

Critical Items List (CIL) Sheet

Critical Item: HGDS Disconnects

B/L: 005.00

Total Quantity: 3

System: HGDS

Find Number: S0517PD140, S0517PD180, S0517PD181

Criticality Category: 1S

FMEA/CIL No: STS85-0205A

System/Area: T-0 Carrier Plate

NASA

PMN/ S70-0517

Part No: MC276-0021-0612

Name: LH2 T-0 Umbilical

Mfg/ Lear Siegler

Drawing/

Part No: 74353000-101

Sheet No: GW70-580517

Function: Provides connection for GN2 sample line from the Mid-Body, Payload and AFT Hazardous Gas Detection System.

Critical Failure Mode/Failure Mode No: Leakage/Disconnect failure during ET fueling operations and countdown, or draining of ET after a pad abort/ STS88-0205.001

Failure Cause: Mechanical failure; seal failure

Failure Effect: Unable to detect H2 leakage in the specified areas. Possible fire/explosion during fueling operations, countdown or draining of ET after a pad abort.

ACCEPTANCE RATIONALE

Design: - Disconnect operating parameters:

	Design	Actual
Flow rate:		12 lb/sec
Operating pressure:	100 psig	vacuum
Proof pressure:	765 +/- 75 psig	
Burst pressure:	3000 psig	
Useful life:	2000 cycles	
Shelf life:	12 years	

Specification drawing MC276-0021-0612 required that the design material for the Q/D shall be suitable for use with SE-S-0073 water, MIL-P-27401 GN2, MIL-P-27407 helium fluids at temperatures ranging from minus 50 degrees F to plus 120 degrees F. The Q/D device is also designed to maintain system interface integrity and provides for an angular and axial misalignment self-correct seal for proper operation.

Test: The MC276-0021 specification required the following tests:

- Each disconnect was proof pressure tested (mated)
- Each disconnect was mated operational tested
- Each disconnect was external leakage tested (mated)
- Each disconnect was external leakage tested (unmated)
- Each disconnect was tested for salt fog, sand and dust per MIL-STD-509
- Each disconnect was random vibration tested and shock tested
- Each disconnect was tested for mated flow
- Each disconnect was thermal cycle tested
- Each disconnect was operation life tested
- Each disconnect was burst pressure tested

MC276-0021-0612 quick disconnect were production and acceptance tested using Lear Siegler test plan TP-1002. The test plan from Lear Siegler tested the following: visual inspection for cleanliness and general configuration of end item, proof pressure, operation test and leakage test, flow and pressure drop test and environmental testing.

Inspection:

The following items were certified by inspection during manufacturing and assembly of quick-disconnect: Raw material, machine items and fabricated parts checked to design envelope dimensions, contaminant control to level 300 for internal surface and mandatory inspection points were included in the assembly procedures. Critical processes were certified by inspection are as follows: passivation of CRES parts, heat treatment of springs, anodizing, chrome plating and application of light film lube on threaded parts.

Each disconnect is inspected per V3517.004, operation 20.

Seals are replaced after each flow

OMRSD File VI TBD.

Failure History:

Current data on test failures, unexplained anomalies, and failures experienced during ground processing activities can be found in the PRACA database. The PRACA database was researched and no failures for this application were found in the critical failure mode

The GIDEP failure data interchange system has been researched and no failure data was found on this component in the critical failure mode.

Operational Use:

The HGDS is checked out prior to each use, including calibration of the sensors. During operation, the sample flow is monitored. If flow rate changes, i.e., transit times increase; the condition will be detected and analyzed for action to be taken.

-Correcting Action: None

-Timeframe:

If the sample flow ceases to the HGDS during fueling operations, launch countdown or ET drain operations, the system becomes vulnerable to fire or explosion for approximately 18 seconds.. Any H2 leak in the system would not be detectable for 18 seconds. This requires the HGDS QD to fail, an H2 leak, and an ignition source in the vicinity of the leak.