SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ORBITAL MANEUVER FMEA NO 03-3 -1007 -3 REV:11/30/87

ASSEMBLY :PRESSURIZATION SUBSYSTEM
P/N RI :MC284-0481
P/N VENDOR:
QUANTITY :4
:TWO PER POD
:

CRIT. FUNC: 1
CRIT. HDW: 1

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

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

REDUNDANCY SCREEN: A- B- C-

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
DES	D W CARLSON	DES	SSM
REL	C M AKERS	REL	REL
QE	W J SMITH	QE	OB

ITEM:
VALVE, CHECK, HELIUM/PROPELLANT, QUAD POPPETS.

FUNCTION:
EACH CHECK VALVE QUAD WITH 4 POPPETS IN SERIES-PARALLEL ARRANGEMENT PROVIDES PARALLEL REDUNDANCY FOR HELIUM PRESSURIZATION AND SERIES REDUNDANCY TO LIMIT BACK FLOW OF PROPELLANT LIQUID AND/OR VAPORS FROM THE PROPELLANT TANKS INTO THE PRESSURIZATION SYSTEM. A SINGLE 304L 25 MICRON FILTER IS UTILIZED AT THE INLET OF THE ASSEMBLY. THE VALVE UTILIZES A CUTTER SEAL DESIGN CONCEPT (TWO SEALING SURFACES PER POPPET).

FAILURE MODE:
RESTRICTED FLOW. (INLET FILTER)

CAUSE(S):
CORROSION, CONTAMINATION.

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

(A,B) LOSS OF PRESSURIZATION CAPABILITY TO ONE PROPELLANT TANK.

(C,D) POTENTIAL LOSS OF CREW/VEHICLE. LOSS OF PRESSURIZATION CAPABILITY COULD RESULT IN MIXTURE RATIO PROBLEMS AND INABILITY TO UTILIZE PROPELLANT REQUIRED FOR DEORBIT, AND INABILITY TO CONTROL VEHICLE DURING ENTRY AND LANDING (WT. & C.G). PROPELLANT TANK OR OTHER STRUCTURAL FAILURE MAY OCCUR DURING LANDING DUE TO EXCESSIVE PROPELLANT REMAINING.

SUBSYSTEM :ORBITAL MANEUVER FMEA NO 03-3 -1007 -3 REV:12/05/8

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

(A) DESIGN
A 25 MICRON FILTER IS PROVIDED AT THE CHECK VALVE INLET. THE PRESSURE DROP IS 2.2 PSID AT 800 SCFM. A TOTAL OF 0.1 GRAM OF AC DUST WILL INCREASE THE DIFFERENTIAL PRESSURE BY ONLY 2 PSI. NO OCCURRENCES OF RESTRICTED FLOW HAVE OCCURRED. THE COLLAPSE PRESSURE OF THE SCREEN IS 400 PSI. HELIUM IS LOADED THROUGH A 5-MICRON GSE FILTER. FILTERS ARE ALSO PROVIDED AT THE HELIUM FILL COUPLING, THE HELIUM ISOLATION VALVE INLET AND OUTLET, THE HELIUM REGULATOR INLET, AND THE VAPOR ISOLATION VALVE INLET (OX SIDE ONLY).

(B) TEST

QUALIFICATION TEST
(4 UNITS) - RANDOM VIBRATION, SHOCK, SURGE PRESSURE (3800 CYCLES), LIFE CYCLE (100,000 CYCLES), THERMAL (-180 TO +150 DEG F), BURST (740 PSI), PROPELLANT COMPATIBILITY. ALSO QUALIFIED AS PART OF POD ASSEMBLY. VIBRO-ACOUSTIC TESTING AT JSC - 131 EQUIVALENT MISSIONS. HOT-FIRE TEST PROGRAM AT WSTF, 517 TESTS (24 EQUIVALENT MISSION DUTY CYCLES). APPROX YEARS PROPELLANT EXPOSURE.

ACCEPTANCE TEST
PROOF PRESSURE, EXTERNAL LEAKAGE, PRESSURE DROP, CRACKING PRESSURE, RESEAT PRESSURE, INTERNAL LEAKAGE, CLEANLINESS, FILTER BUBBLE POINT.

GROUND TURNAROUND
V43CB0.080 PERFORMS LEAK AND FUNCTIONAL FIRST AND EVERY FIFTH FLIGHT.
V43CB0.085 PERFORMS TOTAL PACKAGE LEAK AND FUNCTIONAL EACH FLIGHT.
V43CE0.045 PERFORMS HELIUM OFF LOADING WHICH PURGES THE HELIUM SYSTEM AND CLOSES MANUAL VALVE EVERY FLIGHT.
V43CF0.020 VERIFIES SYSTEM FLUIDS FOR COMPLIANCE TO SPECIFICATION REQUIREMENTS (SE-S-0073).
V43CF0.025 PERFORMS HELIUM SYSTEM ACTIVATION EVERY FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION
MATERIALS AND PROCESSES CERTIFICATIONS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
CLEANLINESS TO LEVEL 100 FOR MMH AND 100A FOR NTO AND CORROSION PROTECTION PROVISIONS (CHEMICAL TREATMENT) ARE VERIFIED BY INSPECTION.

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ASSEMBLY/INSTALLATION
MANUFACTURING ASSEMBLY AND INSTALLATION PROCEDURES ARE VERIFIED BY INSPECTION. CRITICAL DIMENSIONS AND SURFACE FINISHES ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
WELDS ARE PENETRANT INSPECTED OR MAGNETIC PARTICLE INSPECTED

CRITICAL PROCESSES
THE WELDING PROCESS PER RA0107-027 AND VERIFICATION THAT WELDS MEET SPECIFICATION REQUIREMENTS ARE VERIFIED BY INSPECTION. THE WELDS ARE VISUALLY INSPECTED

TESTING
TEST EQUIPMENT AND TOOL CALIBRATION ARE VERIFIED BY INSPECTION. ACCEPTANCE TEST INCLUDING POPPET OPERATION IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
HANDLING, PACKAGING, STORAGE AND SHIPPING REQUIREMENTS ARE VERIFIED BY INSPECTION.

) FAILURE HISTORY
NO FAILURE HISTORY FOR THIS COMPONENT FOR THIS MODE (RESTRICTED FLOW THROUGH FILTER).

) OPERATIONAL USE
FOR FILTER IN FUEL SIDE CHECK VALVE FAILED CLOSED, CLOSE HELIUM ISOLATION VALVES AND OPERATE IN BLOWDOWN TO PC LIMIT. FOR FILTER ELEMENTS IN OXIDIZER SIDE CHECK VALVE FAILED CLOSED - CONTINUE OPERATION TO PC LIMIT. FOR EITHER FAILURE, PROPELLANT IN UNAFFECTED TANK MAY BE UTILIZED IN MIXED CROSSFEED. ULLAGE BLOWDOWN OPERATION IS ADEQUATE FOR DEORBIT AFTER OMS-2 WHEN PROPELLANT REMAINING IS LESS THAN 40%. TYPICAL DEORBIT BURN REQUIRES LESS THAN 30% PROPELLANT.