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PRINT DATE: 01/12/94

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE
NUMBER: 06-1C-0118-X**

SUBSYSTEM NAME: ARS - ARPCS

REVISION: 9 01/12/94

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: N2/O2 CONTROL PANEL CARLETON TECHNOLOGIES	MC250-0002-1001 2720-0001
SRU	: VALVE, CHECK	2662-0001-13

PART DATA

**QUANTITY OF LIKE ITEMS: 2
ONE PER LOOP
TWO PER SUBSYSTEM**

**FUNCTION:
OXYGEN CHECK VALVE AND FILTER (1.6)**

**ALLOWS GAS FLOW IN ONE DIRECTION WHICH PREVENTS COMPLETE LOSS OF
DISTRIBUTION SYSTEM FROM ANY EXTERNAL LEAKAGE UPSTREAM OF CHECK VALVE.
PROVIDES FOR FILTERING OF ALL OXYGEN COMING FROM THE PRSD CRYO OXYGEN
SYSTEMS TO PROTECT DOWNSTREAM COMPONENTS.**

SHUTTLE CRITICAL ITEMS LIST - ORBITER

NUMBER: 06-1C1-0118-01

REVISION: 0 12/13/88 W

SUBSYSTEM: ARS - ARPCS
 LEU N2/O2 CONTROL PANEL
 ITEM NAME: VALVE, CHECK

CRITICALITY OF THIS
 FAILURE MODE: 1 1

FAILURE MODE:

| INABILITY TO OPEN, RESTRICTED FLOW
 AUX O2 TANK NOT INSTALLED

MISSION PHASE:

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

VEHICLE/PAYLOAD/RIT EFFECTIVITY:	102	COLUMBIA
	: 103	DISCOVERY
	: 104	ATLANTIS

CAUSE:

MECHANICAL SHOCK, VIBRATION, CONTAMINATION, CORROSION, PHYSICAL
 BINDING/JAMMING

| CRITICALITY 1/1 DURING INTACT ABORT ONLY? N

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

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

| UNABLE TO SUPPLY OXYGEN TO CABIN THROUGH THIS CRYO SYSTEM.

(B) INTERFACING SUBSYSTEM(S):

LOSS OF ONE O2 SOURCE TO AIRLOCK AND LES.

(C) MISSION:

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1C1-0118-01

POSSIBLE EARLY MISSION TERMINATION AS ONLY ONE OXYGEN SOURCE REMAINS FOR CABIN, AIRLOCK AND LES REQUIREMENTS.

(D) CREW, VEHICLE, AND ELEMENT(S):

LOSS OF ONE O2 SUPPLY SYSTEM RESULTS IN INSUFFICIENT OXYGEN FLOW TO LES SYSTEM. LOSS OF THIS EMERGENCY SYSTEM MAY RESULT IN LOSS OF CREW/VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS

NONE

- DISPOSITION RATIONALE -

(A) DESIGN:

VALVE BODY IS MADE OF 17-4 PH CONDITION C CRES, WHICH IS PRECIPITATION HARDENED CORROSION RESISTANT STEEL WHICH HAS A HIGH STRENGTH TO WEIGHT RATIO. CHECK VALVE HAS SILASTIC 675 SILICONE RUBBER MOLDED INTO THE 17-4 PH CONDITION A POPPET WITH THE BACK PRESSURE LOADS BEING BORNE BY METAL TO METAL CONTACT AND THE ELASTOMER FUNCTIONING AS AN UNBROKEN GAS SEAL ACROSS THE VALVE. SILASTIC 675 SILICONE RUBBER HAS GOOD RESISTANCE TO ENVIRONMENTAL EXPOSURE, FLEXING AND FATIGUE. IT ALSO HAS LOW FLAMMABILITY AND OUTGASSING. THE OZONE RESISTANCE OF SILICONE RUBBER IS EXCELLENT. INLET PORT IS PROTECTED BY A 10 MICRON FILTER. ALL OTHER STATIC SEALS ARE ALSO SILASTIC 675.

