

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 06-1B-0860-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
■ SRU :	VALVE, CHECK	SV806957

PART DATA

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
ULLAGE SAVE COMPRESSOR OUTLET CHECK VALVE

■ QUANTITY OF LIKE ITEMS: 1

■ FUNCTION:
PREVENTS AIR BACK FLOW AT THE OUTLET OF THE ULLAGE SAVE COMPRESSOR.

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SUBSYSTEM: ARS - COOLING
LRU :REGENERABLE CO2 REMOVAL SYSTEM
ITEM NAME: VALVE, CHECK

CRITICALITY OF THIS
FAILURE MODE:2/2

- FAILURE MODE:
FAILS OPEN, INTERNAL LEAKAGE

MISSION PHASE:
00 ON-ORBIT

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

- CAUSE:
MECHANICAL SHOCK, VIBRATION, CORROSION, 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)

- MASTER MEAS. LIST NUMBERS: V61P2901A
: V61P2902A
: V61P2911A
: V61P2912A

- FAILURE EFFECTS -

- (A) SUBSYSTEM:
POSSIBLE REVERSE AIRFLOW FROM THE CABIN TO THE RCRS DURING BED
EQUALIZATION. THE CONTROLLER WILL SHUT DOWN THE RCRS.

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- (B) INTERFACING SUBSYSTEM(S):
NO EFFECT.
- (C) MISSION:
EARLY MISSION TERMINATION.
- (D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT
- (E) FUNCTIONAL CRITICALITY EFFECTS:
LOSS OF USE OF THE RCRS. BACKUP LIQH CANISTERS MUST BE USED FOR CO2 REMOVAL UNTIL LANDING. THE LIQH CANISTER SUPPLY IS ADEQUATE TO ACCOMMODATE A 3 DAY MISSION. LOSS OF ALL OF THESE BACKUPS MAY RESULT IN LOSS OF CREW/VEHICLE. A IR3 PPP CRITICALITY SCENARIO RESULTS.

- DISPOSITION RATIONALE -

- (A) DESIGN:
THE VALVE IS A POPPET FLOW TYPE WHICH IS SPRING LOADED CLOSED AND NON-JAMMING IN BOTH THE OPEN AND CLOSED POSITION. THE VALVE BODY MADE UP OF 6061-T6 ALUMINUM WITH 302 CRES SPRING. THE VALVE IS CIRCLE SEAL CARTRIDGE TYPE WITH A VITON SEAT AND A CRACKING PRESSURE OF 0.5 PSI.
- (B) TEST:
QUALIFICATION TEST: FOR 100 MISSION LIFE. VALVE IS BEING TESTED WHEN INSTALLED IN HIGHER RCRS ASSEMBLY LEVEL. RANDOM VIBRATION 48 MINUTES PER AXIS FOR 3 OTHOGONAL AXIS AT THE RATE OF PLUS 6 db/oct FROM 20 TO 45 HZ; CONSTANT AT 0.003 g2/HZ FROM 45 TO 1000 HZ; DECREASING AT THE RATE OF MINUS 6 db/oct FROM 1000 TO 2000 HZ. SHOCK TEST BY ANALYSIS AT 20 G TERMINAL SAWTOOTH PULSE FOR 11 MILLISECOND DURATION.

ACCEPTANCE TEST:
THE VALVE IS SUBJECTED TO PROOF PRESSURE AT 27 PSIA WHICH IS EQUIVALENT TO 1.5 TIMES THE MAXIMUM OPERATING PRESSURE WITH NO DEFORMATION OR DEGRADATION IN PERFORMANCE. LEAKAGE TEST IS VERIFIED DURING ACCEPTANCE TESTING WITH LEAK RATE NOT TO EXCEED 9 SCCM OF AIR AT 14.7 PSIA.
OMRSD:
ANY TURNAROUND CHECKOUT TESTING IN ACCOMPLISHED IN ACCORDANCE WITH OMRSD AT SYSTEM LEVEL.
- (C) INSPECTION:
RECEIVING INSPECTION
INCOMING PART IDENTIFICATION AND CERTIFICATION VERIFIED BY INSPECTION.

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PROOF, LEAK (INTERNAL/EXTERNAL), FLOW, CRACKING PRESSURE AND WEIGHT VERIFICATION PART OF VENDOR ATP. DIMENSIONAL VERIFICATION AND ATP VERIFIED BY H. S. SOURCE INSPECTION. ANODIZE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS VERIFIED BY INSPECTION. PART CLEAN LEVEL VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
INSTALLATION OPERATIONS VERIFIED BY INSPECTION.

CRITICAL PROCESSES
TORQUE OPERATIONS VERIFIED TO H. S. REQUIREMENTS.

TESTING
IN PROCESS TESTED AS PART OF COMPRESSOR/MUFFLER VERIFICATIONS (REVERSE LEAK). RCRS UNIT ATP VERIFIED BY INSPECTION. VIBRATION TEST OF ORIGINAL DEVELOPMENT TEST UNIT AS A DETAIL OF RCRS ASSEMBLY VERIFIED BY INSPECTION DURING QUALIFICATION TESTING.

HANDLING/PACKAGING
HANDLING AND PART PROTECTION PER H. S. REQUIREMENTS.

■ (D) FAILURE HISTORY:
NO FAILURE HISTORY.

■ (E) OPERATIONAL USE:
INSTALL NEW LIQH CANISTERS FOR CO2 REMOVAL. THE LIQH CANISTER SUPPLY IS ADEQUATE FOR 3 DAYS (MINIMUM).

- 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. Pappas for 6/30/92
: PJCh
: John E.L. Pappas for T.J. Eavenson 6/30/92
: John E.L. Pappas for T.J. Eavenson 9/8/92
: J.P. ... 9/8/92
: W. ... 8-21-92
: K...