

CRITICAL ITEMS LIST (CIL)

SYSTEM:	Propulsion/Mechanical	FUNCTIONAL CRIT:	1
SUBSYSTEM:	GO2 Pressurization	PHASE(S):	b
REV & DATE:	J, 12-19-97	HAZARD REF:	P.06, P.10,
DCN & DATE:			S.03
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 LO2 tank (collapse of ogive section) caused by ullage pressure below structural requirements resulting in fire/explosion.
Loss of mission and vehicle/crew due to LO2 tank structural failure.

TIME TO EFFECT: Seconds

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

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Provides diffusion of pressurant entering LO2 tank.

<u>FMEA ITEM CODE(S)</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY</u>	<u>EFFECTIVITY</u>
2.2.9.1	80921021030-009	Diffuser Assy	1	LWT-54 & Up

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

SYSTEM: Propulsion/Mechanical
SUBSYSTEM: G02 Pressurization
FMEA ITEM CODE(S): 2.2.9.1

REV & DATE: J, 12-19-97
DCN & DATE:

RATIONALE FOR RETENTION

DESIGN:

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 G02 core is 6.32 inches in diameter and contains 1512 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.

- A, B: 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 82621021018. Material selected in accordance with MMC-ET-SE16 and controlled per MMMA Approved Vendor Product Assurance Plan assures conformance of composition, material compatibility and properties. Fusion welding is controlled by STP5502. Vitrolube is applied to component mating surfaces. Compatibility testing for oxygen service is specified per (NHB 8060.1).
- 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. Procurement of fasteners is governed by material fabrication, processing, test and inspection specifications per MMC Standards 26L2 and 26L17.

TEST:

The G02 Diffuser is qualified. Reference COO MMC-ET-TM06-090.

Development Flow Test: Testing of one diffuser included a nitrogen flow test (13.6 lb/sec) to simulate the oxygen operating environment and a helium flow test (to simulate prepress condition between .5 to .6 lb/sec for LO2 and 1.0 to 1.5 lb/sec for LH2 respectively). There was no evidence of damage or permanent deformation. The test criteria exceeded the requirements for the G02 diffuser. (Memo MMC-3541-79-052).

Qualification: Testing of a similar diffuser included one thermal shock cycle (-324°F to 63°F) and sine and random vibration (at 600°F). No anomalies were noted during post vibration inspection of the diffuser (MMC-ET-RA09-12).

Testing of a flight configured diffuser included 3 minutes of sine and random vibration at X axis and 6 minutes of sine and random vibration at Y-Z axis (at 600°F). No screen or frame structural degradation was noted (MMC-ET-RA09-72)

Final qualification of the G02 diffuser was accomplished by MPTA Static firings 6, 7 and 8. The diffuser was exposed to ET flight environments for a total firing time of 27.5 minutes. There was no evidence of damage or permanent deformation (Memo MMC-3543-80-006).

Acceptance

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

CRITICAL ITEMS LIST (CIL)
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SYSTEM: Propulsion/Mechanical
SUBSYSTEM: CO2 Pressurization
FMEA ITEM CODE(S): 2.2.9.1

REV & DATE: J, 12-19-97
DCN & DATE:

RATIONALE FOR RETENTION

INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

- A: Inspect welding (drawing 80921021030).
- A: Witness penetrant inspection (drawing 80921021030).
- B: Witness lubricant application (drawing 80921021030).

Lockheed Martin Procurement Quality Representative:

- A: Verify installation and witness torque (drawing 80921021030).
- A: Verify x-ray results (drawing 80921021030).
- A, C: Verify materials selection and verification controls (MMC-ET-SE16, drawing 80921021030, and standard drawings 26L17 and 26L2).

MAF Quality Inspection:

- B, C: Verify installation and witness torque (drawing 80921021045)

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.