

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : SEPARATION MECHANISMS-MECH FMEA NO 02-3A -U3 -1 REV:10/09/87

ASSEMBLY : UMBILICAL SEPARATION SYSTEM

P/N RI : V073-565450

P/N VENDOR:

QUANTITY : 6

: THREE PER SIDE

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

CRIT. FUNC: 1  
CRIT. HDW: 1

PREPARED BY:

DES R. H. YEE

REL M. B. MOSKOWITZ

QE E. M. GUTIERREZ

REDUNDANCY SCREEN: A- B- C-  
APPROVED BY: (0/1/87) APPROVED BY (NASA):

DES R. H. YEE for P.C. Ordery SSM [Signature]  
REL [Signature] REL [Signature]  
QE [Signature] QE [Signature]

ITEM:

STUD, UMBILICAL ATTACH

FUNCTION:

IN CONJUNCTION WITH FRANGIBLE NUTS (3 PLACES EACH UMBILICAL PLATE) STRUCTURALLY TIES TOGETHER THE ORBITER/EXTERNAL TANK (ET) UMBILICAL PLATES AT THE LH2 AND LO2 VALVE SEPARATION PLANE.

FAILURE MODE:

STRUCTURAL FAILURE

CAUSE(S):

CORROSION, DEFECTIVE PART/MATERIAL OR MANUFACTURING DEFECT, EXCESSIVE LOAD

EFFECT(S) ON:

(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE

(A) LOSS OF STRUCTURAL INTEGRITY BETWEEN UMBILICAL PLATES.

(B) LOSS OF LH2 OR LO2 TO MAIN ENGINES.

(C) LOSS OF MISSION.

(D) POSSIBLE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:

(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A) DESIGN

DESIGN MARGIN EQUAL TO OR GREATER THAN 1.4; FABRICATED OF CORROSION RESISTANT ALLOY (MP15N) FOR ONE-TIME USAGE. DESIGN STRESS ANALYSIS REPORT SD77-SH-0178.

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(B) TEST

SYSTEM QUALIFICATION TESTS: SYSTEM QUALIFIED AS PART OF THE ORBITER/ET-  
UMBILICAL (MPS CLUSTER) SEPARATION SYSTEMS CERTIFICATION/VERIFICATION  
TESTING PER CR-45-565330, TAR-STS-82-0146 AND TAR-STS-82-0508; 49  
SIMULATED LH2/LO2 SEPARATION TESTS (3 STUDS PER TEST); INCLUDES CRYOGENIC  
CHILL-DOWN -423 DEG F AND SOAK, SIMULATED FEED LINE PRESSURES 35 PSIG,  
UMBILICAL RETRACTION, GN2 PURGE ATMOSPHERE, VIBRATION AND STRUCTURAL  
LOADING: HIGH AND LOW SPEED DATA RATES.

ACCEPTANCE TESTS: STATIC TENSION AND STATIC SHEAR TESTS (ROOM TEMPERATURE  
AND 750 DEG F).

OMRSD: TURNAROUND TEST INCLUDES STUD/NUT PREFLIGHT FIT CHECK. NO  
TURNAROUND INSPECTION PERFORMED. NEW HARDWARE REQUIRED FOR EACH FLIGHT  
(OLD HARDWARE EXPENDABLE WITH ET).

(C) INSPECTION

RECEIVING INSPECTION

HARDWARE INSPECTED IN ACCORDANCE WITH QUALITY PLANNING REQUIREMENTS  
DOCUMENT (QPRD). RAW MATERIAL IS VERIFIED AS TO TYPE AND LOT NUMBER  
RECORDED.

ASSEMBLY/INSTALLATION

DETAIL PARTS ARE MACHINED TO SPECIFICATION TOLERANCES AND VERIFIED.  
CORROSION PROTECTION IS APPLIED. DRY FILM LUBRICANT PER SPECIFICATION AND  
CLEANLINESS IS MAINTAINED. PROCUREMENT INSPECT PER MC111-0017; INCLUDES  
100% DISCONTINUITIES EXAM (FLUORESCENT PENETRANT, MIL-I-6866), 100%  
HARDNESS TESTING; RANDOM LOT SAMPLING INCLUDES DEFECT INSPECTION (PER  
MIL-STD-105).

NONDESTRUCTIVE EVALUATION

NONDESTRUCTIVE TESTING (NDT) PENETRANT INSPECT FOR FLAWS PER MT0501-508,  
CLASS 1. MACROSTRUCTURE EXAM AND MICROSTRUCTURE EXAM PERFORMED DURING  
NONDESTRUCTIVE EVALUATION (NDE).

(D) FAILURE HISTORY

NONE.

(E) OPERATIONAL USE

NONE.