SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1C -0207 -1 REV:08/10/8

ASSEMBLY :ATMOS VENTING CONTROL
P/N RI :MC250-0002-0075
P/N VENDOR:2725-0001-3 CARLETON
QUANTITY :2
:ONE PER VALVE
:TWO PER SUBSYSTEM

CRIT. FUNC: 1R
CRIT. HDW: 2

VEHICLE EFFECTIVITY:	102	103	104
PHASE(S): PL	X	X	X
LO			
OO			
DO X LS			

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

PREPARED BY:
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ITEM:
VALVE CAP - CABIN NEGATIVE PRESSURE RELIEF

FUNCTION:
PROVIDES REDUNDANT SEALING FOR THE CABIN NEGATIVE PRESSURE RELIEF VALVE. CAN BE MANUALLY OPENED OR WILL AUTOMATICALLY OPEN WHEN THE NEGATIVE PRESSURE DIFFERENTIAL REACHES 0.5 PSI. THE CAP INCLUDES A FLAPPER TYPE RELIEF VALVE TO RELIEVE DELTA-P ACROSS THE CAP TO PREVENT MINOR PRESSURE FLUCTUATION FROM OPENING THE CAP. THIS CAP IS INTEGRAL TO THE NEGATIVE PRESSURE RELIEF VALVE ASSEMBLY.

FAILURE MODE:
INABILITY TO OPEN

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

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

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

(B) NO EFFECT.

(C) NO EFFECT - LANDING IS ALREADY IN PROGRESS WHEN RELIEF VALVE IS REQUIRED TO FUNCTION.

(D) NO EFFECT. ONLY ONE VALVE IS NEEDED TO REPRESSURIZE THE CABIN.

(E) FUNCTIONAL CRITICALITY EFFECT - SECOND ASSOCIATED FAILURE (FAILURE OF REDUNDANT RELIEF VALVE OR CAP) DURING DE-ORBIT WITH REDUCED CABIN PRESSURE WOULD RESULT IN EXCESSIVE CRUSHING PRESSURE ON THE CABIN AND POSSIBLE LOSS OF CREW/VEHICLE. SCREEN B IS N/A BECAUSE THE CAP IS AN UNLIKE REDUNDANCY TO THE RELIEF VALVE AND IS IN STANDBY UNTIL REQUIRED.

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

(A) DESIGN
VALVE CAP IS LIGHTLY SPRING ASSISTED AND COMPRISES A COVER HOUSING WITH INTEGRAL FLAPPER VALVE AND GUIDE SCREWS. THE SILICONE RUBBER FLAPPER VALVE WITH INTEGRAL FILTER IS DESIGNED TO PREVENT MINOR PRESSURE PERTURBATIONS FROM ACTUATING THE COVER WHILE ASSURING LEAK FREE OPERATION. VALVE CAP IS DESIGNED TO AUTOMATICALLY ACTUATE AFTER THE PRIMARY POPPET OPENS. CAP IS FABRICATED OF 6061-T6 ALUMINUM ALLOY AND THE FLAPPER IS MADE OF SILASTIC 675 SILICONE RUBBER. THE ALUMINUM CAP IS ANODIZED TO PROTECT THE SURFACE FROM CORROSION. STATIC SEALS ARE SILASTIC 675. 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.

(B) TEST
ACCEPTANCE TEST - ACCEPTANCE TEST - PER ATP 2725-3. REVERSE DIRECTION PROOF PRESSURE AT 25 +/- 0.1 PSIG WITH COVER ON AND POPPET OPEN; REVERSE DIRECTION PROOF PRESSURE AT 25 +/- 0.1 PSIG WITH COVER OFF AND POPPET CLOSED; LEAKAGE IN REVERSE DIRECTION AT 2 +/- 0.1 PSIG AND AT 15 +/- 0.15 PSIG WITH COVER ON AND POPPET OPEN; LEAKAGE IN THE REVERSE DIRECTION AT 2 +/- 0.1 AND AT 15 +/- 0.15 PSIG WITH COVER OFF AND POPPET CLOSED; POPPET CRACKING AND RESEAT PRESSURE MEASUREMENT; AND FLAPPER VALVE OPERATION.

QUALIFICATION TESTING - PER QTP 2725-3. LIFE CYCLE TESTING - COVER DEPLOYED AND VALVE POPPET OPENED FULL STROKE FOR 200 CYCLES. RANDOM VIBRATION SPECTRUM - 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.09 G**2/HZ AT 150 HZ. CONSTANT AT 0.09 G**2/HZ FROM 150 TO 900 HZ, DECREASING AT 9 DB/OCTAVE FROM 1000 TO 2000 HZ FOR 48 MINUTES PER AXIS FOR THREE ORTHOGONAL AXES. DESIGN SHOCK - 20 G TERMINAL PEAK, 11 MS SHOCK PULSE IN EACH DIRECTION OF THREE ORTHOGONAL AXES. BURST PRESSURE TEST - 32 PSID FOR 2 MINUTES. ATP TO VERIFY LEAKAGE IS PERFORMED AFTER SHOCK AND VIBRATION TESTING.

IN-VEHICLE TESTING - RELIEF VALVE CAP PULL TEST IS PERFORMED.

OMRSD - RELIEF VALVE CAP PULL TEST IS PERFORMED 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
CORROSION PROTECTION PROVISIONS AND CONTAMINATION CONTROL PLAN ARE VERIFIED BY INSPECTION. CLEANLINESS LEVEL 200A PER MAO110-301 AND 100 ML RINSE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
RAW MATERIAL INSPECTED PRIOR TO MACHINING. IN-PROCESS INSPECTION FOR

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CRITICAL DIMENSIONS VERIFIED. MANDATORY INSPECTION POINTS ARE INCLUDED IN THE ASSEMBLY PROCEDURE.

NONDESTRUCTIVE EVALUATION
X-RAY AND PENETRANT VERIFIED BY INSPECTION.

CRITICAL PROCESSES
PARTS PASSIVATION AND HEAT TREATMENT ARE VERIFIED BY INSPECTION.

TESTING
ATP VERIFIED BY INSPECTION.

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

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

(E) OPERATIONAL USE
TBS.