SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1C1-0123-X

SUBSYSTEM NAME: ARS - ARPCS

REVISION : 2 01/09/90

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	EMERGENCY 02 CONTROL PANEL CARLETON TECHNOLOGIES	MC250-0002-0120 2735-0001
SRU	:	VALVE, CHECK	2662-0001-15

QUANTITY OF LIKE ITEMS: 2
ONE PER FLOW PATH
TWO PER PANEL

FUNCTION:
CHECK VALVE, EMERGENCY 02 REGULATOR OUTLET

PROVIDES PROTECTION AGAINST REVERSE FLOW AND PROVIDES FORWARD FLOW PATH AT THE OUTLET OF THE EMERGENCY OXYGEN REGULATOR.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1C -0123 -2 REV:01/06/8

ASSEMBLY :EMERGENCY O2 CONTROL PNL CRIT. FUNC: 1
P/N RI :MC250-0002-0120 CRIT. HDW: 2
P/N VENDOR:2662-0001-15 CARLETON VEHICLE 102 103 104
QUANTITY :2 EFFECTIVITY: X X X
:ONE PER FLOW PATH PHASE(S): PL X LO X OO X DO X LS X
:TWO PER PANEL

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS

PREPARED BY: APPROVED BY: APPROVED BY (NASA)
DES M. PRICE DES SSM
REL N. L. STEISSLINGER REL REL
QE W. J. SMITH QE QE

ITEM:
CHECK VALVE, EMERGENCY O2 REGULATOR OUTLET

FUNCTION:
PROVIDES PROTECTION AGAINST REVERSE FLOW AND PROVIDES FORWARD FLOW PATH AT THE OUTLET OF THE EMERGENCY OXYGEN REGULATOR.

FAILURE MODE:
OPEN (FAILS TO CHECK), INTERNAL LEAKAGE

CAUSE(S):
MECHANICAL SHOCK, VIBRATION, CONTAMINATION, CORROSION, MATERIAL DEFECT SEAL MATERIAL DEGRADATION

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE

(A) LOSS OF ABILITY TO ISOLATE A LEAK BETWEEN THE CHECK VALVE AND THE REGULATOR OUTLET.

(B,C,D) NO EFFECT - CHECK VALVE FAILURE WITHOUT AN EXTERNAL LEAK UPSTREAM OF CHECK VALVE WOULD NOT AFFECT SYSTEM OPERATION.

(E) FUNCTIONAL CRITICALITY EFFECT - THIS FAILURE IN COMBINATION WITH EXTERNAL LEAKAGE OR A FAILED RELIEF VALVE IN THE SAME FLOW PATH RESULTS IN LOSS OF BOTH SYSTEMS AND OXYGEN SUPPLY TO C.A.P.S./AIRLOCK. SCREEN I FAILS BECAUSE FAILED OPEN CHECK VALVE CANNOT BE DETECTED UNTIL SECOND ASSOCIATED FAILURE OCCURS (EXTERNAL LEAKAGE OF UPSTREAM LINES, FITTINGS OR COMPONENTS, OR FAILED OPEN RELIEF VALVE).

DISPOSITION & RATIONALE:
(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(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 1 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

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1C -0123 -2 REV:01/06/88

ENVIRONMENTAL EXPOSURE, FLEXING AND FATIGUE. IT ALSO HAS LOW FLAMMABILITY AND OUTGASSING. THE OZONE RESISTANCE OF SILICONE RUBBER IS EXCELLENT. THE POPPET GUIDE IS TEFLON COATED FOR SMOOTH, NON-BINDING OPERATION. SPRING IS OF 17-7 PH CONDITION C CRES. INLET PORT IS PROTECTED BY A 10 MICRON FILTER.

(B) TEST

ACCEPTANCE TEST - PROOF PRESSURE 1885 PSIG, LEAK TESTED FOR 1.0 SCCM MAX LEAKAGE AT 900 PSIG. INTERNAL LEAK TESTED AT 100 PSIG, LEAK RATE 0.2 SCCM MAX.

QUALIFICATION TEST - LIFE CYCLE TESTING - 1000 CYCLES AT 875 PSIG. BURST PRESSURE 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 - AFTER INSTALLATION DURING EMERGENCY O2 CONTROL PANEL CHECKOUT, THE CHECK VALVE IS TESTED FOR REVERSE LEAKAGE, 10 SCCM MAX AT 90-150 PSIG.

OMRSD - REVERSE LEAKAGE TEST IS PERFORMED PRIOR TO THE FIRST REFLIGHT OF EACH ORBITER AND AT INTERVALS OF FIVE FLIGHTS, AT 90 - 150 PSIG, 10 SCCM MAX LEAKAGE.

(C) INSPECTION

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

CONTAMINATION CONTROL
CLEANLINESS LEVEL 200A PER MA0110-301 AND 100 ML RINSE TESTS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
4X VISUAL INSPECTION ON SEAL RING IS VERIFIED. TORQUES VERIFIED. DIMENSIONAL CHECKS PERFORMED BY INSPECTION. MIPS ARE INCLUDED IN THE ASSEMBLY PROCEDURE.

CRITICAL PROCESSES
APPLICATION OF LUBRICANT ON SEAL RING VERIFIED BY TECHNICIAN. HEAT TREATMENT AND PARTS PASSIVATION VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
ALL WELDS AND BRAZED TUBING JOINTS ARE RADIOGRAPHICALLY INSPECTED.

TESTING
ATP VERIFIED BY INSPECTION.

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HANDLING/PACKAGING
HANDLING, PACKAGING, STORAGE AND SHIPPING PROCEDURES ARE VERIFIED.

(D) FAILURE HISTORY
NO FAILURE HISTORY APPLICABLE TO INTERNAL LEAKAGE (OPEN) FAILURE MODE. THE CHECK VALVE HAS SUCCESSFULLY BEEN USED THROUGH THE SHUTTLE PROGRAM CONSIDERING THIS FAILURE MODE.

(E) OPERATIONAL USE
1. CREW ACTION
NONE

2. TRAINING
NONE

3. OPERATIONAL CONSIDERATION
FAILURE OF THE CHECK VALVE IS NOT DETECTABLE EITHER ON BOARD OR THROUGH GROUND MONITORING UNLESS THERE IS A SUBSEQUENT FAILURE.