

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 06-1B-0720-X

SUBSYSTEM NAME: ARS - COOLING

REVISION : 7 06/26/92

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
■ LRU :	REGENERABLE CO2 REMOVAL SYSTEM	MC623-0016
■ LRU :	FILTER, ASSEMBLY	SV806019

PART DATA

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
REGENERABLE CO2 REMOVAL SYSTEM INLET FILTER

■ QUANTITY OF LIKE ITEMS: 1

■ FUNCTION:
THE REGENERABLE CO2 REMOVAL SYSTEM INLET FILTER PROTECTS DOWNSTREAM
COMPONENTS FROM CONTAMINATION.

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SUBSYSTEM: ARS - COOLING
LRU :REGENERABLE CO2 REMOVAL SYSTEM
ITEM NAME: FILTER, ASSEMBLY

CRITICALITY OF THIS
FAILURE MODE:2/2

■ FAILURE MODE:
RESTRICTED FLOW

MISSION PHASE:
00 ON-ORBIT

■ VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 105 ENDEAVOUR

■ CAUSE:
CONTAMINATION

■ CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

■ REDUNDANCY SCREEN A) N/A
■ B) N/A
■ C) N/A

PASS/FAIL RATIONALE:

■ A)
■ B)
■ C)

- FAILURE EFFECTS -

- (A) SUBSYSTEM:
REDUCED AIRFLOW THROUGH THE ADSORBING BED, THUS , REDUCED CO2 REMOVAL FROM CABIN AIR.
- (B) INTERFACING SUBSYSTEM(S):
INCREASE IN CABIN CO2 CONCENTRATION.
- (C) MISSION:
THE FILTER IS ACCESSIBLE FOR CLEANING IN FLIGHT. INABILITY TO CLEAN THE FILTER WILL RESULT IN EARLY MISSION TERMINATION.

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- (D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT.

- (E) FUNCTIONAL CRITICALITY EFFECTS:
INABILITY TO CLEAN THE FILTER WILL RESULT IN LOSS OF USE OF THE RCRS.
BACK-UP LIQH SYSTEM MAY BE USED UNTIL LANDING. A 1R3 PPP CRITICALITY
SCENARIO RESULTS AS LOSS OF ALL REDUNDANCY MAY CAUSE LOSS OF CREW/
VEHICLE.

- DISPOSITION RATIONALE -

- (A) DESIGN:

THE FILTER IS A 40/70 MICRON RATING, STAINLESS STEEL WIRE MESH. MESH SIZE IS 50 (0.0055 INCH) x 250 (0.0040 INCH) PER SQUARE INCH. PLAIN DUTCH SINGLE WEAVE FILTER CLOTH DESIGN. THE SCREENS ARE BONDED AND RIVETED TO THE INSIDE OF THE FILTER FRAME. A RUBBER SEAL IS BONDED TO THE SIDE OF THE FRAME TO PREVENT AIR BYPASS LEAKAGE. THE FILTER IS SLID INTO A BRAZED ALUMINUM BOX WHICH IS MOUNTED DIRECTLY AT THE INLET OF THE RCRS FAN. THE FILTER IS ACCESSIBLE FOR CLEANING IN FLIGHT.

- (B) TEST:

QUALIFICATION TEST FOR 100 MISSIONS:

THE RCRS FILTER (40/70 MICRON) IS CERTIFIED BY SIMILARITY WITH THE SHUTTLE CABIN FAN FILTER. QUALIFICATION TESTING WILL BE PERFORMED AT THE HIGHER ASSEMBLY LEVEL. RANDOM VIBRATION INCREASING AT 6 DB/OCT FROM 20 TO 45 HZ; CONSTANT AT 0.003 g²/HZ FROM 45 TO 1000 HZ; DECREASING AT -6 DB/OCT FROM 1000 TO 2000 HZ FOR THE DURATION OF 48 MINUTES PER AXIS FOR THREE ORTHOGONAL AXES.

ACCEPTANCE TEST:

SYSTEM PERFORMANCE TESTED TO VERIFY NO FLOW RESTRICTION. THE UNIT IS BURN IN/ RUN IN FOR 16-DAY MISSION SIMULATION WITH NO EVIDENCE OF DAMAGE OR DEFORMATION.

OMRSO:

ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSO AT SYSTEM LEVEL.

- (C) INSPECTION:

RECEIVING INSPECTION

INCOMING MATERIAL IDENTIFICATION AND CERTIFICATION VERIFIED BY INSPECTION. INCOMING MATERIAL DIMENSIONAL CHARACTERISTICS ARE VERIFIED AT VENDOR BY SOURCE INSPECTION. INCOMING PART ANODIZE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

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CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS ARE VERIFIED BY INSPECTION. TEST EQUIPMENT AND GAS CLEANLINESS VERIFIED BY INSPECTION. PRODUCT CLEANLINESS VERIFIED TO DRAWING REQUIREMENTS BY INSPECTION.

ASSEMBLY/INSTALLATION

FABRICATION/ASSEMBLY OPERATIONS VERIFIED BY INSPECTION.

CRITICAL PROCESSES

TORQUE OPERATIONS VERIFIED TO H. S. REQUIREMENTS. ADHESIVE BONDING PROCESSES VERIFIED BY INSPECTION. DIP BRAZING PROCESSING VERIFIED BY INSPECTION (VISUAL).

TESTING

FUNCTIONAL PERFORMANCE VERIFIED AT RCRS UNIT ATP. RCRS UNIT ATP WITNESSED AND VERIFIED TO BE WITHIN REQUIREMENTS BY INSPECTION. PROOF, LEAK AND FLOW TESTED AT FILTER ASSEMBLY LEVEL.

HANDLING/PACKAGING

HANDLING AND PART PROTECTION MAINTAINED PER H. S. REQUIREMENTS.

■ (D) FAILURE HISTORY:

THERE HAVE BEEN NO CASES OF RESTRICTED FLOW WITH IDENTICAL CABIN FAN FILTER.

■ (E) OPERATIONAL USE:

SHUT DOWN THE RCRS WHEN CABIN CO2 LEVEL IS UNACCEPTABLE. UTILIZE LIQH CANISTERS. THE LIQH CANISTER SUPPLY IS ADEQUATE FOR 3 DAYS.

- APPROVALS -

RELIABILITY MANAGER : T. J. EAVENSON
DESIGN ENGINEERING : P. J. CHEN
QUALITY ENGINEERING : E. OCHOA
NASA RELIABILITY :
NASA SUBSYSTEM MANAGER :
NASA QUALITY ASSURANCE :

K.L. Paster for 6/30/92
P. J. Chen
E. Ochoa for T.J. Eavenson 6/30/92
9/8/92
9/9/92
8/21/92
8/21/92