

CRITICAL ITEMS LIST (CIL)

SYSTEM:	Propulsion/Mechanical	FUNCTIONAL CRIT:	1
SUBSYSTEM:	GH2 Pressurization	PHASE(S):	b
REV & DATE:	J, 12-19-97	HAZARD REF:	P.06, P.07, S.04, S.11
DCN & DATE:			
ANALYSTS:	J. Attar/H. Claybrook		

FAILURE MODE: Fails to Diffuse Pressurant

FAILURE EFFECT: b) Loss of mission and vehicle/crew due to structural failure of LH2 tank (collapsed barrel section) caused by ullage pressure below structural requirements resulting in fire/explosion.
Loss of mission due to premature engine shutdown caused by loss of MPSP.

TIME TO EFFECT: Seconds

FAILURE CAUSE(S):
 A: Structural Failure of Diffuser
 B: Seizure of Mating Components
 C: Fracture of Diffuser Attachment Hardware

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Provides diffusion of pressurant entering the LH2 tank.

<u>FMEA ITEM CODE(S)</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY</u>	<u>EFFECTIVITY</u>
2.7.10.1	80921021038-009	Diffuser	1	LWT-54 & Up

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

SYSTEM: Propulsion/Mechanical
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FMEA ITEM CODE(S): 2.7.10.1

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RATIONALE FOR RETENTION

DESIGN:

- A, B: The diffuser is a fabricated unit consisting of a core assembly and a screen assembly. The core is a tube formed from .100 inch thick stainless steel sheet and is welded to a flange and end cap. The GH2 core is 6.32 inches in diameter and contains 912 holes, .125 inch diameter, equally spaced over its length and diameter. The screen assembly is 9.5 inches in diameter and is bolted to the flange and end cap. The core diverts the autogenous flow into radial jets which are dispersed by the screen. The diffuser has been designed to meet the required ultimate safety factor of 1.4 (ET Stress Report 826-2188) and other operating and nonoperating requirements specified per 80921021018. Materials selected in accordance with MMC-ET-SE16 and controlled per MMMA Approved Vendor Product Assurance Plan assures repetitive conformance of composition and properties. Fusion welding is controlled by STP5502. Vitrolube is applied to component mating surfaces.
- C: Attachment hardware was selected from the Approved Standard Parts List (ASPL 826-3500), installed per STP2014, and torqued using values specified on engineering drawings.

TEST:

The GH2 Diffuser is qualified. Reference COQ MMC-ET-TM06-091.

Qualification: Testing of one diffuser included random vibration at +257^o F, thermal shock (helium ambient flow test @ 2.0 lbs/sec with diffuser initially chilled to -320^o F), and hydrogen ambient flow test at 2.0 to 2.8 lbs/sec. Based on the strain gage response data, analysis was performed that showed infinite fatigue life and qualified the diffuser for flow rates 4.22 lb/sec helium and 3.34 lb/sec hydrogen (MMC-ET-RA09-58).

109% Flow Test: Qualification testing was performed on an additional unit to verify structural integrity of the GH2 diffuser when subjected to hydrogen gas flow rates to 5.0 lbs/sec. The total flow test time was 22 minutes. No anomalies were noted during any of the post flow inspections of the diffuser (R82-164 MMC Denver Test Report).

MPTA Firings/Tankings: The GH2 diffuser has accumulated 60 minutes of firing time, 14 cryogenic cycles, and 28 pressurization cycles. No visual defects were noted during tank entries, the last of which was after SF-12.

Acceptance:

Vendor:

- C: Attachment bolts are procured and tested to standard drawing 26L2.

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INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

- B, C: Verify installation/assembly and witness torque (drawing 80921021038).
- A: Inspect welding (drawing 80921021038).
- A: Penetrant inspect welding (drawing 80921021038).
- B: Witness lubricant application (drawing 80921021038).

Lockheed Martin Procurement Quality Representative:

- A, C: Verify materials selection and verification controls (MMC-ET-SE16, drawing 80921021038, Standard drawings 26L17 and 26L2).
- A: Verify X-Ray results (drawing 80921021038).

MAF Quality Inspection:

- A, C: Witness installation and torque (drawing 80924061028 and 80921021038).

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.