium injection is assessed criticality 1R.

Effect of First Redundancy Loss:

(Helium Injection) - Flow of LO2 from the tank to the SSME's by the active engine bleed system provides a cooling effect within the feedline and geysering will not occur. Adapter leakage resulting in loss of helium injection will be detected by the facility flowmeter and the action taken is LO2 stop flow.

Effect of Second Redundancy Loss:

(SSME Bleed) - For worst case (no helium injection, stop flow, and engine bleeds closed) geysering will occur in approximately 100 minutes. Action is taken to safe (off load) the ET.

TEST:

The Adapter is certified. Reference HCS MMC-ET-TM08-L-P015.

Acceptance:

MAF - (Vehicle Assembly):

- A, B: Perform leakage test (MMC-ET-TM04k).

INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

- A: Verify materials selection and verification controls (MMC-ET-SE16 and standard drawing 57L6).

MAF Qualify Inspection:

- B: Verify installation and witness torque (drawing 80921011941).
- A, B: Witness 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.