

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: M4-1BG-FLO10-X

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC

REVISION : 1 11/12/91

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
■ SRU :	FILTER) 02 WINTEC)	MC286-0054-0001 24267-605

FM

PART DATA

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
FILTER, O2

- REFERENCE DESIGNATORS: 40V45FLO10
- : 40V45FLO20
- : 40V45FL410
- : 40V45FL460
- : 40V45FL610
- : 40V45FL763
- : 40V45FL773
- : 40V45FL783
- : 40V45FL793

■ QUANTITY OF LIKE ITEMS: 1
ONE PER TANK

■ FUNCTION:
PROTECTS THE FCP'S AND ECLSS FROM ANY PARTICULATE CONTAMINATION WHICH
MAY BE PRESENT IN O2 TANKS.

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SUBSYSTEM: ELECTRICAL POWER GENERATION - CRYO, GENERIC REVISION# 1 11/12/91 R

ITEM NAME: FILTER, O2

CRITICALITY OF THIS FAILURE MODE: 1R2

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- FAILURE MODE:
PLUGGED OR RESTRICTED

MISSION PHASE:

PL	PRELAUNCH
LO	LIFT-OFF
OO	ON-ORBIT
DO	DE-ORBIT
LS	LANDING SAFING

- VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS
: 105 ENDEAVOUR

- CAUSE:
CONTAMINATION.

- CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

- REDUNDANCY SCREEN A) PASS
- B) PASS
- C) PASS

PASS/FAIL RATIONALE:

- A)
- B)
- C)

- FAILURE EFFECTS -

- (A) SUBSYSTEM:
SUBSYSTEM DEGRADATION - LOSS OF CAPABILITY TO DISTRIBUTE CONSUMABLES FROM ONE O2 SUPPLY TANK.
- (B) INTERFACING SUBSYSTEM(S):
REDUCED QUANTITY OF O2 CONSUMABLES AVAILABLE FOR THE ECLSS AND FUEL

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CELL POWERPLANT OPERATION.

- (C) MISSION:
MINIMUM DURATION MISSION INVOKED.
- (D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT AFTER FIRST FAILURE.
- (E) FUNCTIONAL CRITICALITY EFFECTS:
COMPLETE BLOCKAGE MAY RESULT IN LOSS OF CREW/VEHICLE IF COMBINED WITH A FAILED CLOSED TANK RELIEF VALVE (TANK RUPTURE). ALSO, FAILURE OF THE O2 TANK 1 OR 2 FILTER IN CONJUNCTION WITH THE MANIFOLD ISOLATION VALVE IMMEDIATELY DOWNSTREAM FAILING CLOSED RESULTS IN INSUFFICIENT O2 FLOW TO THE LAUNCH/ENTRY SUIT (LES). LOSS OF THIS EMERGENCY SYSTEM MAY RESULT IN LOSS OF CREW/VEHICLE.

- DISPOSITION RATIONALE -

- (A) DESIGN:
DURING DEVELOPMENT TESTS, SUMP CAPACITY INCREASED FROM 0.204 CU IN. TO 0.944 CU IN. TO ADD TO CONTAMINANT CAPACITY. 12 MICRON ABSOLUTE FILTER ELEMENT REPLACED EVERY 25 MISSIONS OR AS DETERMINED BY SYSTEM CHECKOUT.

- (B) TEST:
QUALIFICATION TEST VERIFIED PRESSURE DROP LESS THAN 15 PSI AFTER INTRODUCTION OF 4 GRAMS OF AC FINE DUST AT MAXIMUM SYSTEM FLOW RATES.

ACCEPTANCE TEST VERIFIES LEVEL 200A CLEANLINESS BY PARTICLE COUNT AND NON-VOLATILE RESIDUE (NVR), BUBBLE POINT AND PRESSURE DROP ARE WITHIN TOLERANCE. DURING PANEL MODULAR ASSEMBLY, FILTER PERFORMANCE IS FURTHER VERIFIED.

CMRSD: PRSD FILTER FLOW VERIFIED IN FLIGHT.

- (C) INSPECTION:
RECEIVING INSPECTION
MATERIAL CERTIFICATIONS AND TEST REPORTS ARE REVIEWED TO VERIFY THAT MATERIAL COMPOSITION, DIMENSIONS, AND SURFACE CONDITIONS COMPLY WITH DESIGN REQUIREMENTS.

CONTAMINATION CONTROL
ACCOMPLISHMENT OF PREASSEMBLY CLEANING, VAPOR DEGREASING, AND ULTRASONIC CLEANING IS VERIFIED. PIECE PART CLEANLINESS IS CERTIFIED TO A LEVEL 200A (MAO110-301) BY AN NVR AND PARTICLE COUNT (50 ML FLUSH THROUGH A MILLIPORE FILTER); PIECE PARTS ARE INSPECTED FOR BURRS. COMPONENT COMPONENT ASSEMBLY, PACKAGING, AND SUBSEQUENT SUBASSEMBLY INSTALLATION

Handwritten notes:
A...
B...
C...
D...
E...

FM

Handwritten notes:
REPEATED
WORK
SW

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ARE ACCOMPLISHED IN 100,000 CLASS CLEANROOM ENVIRONMENTS. COMPLETED ASSEMBLY IS VERIFIED TO LEVEL 200A.

ASSEMBLY/INSTALLATION
NO HALOGENATED OR SULFONATED SOLVENTS OR METHYL ALCOHOL ALLOWED DURING ANY PROCESSING OF MESH PACK OR ELEMENT ASSEMBLY.

TESTING
ATP VERIFIES LEVEL 200A CLEANLINESS.

HANDLING/PACKAGING
PACKAGING IS INSPECTED FOR INTEGRITY AND COMPLIANCES WITH MATERIAL HANDLING REQUIREMENTS.

■ (D) FAILURE HISTORY:
THERE HAVE BEEN NO ACCEPTANCE TEST, QUALIFICATION TEST, FIELD OR FLIGHT FAILURES ASSOCIATED WITH THIS FAILURE MODE.

■ (E) OPERATIONAL USE:
REDUNDANT TANK HEATERS ENABLED TO SUPPLY REACTANTS TO THE FUEL CELLS. FOR A COMPLETELY PLUGGED FILTER, CREW WILL DEACTIVATE ASSOCIATED TANK HEATERS IN RESPONSE TO HIGH PRESSURE FAULT ANNUNCIATION.

- APPROVALS -

RELIABILITY ENGINEERING: M. D. WEST
DESIGN ENGINEERING : M. M. SCHEIERN
QUALITY MANAGER : O. J. BUTTNER
NASA RELIABILITY :
NASA SUBSYSTEM MANAGER :
NASA QUALITY ASSURANCE :

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