

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 06-1C-1502-X

SUBSYSTEM NAME: ARS - ARPCS

REVISION : 7 01/24/91

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER	
LRU :	QUICK DISCONNECT	F361-2660-3	RI TO VERI. P/N.
	RT TO ADD VENDOR NAME		
	PART DATA		

QUANTITY OF LIKE ITEMS: 8
ONE PER STATION

FUNCTION:
QUICK DISCONNECT, LES BREATHING STATION

PROVIDES THE INTERFACE FOR CONNECTING THE LAUNCH/ENTRY SUITS (LES) TO
THE OXYGEN SUPPLY SYSTEM.

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PRINT DATE: 01/10/90

SHUTTLE CRITICAL ITEMS LIST - ORBITER

NUMBER: 06-1C3-1502-01

REVISION# 2 01/10/90

SUBSYSTEM: ARS - ARPCS
LRU :QUICK DISCONNECT
ITEM NAME: QUICK DISCONNECT

CRITICALITY OF THIS
FAILURE MODE:152

- FAILURE MODE:
INABILITY TO CLOSE; INTERNAL AND EXTERNAL LEAKAGE

MISSION PHASE:

PL PRELAUNCH
LO LIFT-OFF
CO ON-ORBIT
DO DE-ORBIT
LS LANDING SAFING

- VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS
: 105 ENDEAVOUR

CAUSE:

MECHANICAL SHOCK, VIBRATION, CORROSION, CONTAMINATION, PHYSICAL
BINDING/JAMMING

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) N/A
C) PASS

PASS/FAIL RATIONALE:

A)

B)

SCREEN B IS N/A BECAUSE THE QD IS UNLIKE REDUNDANCY TO THE UPSTREAM
SHUTOFF VALVE AND IS IN STANDBY UNTIL REQUIRED.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

O2 FLOW INTO CABIN UNTIL CORRECTING ACTION IS IMPLEMENTED.

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(B) INTERFACING SUBSYSTEM(S):
LOSS OF ONE REDUNDANT O2 SEAL.

(C) MISSION:
UNRESTRICTED FLOW OF O2 INTO CABIN DURING LIFTOFF PHASE.

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECTS:
INABILITY TO ISOLATE O2 LEAK CAN CAUSE LOSS OF EMERGENCY O2 SUPPLY TO LES.

- DISPOSITION RATIONALE -

(A) DESIGN:
THE QUICK DISCONNECT IS A MECHANICAL CONNECTOR WHICH INCLUDES A MALE COUPLING WHICH IS THE FLIGHT HALF. THE FITTING IS MADE OF 304 CRES CORROSION RESISTANT, O2 COMPATIBLE STAINLESS STEEL. THE SPRING IS MADE OF 302 CRES STAINLESS STEEL. BOTH THE FITTING AND THE SPRING ARE PASSIVATED WHICH FORMS A PROTECTIVE COATING ON ITS SURFACE AND REDUCES THEIR CHEMICAL ACTIVITY.

■ (B) TEST:
ACCEPTANCE TEST - PROOF PRESSURE 225 PSIG APPLIED FOR 5 MINUTES. LEAK RATE REQUIREMENT IS 0.001 LB/HR O2 MAX AT 40 PSID.
ENGAGED AND DISENGAGED LEAKAGE TESTS: 100 +/- 10 PSIG APPLIED; ZERO LEAKAGE INDICATED ON THE 0 TO 100 CC/MIN FLOWMETER.
PRESSURE DROP: 3 PSID MAX AT 15 LB/HR O2 FLOW AT 70 F AND 40.7 PSIA INLET PRESSURE.
DISCONNECT FORCE: 10 LB MAX AT 40 PSID.

QUALIFICATION TEST - BURST PRESSURE: 300 PSIG APPLIED FOR 5 MINUTES.
LIFE CYCLE: 1000 CONNECT/DISCONNECT CYCLES.

IN-VEHICLE TESTING - QD LEAKAGE TEST IS PERFORMED AT 90 - 150 PSIG, 10 SCCM MAX LEAKAGE.

DMRSD - QD INTERNAL LEAK TEST IS PERFORMED BEFORE THE FIRST REFLIGHT OF EACH ORBITER AND AS A CONTINGENCY FOR LRU REPLACEMENT AT 90 - 150 PSIG, 10 SCCM MAX SYSTEM LEAKAGE. 900, 100 PSI O2 EMERGENCY BREATHING SYSTEM 1 & 2 LEAK CHECK IS PERFORMED PRIOR TO FIRST REFLIGHT OF EACH ORBITER AND EVERY FIVE FLIGHTS AT 900-950 PSIG; 70 SCCM MAX LEAKAGE. INFLIGHT CHECKOUT DURING EACH MISSION WILL VERIFY NO GROSS EXTERNAL LEAKAGE.

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(C) INSPECTION:

RECEIVING INSPECTION

RAW MATERIAL VERIFIED BY INSPECTION FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL

CORROSION PROTECTION PROVISIONS VERIFIED BY INSPECTION. CLEANLINESS LEVEL 200A PER MA0110-301 VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING PROCESSES, INSTALLATION AND ASSEMBLY VERIFIED BY INSPECTION. CRITICAL DIMENSIONS VERIFIED BY INSPECTION. TORQUES AND SURFACE FINISH ARE VERIFIED BY INSPECTION. SEALS ARE VISUALLY EXAMINED PRIOR TO INSTALLATION FOR DAMAGE AND CLEANLINESS.

NONDESTRUCTIVE EVALUATION

X-RAY AND FLUORESCENT PENETRANT INSPECTION VERIFIED BY INSPECTION.

CRITICAL PROCESSES

PARTS PASSIVATION AND WELDS ARE VERIFIED BY INSPECTION.

TESTING

ATP VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING, PACKAGING, STORAGE AND SHIPPING PROCEDURES ARE VERIFIED.

(D) FAILURE HISTORY:

ONE FAILURE HAS OCCURRED:

AC5433-010, 4/6/83. ON CV-102 AT KSC, A QD ON PANEL C6 BROKE INTO TWO PIECES WHEN REMOVED. THE DYNATUBE/QD WELD HAD VIRTUALLY NO WELD PENETRATION. THE SUPPLIER DRAWING SHOWED A FILLET WELD CALL OUT BUT DID NOT DEFINE PASS/FAIL CRITERIA OR INSPECTION PROCEDURES. CORRECTIVE ACTION - VENDOR DRAWING WAS REVISED TO REQUIRE A BUTT WELD. FULL PENETRATION AND ABSENCE OF CRACKS TO BE VERIFIED BY RADIOGRAPHIC AND DYE PENETRANT INSPECTION.

(E) OPERATIONAL USE:

TBS.

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- APPROVALS -

RELIABILITY ENGINEERING:	D. R. RISING	DRR	
DESIGN ENGINEERING	: K. KELLY	KK	for P. L. Schubert
QUALITY ENGINEERING	: M. SAVALA	ms	Q. R. Buttner 3/6/90
NASA RELIABILITY	:	TS	W. Steinke 5/10/90
NASA SUBSYSTEM MANAGER	:		Donald M. Vary 5/11/90
NASA QUALITY ASSURANCE	:		James G. Smith 4-3-90