CRITICAL ITEMS LIST (CIL)

SYSTEM:	Propulsion/Mechanical	FUNCTIONAL CRIT:	1
SUBSYSTEM:	External Tank Carrier Assembly	PHASE(S):	a, c
REV & DATE:	J, 12-19-97	HAZARD REF:	S.06
DCN & DATE:	004, 6-30-99		
ANALYSTS:	E. Flauss/H. Claybrook		

FAILURE MODE: Leakage

FAILURE EFFECT:
a) Loss of mission and vehicle/crew due to fire/explosion.
c) Loss of life due to ET impact outside of designated footprint.

TIME TO EFFECT: Seconds

FAILURE CAUSE(S): Structural Failure of Housing

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Connects ET GH2 vent line to ground vent system and provides separation at lift-off.

FMEA ITEM CODE(S)	PART NO.	PART NAME	QTY	EFFECTIVITY
2.15.4.1	PD4800173-010	ET Vent Disconnect	1	LWT-54 thru 107
	RR42690-2		1	LWT-108 thru 114
	80923021050-009		1	LWT-115 & Up

REMARKS:

SYSTEM:	Propulsion/Mechanical	REV & DATE:	J, 12-19-97
SUBSYSTEM:	External Tank Carrier Assembly	DCN & DATE:	001, 6-15-98
FMEA ITEM CODE(S):	2.15.4.1		

RATIONALE FOR RETENTION

DESIGN:

The ET vent disconnect is functionally identical to the disconnect used on the Saturn II Booster for the Apollo Program. The disconnect was modified to use a flange mounting method to facilitate installation to the Intertank carrier plate assembly. The disconnect mates the ground vent system to the Intertank carrier assembly interface. The vent disconnect is designed (while mated) to operate with internal pressures ranging from 0 to 37 psig and to withstand proof pressure of 56 psig and burst pressure of 74 psig without rupture. A mechanical stop is provided to retain the ground vent disconnect's spring loaded check valve in the open position.

The disconnect housing is fabricated from A356-T61 aluminum alloy, penetrant inspected, and is designed to the required yield (1.1) and ultimate (1.4) safety factors (ET Stress Report 826-2188, and Lear Siegler Report TR-2105). Materials selected in accordance with MMC-ET-SE16 and controlled per MMMA Approved Vendor Product Assurance Plan assures conformance of composition, material compatibility and properties.

TEST:

The ET Vent Disconnect (flight side) is qualified as a subassembly to the total vent disconnect assembly. Reference COQ MMC-ET-TM06-027.

Development: Testing of a disconnect assembly (ground and flight sides) included alignment, mating and sealing force, proof pressure, leakage, (at ambient and cryogenic), for acceptance; misalignment, mating and sealing force, leakage (at ambient and cryogenic), bonding test, alignment, and burst pressure. There was no evidence of structural failure or leakage (Lear Siegler Inc. TR-2161).

Qualification: Testing of two disconnect assemblies (ground and flight sides) include alignment, initial and final mating and sealing force, proof pressure, leakage (at ambient and cryogenic) for acceptance; proof pressure, bonding, leakage, random vibration, static and dynamic load, 100 operating life cycles (50 at ambient and 50 at cryogenic) and burst pressures. There was no evidence of structural failure or leakage (MMC-ET-RA09-32).

System Qualification: The ET umbilical and intertank access arm system qualification testing was conducted at the Launch Equipment Test Facility (LETF) at KSC. The objectives were to verify the KSC ground system hardware design and to perform integrated testing with the ETCA. Testing was conducted in a series of 13 tracking tests and 17 disconnect tests simulating various vehicle configurations with motions for anticipated environmental, test, and launch conditions from predicted worst-case vehicle stacking and on-pad positioning offsets including 2.75 seconds of simulated engine firing.

Test results and data analysis verified that the KSC design/hardware is satisfactory, and when integrated with the MSFC flight umbilical, the system meets all of the specified requirements and is qualified for Space Shuttle operations at launch sites (KSC-DD-119-TR).

Acceptance:

Vendor - (Flight Side):

Perform proof pressure and leakage tests with pressure cap installed (Lear Siegler TP-995 LWT-54 thru 107, 80923021041 LWT-108 thru 114); 80923021019 for LWT-115 & Up.

Launch Site:

Perform leakage test (OMRSD File IV).

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RATIONALE FOR RETENTION

INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

Verify material selection and verification controls (MMC-ET-SE16 and drawing RR42522, Lear Siegler for LWT-54 thru 114 and drawing 80923021047 for LWT-115 & Up).

Penetrant inspect after machining (MIL-I-6866 Type I, Method A).

Lockheed Martin Procurement Quality Representative:

Witness proof pressure and leakage test (Lear Siegler TP-995 LWT-54 thru 107, 80923021041 LWT-108 thru 114); 80923021019 for LWT-115 & Up

MAF Quality Inspection:

Verify installation (drawing 80923021026 for LWT-54 thru 114; 80923021051 for LWT-115 & Up).

Launch Site:

Verify installation of GUCA (drawing 82629021109).

Witness leakage test (OMRSD File IV).

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.