

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LIFE SUPPORT FMEA NO 06-2C -0206 -2 REV:09/28/8  
 ASSEMBLY : FECAL COLLECTION EQUIPMENT CRIT. FUNC:  
 P/N RI : MC282-0069 CRIT. KDW:  
 P/N VENDOR: 63D717615G1 VEHICLE 102 103 104  
 QUANTITY : 1 EFFECTIVITY: X X X  
 : PHASE(S): PL LO OO X DO LS  
 : ONE PER SUBSYSTEM

REDUNDANCY SCREEN: A- B- C-  
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
 DES D. SANDERSFELD DES *[Signature]* SSM *[Signature]*  
 REL L. SCHASCHL REL *[Signature]* REL *[Signature]*  
 QE M. SAVALA QE *[Signature]* QE *[Signature]*

ITEM:  
 COMMODE/FILTER LINER

FUNCTION:  
 PREVENTS MOVEMENT OF SOLID WASTE AND BACTERIA FROM COMMODE IN THE  
 TRANSPORT AIR STREAM OR IN THE VAPOR MOVING OVERBOARD.

FAILURE MODE:  
 DAMAGED OR COMES LOOSE

CAUSE(S):  
 MECHANICAL SHOCK, VIBRATION, PUNCTURE FROM SHARP OBJECT

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

(A) FUNCTIONAL DEGRADATION - DEBRIS NOT CONTAINED IN FILTER LINER.  
 POSSIBLE CLOGGING OF DOWNSTREAM LINES, ORIFICES, ODOR/BACTERIA FILTER,  
 OR VALVES. LOSS OF AIR FLOW MAY PREVENT USE OF WCS FOR WASTE  
 COLLECTION.

(B) FAILURE WOULD RESULT IN USE OF CONTINGENCY FECAL BAGS.

(C) DAMAGED FILTER LINER MAY ALLOW DEBRIS TO RESTRICT AIR FLOW IN  
 DOWNSTREAM COMPONENTS. LOSS OF WASTE COLLECTION CAPABILITY MAY REQUIRE  
 EARLY MISSION TERMINATION.

(D) NO EFFECT.

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

(A) DESIGN  
 FILTER LINER CONSTRUCTED OF NON-WOVEN POLYPROPYLENE WITH SCRIM MADE OF  
 WOVEN POLYPROPYLENE. TWELVE METAL STAVES HOLD IT IN PLACE AT SIDES.  
 FILTER LINER IS CLAMPED WITH METAL RINGS AT TOP AND BOTTOM, AND SECURED  
 WITH METAL FASTENERS. EQUATORIAL JOINTS AND GASKET ON TOP AND BOTTOM  
 MADE OF RTV 630. FILTER LINER IS REPLACED AFTER EACH FLIGHT.

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PROTECTIVE LAYERS ON EACH SIDE OF THE FILTER LINER HELP TO PREVENT PUNCTURES OR ABRASION DURING MANUFACTURING AND INSTALLATION PROCESSES. IF FAILURE OCCURS IN FLIGHT, DEBRIS IS RETAINED IN THE COMMODE BY THE SPACER FABRIC AND COMMODE OUTLET SCREEN. BACTERIA IS PREVENTED FROM ENTERING CABIN BY ODOR/BACTERIA FILTER.

(B) TEST

QUALIFICATION TESTS - STRUCTURAL INTEGRITY WAS EXAMINED VISUALLY AND LINER MATERIAL WAS TESTED TO WITHSTAND A DIFFERENTIAL PRESSURE OF 20 INCHES OF WATER. ABRASION TESTING SHOWED NO SIGNIFICANT WEAR ON THE REINFORCED LINER AFTER 100 ROTATIONS OF THE ABRASION WHEEL WITH 250 GM WEIGHT. JOINTS TESTED TO BE AS STRONG AS LINER ITSELF. FROOF PRESSURE TEST AT 0.6 INCHES WATER - MAXIMUM OPERATING LEVEL IS 0.3 - 0.4 INCHES WATER. VIBRATION CERTIFICATION WAS DONE BY ANALYSIS. BACTERIAL TEST - FILTER EFFICIENCY WILL NOT BE LESS THAN 99.99% FOR PARTICLES 0.45 MICRONS OR LARGER. FILTER LINER SUBJECTED TO AN EXCESS OF 200 REPRESSURIZATION CYCLES.

ACCEPTANCE TEST - DELTA P AND PARTICULATE TEST PERFORMED.

OMRSD: A NEW FILTER LINER IS INSTALLED PRIOR TO EACH FLIGHT. VISUAL INSPECTION AND REPRESSURIZATION TEST IS PERFORMED TO INSURE NO DAMAGE AND PROPER INSTALLATION AT VENDOR BEFORE EACH FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

CERTIFICATION OF RAW MATERIALS AND PROCESSES IS VERIFIED.

ASSEMBLY/INSTALLATION

VISUAL INSPECTION IS PERFORMED ON THE FILTER LINER MATERIAL. INSTALLATION IS VERIFIED.

TESTING

TESTS FOR MICROBIAL FILTERING OF FILTER LINER MATERIAL, AND PROCESS CONTROL SAMPLES OF RTV BONDING IS VERIFIED. ATP IS WITNESSED.

HANDLING/PACKAGING

PARTS PROTECTION AND HANDLING REQUIREMENTS ARE VERIFIED. FINAL PACKAGING IS WITNESSED.

(D) FAILURE HISTORY

NO FAILURES FOR THE PRESENT DESIGN. WITH AN EARLIER DESIGN, POST FLIGHT INSPECTION REVEALED A LARGE TEAR IN THE FILTER LINER. NO BACTERIA WAS FOUND DOWNSTREAM. CORRECTIVE ACTION - THE FILTER LINER WAS REDESIGNED TO GO ALONG WITH THE VANE COMPACTOR. THE NEW FILTER LINER IS REINFORCED AND USES INTERNAL STAVES INSTEAD OF EXTERNAL STAVES AND VELCRO.

(CAR #AC8467)

(E) OPERATIONAL USE

IF FAILURE OCCURS IN FLIGHT, DEBRIS IS RETAINED IN THE COMMODE BY THE SPACER FABRIC AND COMMODE OUTLET SCREEN. BACTERIA IS PREVENTED FROM ENTERING THE CABIN BY ODOR/BACTERIA FILTER. CREW CAN USE CONTINGENCY FECAL BAGS.