SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1C -0203 -1 REV:08/10/

ASSEMBLY :ATMOS VENTING CONTROL
P/N RI :MC250-0002-0090
P/N VENDOR:2874-0001-3 CARLETON
QUANTITY :1
:TWO BUTTERFLY VALVES
: IN ONE HOUSING

CRIT. FUNC: 1R
CRIT. HDW: 2

VEHICLE EFFECTIVITY:	102 X	103 X	104 X

PHASE(S): PL X LO X OO X DO X LS

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

PREPARED BY:
DES M. PRICE
REL N. L. STEISSLINGER
QE S. MOR

APPROVED BY:
DES
REL
QE

APPROVED BY (NASA):
SSM
REL
QE

ITEM:
BLEED VALVE - CABIN PRESSURE, MOTOR OPERATED

FUNCTION:
PROVIDES FOR VENTING THE CREW COMPARTMENT THROUGH THE AFT BULKHEAD FOLLOWING A 2 PSID PRELAUNCH PRESSURE TEST. THESE TWO VALVES (CABIN VENT AND VENT ISOLATION) WORK IN SERIES TO ALLOW 16-20 LB/MIN OF AIR TO FLOW OUT OF THE CABIN. VALVE IS MOUNTED ON THE XO 576 BULKHEAD, WITH A SINGLE O-RING SEAL (REF. FMEA 01-4-CS44-1).

FAILURE MODE:
INABILITY TO CLOSE

CAUSE(S):
MECHANICAL SHOCK, VIBRATION, ELECTRICAL FAILURE, PHYSICAL BINDING/JAMMING, CONTAMINATION

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

(A) LOSS OF REDUNDANCY - ONE VALVE REMAINS TO CONTAIN CABIN ATMOSPHERE.

(B) NO EFFECT.

(C) POSSIBLE EARLY MISSION TERMINATION IF A VALVE FAILS OPEN AFTER LAUNCH - VALVES ARE CLOSED ON ORBIT. PRELAUNCH FAILURE RESULTS IN LAUNCH SCRUB.

(D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - POTENTIAL LOSS OF CREW/VEHICLE UPON FAILURE OF REDUNDANT VALVE. EXCESSIVE LOSS OF CABIN ATMOSPHERE.

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

(A) DESIGN
THE VALVE BODY IS MADE OF A356.0 T61 ALUMINUM ALLOY, TEFLON PENETRATED HARD ANODIZED (NITUFF COATING). THE CABIN PRESSURE BLEED VALVE COMPRISES TWO INDIVIDUALLY MOTOR DRIVEN VALVES IN A COMMON VALVE BORE. THE VALVES ARE MADE OF 17-4 PH CONDITION A CRES WHICH IS PRECIPITATION HARDENED

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1C -0203 -1 REV:08/10/88

CORROSION RESISTANT STEEL HAVING A HIGH STRENGTH TO WEIGHT RATIO. THE BORE AREA IS TEFLON IMPREGNATED HARD ANODIZED TO MINIMIZE FRICTION AND PROVIDE THE GREATEST CORROSION RESISTANCE. THE SILICONE ELASTOMER IS MOLDED IN PLACE ON THE METAL POPPET THUS ASSURING A CONTINUOUS UNBROKEN GAS SEAL ACROSS THE EDGE OF THE BUTTERFLY VALVE. SILICONE RUBBER IS AN ORGANOSILICON OXIDE POLYMER WHICH IS CHARACTERIZED BY REMARKABLE TEMPERATURE STABILITY, CHEMICAL INERTNESS, WATER PROOFNESS, AND EXCELLENT DIELECTRIC PROPERTIES. A CAPTIVE DEBRIS SCREEN ON THE CABIN AND A FILTER SCREEN ON THE BULKHEAD SIDE OF THE VALVE PROVIDE PROTECTION FROM FOREIGN MATERIAL.

(B) TEST

ACCEPTANCE TEST - PER ATP 2874-3. PROOF PRESSURE 24 PSIG, LEAKAGE (INTERNAL AND EXTERNAL) 1 SCCM MAX AT 16.7 PSIG.

QUALIFICATION TESTING - PER QTP 2874-1. LIFE CYCLE AND THERMAL VACUUM WERE CERTIFIED BY SIMILARITY TO THE POSITIVE PRESSURE RELIEF VALVE. RANDOM VIBRATION SPECTRUM - 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.09 G**2/HZ, CONSTANT AT 0.09 G**2/HZ FROM 150 TO 900 HZ, DECREASING AT 9 DB/OCTAVE FROM 900 TO 2000 HZ FOR 48 MINUTES PER AXIS. LEAKAGE RATE MONITORED DURING VIBRATION LIMITED TO 1.0 SCCM MAX. SINUSOIDAL VIBRATION - 5 - 25 HZ AT AN ACCELERATION AMPLITUDE OF PLUS OR MINUS 0.25 G PEAK IN THREE ORTHOGONAL AXES; DURATION CONTROLLED BY A ONE OCTAVE PER MINUTE SWEEP RATE. DESIGN SHOCK - THREE 20 G TERMINAL PEAK, 11 MS DURATION SHOCK PULSES IN THREE ORTHOGONAL AXES. BURST PRESSURE - 33.4 +/- 0.15 PSIG FOR 3 MINUTES MINIMUM; LEAKAGE NOT TO EXCEED 100 SCCM. ATP TO VERIFY LEAKAGE IS PERFORMED AFTER SHOCK AND VIBRATION TESTING.

IN-VEHICLE TESTING - VENT AND VENT ISOLATION VALVES' OPEN/CLOSE FUNCTION ARE VERIFIED.

OMRSD - VENT AND VENT ISOLATION VALVES' OPEN/CLOSE FUNCTION ARE VERIFIED BEFORE THE FIRST REFLIGHT OF EACH ORBITER AND AT INTERVALS OF FIVE FLIGHTS.

(C) INSPECTION

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

CONTAMINATION CONTROL
CLEANLINESS LEVEL 200A PER MAO110-301 AND 100 ML RINSE TESTS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
TORQUES VERIFIED BY INSPECTION. DIMENSIONAL CHECKS PERFORMED BY INSPECTION. 10X VISUAL INSPECTION ON SEAL RING. MIPS ARE INCLUDED IN THE ASSEMBLY PROCEDURE.

NONDESTRUCTIVE EVALUATION
WELDS ARE PENETRANT INSPECTED AND VERIFIED BY INSPECTION.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1C -0203 -1 REV:08/10/

CRITICAL PROCESSES
SOLDER CONNECTIONS VERIFIED BY INSPECTION IN ACCORDANCE WITH NHB5300.4(3A). POTTING VISUALLY VERIFIED BY INSPECTION. BRAYCOTE LUBRICANT ON SEAL RING VERIFIED BY TECHNICIAN. ANODIZING, PARTS PASSIVATION AND HEAT TREATMENT VERIFIED BY INSPECTION.

TESTING
ATP VERIFIED BY INSPECTION.

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

(D) FAILURE HISTORY
NO FAILURE HISTORY APPLICABLE TO INABILITY TO CLOSE FAILURE MODE. THE BLEED VALVE HAS SUCCESSFULLY BEEN USED THROUGH THE SHUTTLE PROGRAM CONSIDERING THIS FAILURE MODE.

(E) OPERATIONAL USE
TBS.