

CRITICAL ITEMS LIST (CIL)

SYSTEM: Propulsion/Mechanical
 SUBSYSTEM: LO2 Propellant Feed
 REV & DATE: J, 12-19-97
 DCN & DATE:
 ANALYSTS: J. Attar/H. Claybrook

FUNCTIONAL CRIT: 1
 PHASE(S): a, b
 HAZARD REF: P.06

FAILURE MODE: Failure to meet LO2 cleanliness specification

FAILURE EFFECT: a) Loss of mission and vehicle/crew due to fire/explosion resulting from particle impacting feedline wall.
 Loss of mission and vehicle/crew due to fire/explosion resulting from debris damaging turbo pump.
 b) Loss of mission and vehicle/crew due to fire/explosion resulting from particle impacting feedline wall.
 Loss of mission and vehicle/crew due to fire/explosion resulting from debris damaging turbo pump.

TIME TO EFFECT: Immediate

FAILURE CAUSE(S): A: Contaminated LO2 Feedline
 B: Contaminated Helium Inject Line Downstream of Filters

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Provides LO2 to Orbiter for drain and engine demand.

| <u>FMEA ITEM CODE(S)</u> | <u>PART NO.</u> | <u>PART NAME</u> | <u>QTY</u> | <u>EFFECTIVITY</u> |
|--------------------------|-------------------------|-------------------------------|------------|-------------------------------|
| 2.1.20.1 | 80921011009-009 -500 | LO2 Feedline Instl | 1 1 | LWT-54 thru 88 LWT-89 & Up |
| 2.1.21.1 | 80921011009-019 -510 | LO2 Feedline Instl | 1 1 | LWT-54 thru 88 LWT-89 & Up |
| 2.1.22.1 | 80923011900-009 | LO2 Feedline Instl | 1 | LWT-54 & Up |
| 2.1.23.1 | 80921011913-030 -500 | LO2 Feedline Instl | 1 1 | LWT-54 thru 88 LWT-89 & Up |
| 2.1.24.1 | 80912630001-001 | Suction Fitting | 1 | LWT-54 & Up |
| 2.1.25.1 | 80921011935-009 -010 | Filter Check Valve Assy | 2 2 | LWT-54 thru 73 LWT-74 & Up |
| 2.1.26.1 | 80921011941-040 -060 | Filter Check Valve Assy Instl | 1 1 | LWT-54 thru 73 LWT-74 & Up |
| 2.1.27.1 | 80921011930-010 | GHe Inject Instl | 1 | LWT-54 & Up |

REMARKS:

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

| | | | |
|--------------------|---|-------------|-------------|
| SYSTEM: | Propulsion/Mechanical | REV & DATE: | J, 12-19-97 |
| SUBSYSTEM: | LO2 Propellant Feed | DCN & DATE: | |
| FMEA ITEM CODE(S): | 2.1.20.1, 2.1.21.1, 2.1.22.1, 2.1.23.1, 2.1.24.1, 2.1.25.1, 2.1.26.1, 2.1.27.1 | | |

RATIONALE FOR RETENTION

DESIGN:

- A: The LO2 feed system consists of the tank suction fitting and nine line components including three flexible assemblies, four straight line sections, an aft cast elbow, ET/ORB disconnect assembly and associated attachment hardware. Bellows sections provided on each flexible feedline accommodate installation tolerances, temperature induced shrinkage and flight motions. The feedlines provide for the transfer of LO2 to the tank during propellant loading and transfer of LO2 from the tank to the Orbiter during engine operation. Propellant quality supplied to the Orbiter from the tank is controlled through the use of a 800 micron screen.
- B: The Helium Inject system provides helium from the ground umbilical to the aft end of the LO2 feedline to prevent geysering during loading and hold before launch. Filters, check valves, tube assemblies and associated connecting hardware are installed at the aft end. Filters provide filtration and quad redundant check valves prevent backflow of GO2/LO2 during flight. Penetration into the feedline elbow is downstream of the 800 micron propellant screens.
- A, B: Cleanliness of the LO2 tank and feedline assemblies downstream of the propellant screens, and helium inject system components downstream of the filters is specified for oxygen service. Maintaining cleanliness is specified for vehicle assembly and for vehicle processing at the launch site.

TEST:

Installation drawings listed as part numbers for these item codes, except the 80921011935-009/010 filter check valve assembly, are certified for cleanliness failure modes by HCS MMC-ET-TM08-L-P017. The Suction Fitting, item code 2.1.24.1 for LWT-89 & Up, is certified by HCS MMC-ET-TM08-L-S501. The filter check valve assembly, item code 2.1.25.1, is certified for cleanliness by COO MMC-ET-TM06-099. Part numbers for the components to be inspected for cleanliness in each installation drawing are listed below.

- | | |
|----------|---|
| 2.1.20.1 | LO2 Feedline Installation *** PD4800175-030, -089, -500 ** 80921011900-009 ** 80921011900-010 ** 80921011900-019 ** 80921011900-020 *** PD4800175-069, -090, -509 |
| 2.1.21.1 | LO2 Feedline Installation V527-415273 ME261-0045 |
| 2.1.22.1 | LO2 Feedline Installation *** PD4800175-080, -099, -510 |
| 2.1.23.1 | LO2 Feedline Installation ** 80921011911-009 |
| 2.1.24.1 | Suction Fitting 80912630001-001 |
| 2.1.25.1 | Filter Check Valve Assembly * 80921011935-009 |
| 2.1.26.1 | Filter Check Valve Assembly Installation * 80921011942-001 ** 57L7-4J * 80921011938-002 ** 80921011931-039 ** MS26394J4 |
| 2.1.27.1 | GHe Inject Installation ** 80921011934-039 ** 57L6-4J |

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

TEST: (cont)

Acceptance:

Vendor:

A, B: Perform Particulate and NVR Test on applicable subsystem elements (STP5008).

MAF:

A, B: Perform Particulate and NVR Test on applicable subsystem elements (STP5008 and 5009).

INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

A, B: Inspect cleanliness for items marked with * above (STP5008) and items marked with *** (MPS-MPO-105).

MAF Quality Inspection:

A, B: Verify component cleanliness for items marked with ** above (STP5008).

A, B: Witness component interior cleanliness maintained during installation (STP5011).

A, B: Verify cleanliness of tank interior for FMEA Item 2.1.24.1 (drawing 80912005009 and STP5009).

A, B: Inspect (visually) components for foreign objects and debris (STP5011).

Launch Site:

A, B: Visually inspect 17 inch umbilical and aft elbow for foreign objects and debris (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.