

Failure Modes and Effects Analysis/Critical Items List

Document Number: JSC-38378 Document Rev. No.: C Document Date: 8/26/97
 Title: Risk Assessment Executive Summary Report (RAESR) for the USA SAFER

Item Name: Relief Valve Qty: 1 FMEA Number: US-SFR-120
 Item Part Number: 5159T-6T-L-300 ORU Name: SAFER
 Subsystem Name: Propulsion ORU Part Number: SED33105900-311
 Function: Protects low-pressure system against failed open/leaking regulator.

Item Type Designator: C PG/IP Identifier: N/A
 Reference Designator/Find No.: N/A Drawing Number: SED33105904
 Logistics Control Number: N/A

End Item Name: SAFER
 End Item Capability: Six degrees of freedom through 24 thrusters, each rated at 0.8 ± 0.08 lbs. force in vacuum.
 End Item Function: Provides emergency EVA self-rescue for separated crewmember.
 ISS Zone: EVA Shuttle Zone: EVA

Criticality

Critical Item: Yes: _____ No: X Criticality Category: ISS: 1R Shuttle: 1R/3
 Success Paths: Success Paths Remaining:

Failure (Mode, Cause, Detection, Corrective Action)

Failure Mode: Relief valve fails closed.
 Failure Mode Code:
 Failure Cause: Contamination, binding of relief poppet, piece-part failure.
 Failure Detection:
 Flight: IVA – None.
 EVA – None, unless over-pressurization structural failure occurs. Leak warning will be displayed if pressure system structural failure occurs.
 Ground: Functional Test.
 Time To Detect Quantity: 30 Time To Detect Units: Seconds
 Correcting Action: IVA – None.
 EVA – None.
 Remarks: None
 Failure Effect Phase: EVA Operations Affected Stage(S): EVA Operations

Failure Effect

On ORU/Assembly:
First/Second Failure: Inadvertent EVA crewmember separation.
Third Failure: Regulator failure.
Fourth (this) Failure: Relief Valve fails to release high pressure. Downstream pressure exceeds design pressure limit, structural failure of low-pressure system. This structural failure would take place at the weakest point in the low-pressure system, the Nomex braided Teflon flex hoses. These flex hoses would split open, releasing the GN₂. The Nomex/Teflon debris, which is generated, would be of low mass and, therefore, have low energy.
 On Subsystem/Next Assembly: Rupture of flex hoses.
 On End Item/Segment: Prevents self rescue.
 On Crew/ISS: Possible loss of EVA crewmember.
 Time To Effect Quantity: 1 Time To Effect Units: Minutes

Redundancy Screen

ISS	(Shuttle)			
Checkout Pre-Launch	(A):	Pass		
Checkout On-Orbit	(B):	N/A		
Detection Flight Crew:		Pass	Or	Detection Ground Crew: Fail
Loss Of Redundancy From A Single Cause	(C):	N/A		