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FMEA #: 35-570-0529-14-a-01

END ITEM EFFECTIVITY:
X X X
OV102 OV103 OV104

MODEL NO/NAME: 570-0529, LO₂ T-0 Umbilical Carrier Plate

ORBITER SUBSYSTEM: Aft Fuselage

PART NUMBER:	PART NAME:	REFERENCE DESIGNATION:	QUANTITY (PER SYSTEM)
259T-8TT	Check Valve	---	2

CRITICALITY NUMBER: 18

FUNCTION: Provide monodirectional N₂ flow from purge manifold to 8 inch main LO₂ fill and drain QD purge can.

CRITICAL FAILURE MODE: Stuck closed (loss of purge).

CAUSE: Mechanical shock

FAILURE EFFECT ON:

- (A) END ITEM: Possible icing at contact areas of purge can seals.
- (B) INTERFACING SUBSYSTEM(S): None.
- (C) ORBITER: Possible icing, damage to orbiter TPS. Excessive leaking O₂ undiluted by GN₂ provides a hazardous explosive environment which could result in loss of orbiter due to explosion.
- (D) PERSONNEL: Hazard to crew during descent depending on extent of TPS damage. Loss of crew life due to (C).

HAZARDS: Cutoff of purge could lead to ice build-up.

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DESIGN: The relaxed state of the check valve is closed due to a spring force. It is designed such that increased backflow pressure increases sealing efficiency because of a metal-to-metal seat contact. The body is made of 303 CRES, the spring is 302 CRES, and the O-Rings are of Buna N. It may be mounted in any position, is designed for most gases and is quiet when switching open or closed. The design features a positive stop in both fully open and fully closed positions. This ensures no failure in the open and closed positions and eliminates spring and seal fatigue. The Buna N O-Ring is situated to absorb any mechanical shock waves during operation. It is designed to operate in the -40°F to +250°F temperature range (temperature during operation -20°F to 100°F) and 0-3000 psig rated operating pressure. Proof is 1 1/2 times rated operating pressure and burst is 2 1/2 times rated operating pressure.

TEST:

ACCEPTANCE TESTS: Tests per Circle Seal Control part specification include: proof pressure, burst pressure, leakage, spring strength. Check valve shall be pressurized to 4,500 PSIG, held for two minutes. There shall be no deformation or leakage failure. Test will be observed and verified by inspection.

CHECK-OUT TESTS: The check-out test is performed at the T-0 Umbilical Carrier Plate final assembly level per document No. ML0208-0012.

CERTIFICATION OR QUALIFICATION TESTS: The check valve is in compliance with T-0 Umbilical Carrier Plate document ML0208-0012 and is certified per Rockwell CR No. 33-580529-001E.

INSPECTION: Items are inspected for identification and damage. The check valve must meet the same cleanliness requirements as tube assemblies. The valves are disassembled for cleaning, and O-rings replaced as necessary prior to reassembly and pressure test. Despite the device's simplicity, it has a repair kit so that consistent operation is maintained.

OPERATIONAL USE: Cutoff of liquid oxygen flow through carrier plate to preclude leakage, icing. Securing of LO₂ system per S1004.

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During servicing only, failure of the umbilical purge system at the 8 inch disconnect interface area will cause the vehicle plate to reach cryogenic temperatures of -297°F (LO_2) causing icing conditions on vehicle 8 inch disconnect interface seal resulting in possible tearing of vehicle interface seal at T-0 umbilical disconnect mode. This condition is controlled by monitoring of the 750 PSIG GN_2 supply pressure for the Facility tanks to verify GN_2 flow.

FAILURE HISTORY: No failures of these devices have been reported.