Critical Items List (CIL) Sheet

Critical Item: OV/ET Purge Plate Disconnect
B/L: 005.00
Total Quantity: 1
System: MPS
Find Number: S0517PD886
Criticality Category: 1S

FMEA/CIL No: STS85-0205A
System/Area: MPS

NASA
Part No: MC276-0021-0612
PMN/ S70-0517
Name: LH2 T-0 Umbilical

Mfg/ Lear Siegler
Part No: 74353000-101
Drawing/
Sheet No: GW70-580517

Function: Provides connection to PD 405 for He purge line from MLP to OV/ET disconnect cavity plate.

Critical Failure Mode/Failure Mode No: Leakage during ET fueling operations and countdown, or draining of ET after a pad abort/ STS88-0205.002

Failure Cause: Mechanical failure; seal failure

Failure Effect: Unable to maintain inert environment in OV/ET disconnect cavity. Possible fire/explosion during fueling operations, countdown or draining of ET after a pad abort if LH2 leak is also present.

ACCEPTANCE RATIONALE

Design: - Disconnect operating parameters:

	Design	Actual
Flow rate:		12 lb/sec
Operating pressure:	100 psig	40 psig
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 was 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.

Audible leak test performed during system checkout per V1149.

Inspection:

The following items were certified by inspection during manufacturing and assembly of quick-disconnect: Raw material, machine items and fabricated parts check to design envelope dimensions, contaminant control to level 300 for internal surface and mandatory inspection points were included in the assembly procedures. Critical processes that 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.

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 in the critical mode for this application were found. Other QDs of this basic part number, but a different size, have recorded failures in which leakage occurred, but the operating parameters were also different.

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 ground crew inspects the system to be purged and determines the required pressure to purge system and sets system to that pressure. V1149 requires leak check every flow. During operation, the purge flow is monitored. If flow rate changes, or Hazardous Gas Detection System transit times increase, the condition will be detected and analyzed.

OMRSD File VI TBD.

-Correcting Action: None

-Timeframe:

If the purge flow ceases to the OV/ET disconnect cavity during fueling operations, launch countdown or ET drain operations, the system becomes vulnerable to fire or explosion for approximately 18 seconds. This requires an H2 leak and an ignition source in the vicinity of the OV/ET disconnect.