CRITICAL ITEMS LIST (CIL)

SYSTEM:	Propulsion/Mechanical	FUNCTIONAL CRIT:	1
SUBSYSTEM:	GH2 Pressurization	PHASE(S):	a, b, c
REV & DATE:	J, 12-19-97	HAZARD REF:	P.03, P.06, P.07, S.04, 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 or LH2 tank structural failure.
Loss of mission due to premature engine shutdown caused by loss of NPSP.
c) Loss of life due to ET impact outside designated footprint.

TIME TO EFFECT: Seconds

FAILURE CAUSE(S):
A: Structural Failure of Hardline Component
B: Flange Mating Surface Defects
C: Fracture of One Attachment Bolt
D: Structural Failure of Slide Mount Housing
E: Structural Failure of Mount Fitting

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Transports GHe/GH2 during prelaunch and GH2 during ascent to maintain LH2 tank ullage pressure requirements.

FMEA ITEM CODE(S)	PART NO.	PART NAME	QTY	EFFECTIVITY
2.7.7.1	PD4800205-089	Aft Straight Line (Crossbeam)	1	LWT-54 & Up

REMARKS:

SYSTEM: Propulsion/Mechanical
SUBSYSTEM: GH2 Pressurization
FMEA ITEM CODE(S): 2.7.7.1

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

RATIONALE FOR RETENTION

DESIGN:

A: The Aft Straight Line Assembly consists of fixed flanges, straight tube sections, and a fixed support bracket. The line is installed to a fixed support mounting bracket beneath the ET/Orbiter crossbeam assembly. The line assembly is fabricated from ARMCO 21-6-9 CRES and is an all welded configuration. Emphasis has been placed on joint geometry to enhance weld integrity. The line assembly has been designed to meet the required ultimate safety factors (1.4 for loads and 1.5 for pressure) and the required yield safety factors (1.1 for loads and 1.25 for pressure) (ET Stress Report 826-2188 and ET10-SR-0002, Arrowhead). The line assembly also meets the other operational and nonoperational requirements defined per PD48000205. Materials selected in accordance with MMC-ET-SE16 and controlled per MMA Approved Vendor Product Assurance Plan assures repetitive conformance of composition, material compatibility and properties. Fusion welding specifications, processes, and quality controls are in accordance with MPS-MPQ-103 (Arrowhead).

B: Flange mating seal surface flatness, waviness and finish are specified on Engineering drawings to assure performance within the capability of the seal.

C: Attachment fasteners were selected from the approved standard parts list (ASPL 826-3500), installed per STP2014 and torqued using values specified on engineering drawings.

D: The slide mount housings provide for attachment of the pressurization line to the crossbeam support assemblies at slide mount locations. The housing is made from 304L CRES and was designed to meet the required yield 1.1 and ultimate 1.4 safety factors for loads (Barry Stress Report; WD 92885-1-001). Materials selected in accordance with MMC-ET-SE16 assures repetitive conformance of composition and properties.

E: The support assemblies provide for attachment of the GH2 pressurization line assembly to the crossbeam at a fixed and adjacent sliding location. The assemblies are machined from 7075 T7351 aluminum alloy plate and were designed to meet the required yield 1.1 and ultimate 1.4 safety factors for loads (ET Stress Report 826-2188). Materials selected in accordance with MMC-ET-SE16 assures repetitive conformance of composition and properties.

TEST:

The Aft Straight Line Assembly is qualified. Reference COQ MMC-ET-TM06-084.

Qualification: Testing of one line assembly included 2 proof loads/operating pressure and leakage (no bubbles helium at 300 psig) for acceptance, an electrical bonding (for impedance) test and 2 ultimate axial load tests (6,555 lb at 920 psig and 25,025 lbs respectively). There was no evidence of collapse, rupture or deformation (MMC-ET-RA09-95). PD4800205-089 is qualified by analysis/similarity to PD4800205-030.

The slide mount housing is qualified as a subassembly of the slide mount assembly (QSL54-1).

Acceptance:

Vendor - (Line Assembly):

A: Perform proof loads/operating pressure test and leakage test (ATP 14205-389, Arrowhead).

MAF - (Line Assembly):

B: Perform dual seal leakage rate test for flange joints after installation (MMC-ET-TM04k).

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

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SUBSYSTEM:	GH2 Pressurization	DCN & DATE:	
FMEA ITEM CODE(S):	2.7.7.1		

RATIONALE FOR RETENTION

INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

A-E: Verify materials selection and verification controls (MMC-ET-SE16, drawing 80911071881, Arrowhead drawings 14205-63, 14205-69, 14205-43, 14205-89, 14205-59, and standard drawings 26L2, 26L3 and 54L1).

A: Inspect welding (MPS-MPQ-103, Arrowhead).

A: Penetrant inspect welding (MIL-I-6866, Type I, Method A, Group VI).

A: Verify X-Ray results (QCI-16-057, Arrowhead).

B: Inspect mating surface flatness, finish and dimensions (drawing 14205-69 and 14205-63, Arrowhead).

Lockheed Martin Procurement Quality Representative:

A, B: Witness proof load/operating pressure and leakage tests (ATP 14205-389, Arrowhead).

MAF Quality Inspection:

B: Inspect sealing surfaces for freedom of nicks, radial scratches or other imperfections (acceptance drawing 82620000001).

B, C: Verify installation and witness torque (drawing 80921021009).

B, C: Witness seal flange leakage tests (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.