

CRITICAL ITEMS LIST (CIL)

SYSTEM:	Venting	FUNCTIONAL CRIT:	1
SUBSYSTEM:	Intertank	PHASE(S):	a, b
REV & DATE:	J, 12-19-97	HAZARD REF:	S.01, S.05
DCN & DATE:	002, 2-28-99		
ANALYSTS:	P. Gandhi/E. Nowell		

FAILURE MODE: Blockage

FAILURE EFFECT:

- a) Loss of mission and vehicle/crew due to excessive delta pressure across LH2 tank forward dome resulting in fire/explosion.
- b) Loss of mission and vehicle/crew due to overpressure causing structural failure of Intertank.

TIME TO EFFECT: Seconds

FAILURE CAUSE(S):

- A: Foreign Obstruction
- B: Out of Tolerance TPS on LO2 Feedline
- C: Out of Tolerance Dimensional Clearance between Rub-Strips and Feedline

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Provides venting for Intertank during prelaunch purge operations and ascent phase.

<u>FMEA ITEM CODE(S)</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY</u>	<u>EFFECTIVITY</u>
7.2.1.1	80911001349-029	LO2 Feedline Fairing	1	LWT-54 thru 88, 600 & Up
	-509	Installation (LO2 Feedline Fairing Leak Area)	1	LWT-89 thru 599

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

SYSTEM: Venting
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FMEA ITEM CODE(S): 7.2.1.1

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

DESIGN:

The Intertank min-max vent/leak areas (compartment venting reports MMC-ET-SE05-95 and MMC-ET-SE05-579) are designed to provide an acceptable compromise between ascent phase venting and ground purge constraints. A hydrogen dome wall collapse pressure of .21 psid (NMMMA Memo 3512-82-032) limits the Intertank compartment overpressure during ground purge operations. Allowable air ingestion is limited to that volume of air which will not cause the Intertank oxygen concentration to exceed 4.0 percent of the Intertank volume.

External pressure coefficients and discharge coefficients applied at the LO2 feedline fairing are documented in MMC-ET-SE05-95 and MMC-ET-SE05-579. The LO2 feedline fairing leak area is defined by the gap formed between the LO2 feedline and the rub-strips.

Vent system performance verification is by analysis (MMC-ET-SE05-95 for LWT-54 thru 88 and MMC-ET-SE05-579 for LWT-89 & Up).

- A: Intertank cleanliness is verified by MPP 80913001005. The annular shape of the LO2 feedline fairing leak area would be difficult to block. Heated GN2 purge precludes ice build-up around the leak area.
- B: Engineering requirements (drawing 80971028464 for LWT-54 thru 63; drawing 80971028465 for LWT-64 & Up) assure that the feedline circumference in the leak area will be maintained between 57.5 inches and 58.8 inches. Approximately 15 inches of the feedline (where it enters the fairing) is fabricated and machined to these requirements to allow for line movement.
- C: Rub-strips (drawing 80911001344) are cut to provide the required clearance for each tank (during final assembly per drawing 80911001349) such that the leak area around the LO2 feedline is between 38.79 and 43.02 square inches.

TEST:

The LO2 Feedline Fairing Installation (LO2 Feedline Fairing Leak Area) is certified. Reference MCS MMC-ET-TM08-L-5148 (LWT-54 thru 88) and MCS MMC-ET-TM08-L-5513 (LWT-89 & Up).

MPTA tests in 1978 (MMC-ET-SE05-86) verified the min-max vent/leak area predictions, discharge coefficients, and the purge math model.

DF: flight data (FEWC Flight Evaluation Report) updated and verified the Intertank ascent venting model.

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INSPECTION:

MAF Quality Inspection:

- A: Inspect (visually) Intertank internal cleanliness during post installation shakedown inspection (MPP 80913001005).
- A: Inspect (visually) leak area for freedom of obstruction (MMC-ET-TM04K and drawing 80900000000).
- B: Dimensionally inspect feedline circumference (MMC-ET-TM04K).
- C: Dimensionally inspect gaps between rub-strips and LO2 feedline (MMC-ET-TM04K and drawing 80911001349).

Launch Site:

- A: Inspect (visually) Intertank internal cleanliness (OMRSD File IV).
- A: Inspect (visually) leak area for freedom of obstruction (OMRSD File IV and drawing 80901019008).

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.