(B) TEST:

ACCEPTANCE TEST - PROOF PRESSURE 1885 PSIG, LEAK TESTED FOR 1.0 SCCM MAX LEAKAGE AT 900 PSIG. PRESSURE DROP 2 PSID MAX AT 100 PSIG AND 75 LB/HR.

QUALIFICATION TEST - LIFE CYCLE TESTING - 1000 CYCLES AT 875 PSIG. BURST PRESSURE IS 2500 PSIG. SUBJECTED TO THE FOLLOWING AS PART OF THE EMERGENCY O2 CONTROL PANEL. DESIGN SHOCK - 20G TERMINAL SAWTOOTH PULSE OF 11 MS DURATION IN EACH DIRECTION OF THREE ORTHOGONAL AXES. RANDOM VIBRATION SPECTRUM ENVELOPE - 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.03 G**2/HZ AT 150 HZ. CONSTANT AT 0.03 G**2/HZ FROM 150 TO 1000 HZ, DECREASING AT 6 DB/OCTAVE FROM 1000 TO 2000 HZ FOR 48 MINUTES PER AXIS FOR THREE ORTHOGONAL AXES. ATP TO VERIFY LEAKAGE IS PERFORMED AFTER SHOCK AND VIBRATION TESTING.

IN-VEHICLE TESTING - FLOW LIMITER (RESTRICTOR) TEST VERIFIES THE REQUIRED FLOW RATE FROM THE PRSD CRYO O2 SYSTEM.

OMRSD - O2 REGULATOR ASSEMBLY CHECKS, PERFORMED BEFORE THE FIRST REFLIGHT OF EACH ORBITER AND AT INTERVALS OF FIVE FLIGHTS, VERIFY REQUIRED FLOW FROM THE PRSD SYSTEM. THE PRSD SYSTEM IS SERVICED WITH GO2 PER SE-S-0073 AND THE GROUND HALF QUICK DISCONNECTS CONTAIN FILTERS.

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1C1-0118-01

(C) INSPECTION:

RECEIVING INSPECTION
RAW MATERIAL VERIFIED BY INSPECTION FOR MATERIAL AND PROCESS
CERTIFICATION.

CONTAMINATION CONTROL

CLEANLINESS LEVEL 300A PER MA0110-301 AND 100 ML RINSE TEST VERIFIED BY
INSPECTION. SYSTEM GAS SAMPLES ASSOCIATED WITH RESERVICING ARE
ANALYZED FOR CONTAMINATION.

ASSEMBLY/INSTALLATION

DIMENSIONAL CHECK INCLUDING MIPS FOR PERPENDICULARITY AND CONCENTRICITY
ARE PERFORMED AND VERIFIED BY INSPECTION. TIG WELD SCHEDULES VERIFIED
BY INSPECTION. VISUAL INSPECTION USING 10X MAGNIFICATION ON SEAL RING
VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

RADIOGRAPHIC AND PENETRANT INSPECTION OF WELDS VERIFIED BY INSPECTION.

CRITICAL PROCESSES

TIG WELD, PARTS PASSIVATION AND HEAT TREATMENT VERIFIED BY INSPECTION.
SOLDER CONNECTIONS VERIFIED BY INSPECTION.

TESTING

ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING, PACKAGING, STORAGE AND SHIPPING PROCEDURES ARE VERIFIED BY
INSPECTION.

(D) FAILURE HISTORY:

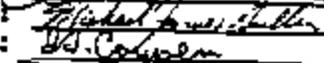
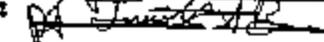
NO FAILURE HISTORY.

(E) OPERATIONAL USE:

TBS.

- APPROVALS -

RELIABILITY ENGINEERING: N. L. STEISSLINGER
DESIGN ENGINEERING : M. PRICE
QUALITY ENGINEERING : S. MOR
NASA RELIABILITY :
NASA SUBSYSTEM MANAGER :
NASA QUALITY ASSURANCE :

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NLP: 
SM: 
TD: 
:  5, 1989
: 
:  1/6/89