

**SSME FMEA/CIL**  
**REDUNDANCY SCREEN**

Component Group: Propellant Valves  
 CIL Item: O300-08  
 Component: Anti-flood Valve  
 Part Number: RS007083  
 Failure Mode: Fretting of internal parts.

Prepared: P. Lowrmore  
 Approved: T. Nguyen  
 Approval Date: 6/30/99  
 Change #: 1  
 Directive #: CCBD ME3-01-5228  
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Phase	Failure / Effect Description	Criticality Hazard Reference
SMC 4.1	Fire from ignition of internal parts. Loss of vehicle.  Redundancy Screens: SINGLE POINT FAILURE N/A.	1 ME-C3S, ME-C3M, ME-C3A,C

SSME F/A/CIL  
DESIGN

Component Group: Propellant Valves  
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Design / Document Reference

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**FAILURE CAUSE:** A: Relative motion of: Poppet/Retainer, Poppet/Piston, Poppet/Spring/Piston.

THE POPPET (1) MATERIAL IS TUNGSTEN CARBIDE. THE MATERIAL WAS SELECTED FOR ITS HARDNESS AND WEAR RESISTANCE (4). THE PISTON (2) AND RETAINER (3) ARE HEAT TREATED INCONEL 718. THE MATERIAL WAS SELECTED FOR ITS STRENGTH AND WEAR RESISTANCE (4). THE POPPET AND PISTON IS ON MACHINED SPHERICAL RADII TO MAXIMIZE THE CONTACT AREA. THE SPHERICAL RADII SURFACE FINISHES ARE CONTROLLED AND THE PISTON SURFACE IS DRY-FILM LUBRICATED TO REDUCE FRICTION AND PREVENT WEAR AND FRETTING. A SPRING (5) LOADS THE POPPET ON THE RETAINER WHEN THE ANTI-FLOOD VALVE (6) IS IN THE OPEN POSITION. THE SPRING LOAD PREVENTS POPPET FLUTTER AND PREVENTS FRETTING BETWEEN THE POPPET AND RETAINER. THE ANTI-FLOOD VALVE SUCCESSFULLY COMPLETED DVS TESTING REQUIREMENTS (7), INCLUDING VIBRATION (8), AND ENDURANCE (9). ALL MATERIALS MEET THE LOX COMPATIBILITY REQUIREMENT FOR THE OPERATING ENVIRONMENT (10).

(1) RS008225; (2) R0019123; (3) RS008226; (4) RSS-8582; (5) RS008227; (6) RSC07063 (7) DVS-SSME-508; (8) RSS-508-33, RSS-508-34; (9) RSS-508-32; (10) RL10017

**SSME FMEA/CIL  
INSPECTION AND TEST**

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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	POPPET		RS008225
	PISTON		R0019123
	RETAINER		RS008226
	SPRING		RS008227
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING REQUIREMENTS.	
		HEAT TREAT IS VERIFIED PER DRAWING REQUIREMENTS.	RS008226 R0019123
		SURFACE FINISH IS VERIFIED PER DRAWING REQUIREMENTS.	RS008225 R0019123
	PARTS ARE PENETRANT INSPECTED PER DRAWING REQUIREMENTS.	R0019123 RS008225	
	DRY-FILM LUBRICATION IS VERIFIED PER DRAWING REQUIREMENTS.	R0019123	
	ASSEMBLY INTEGRITY	PROPER ASSEMBLY IS VERIFIED PER ASSEMBLY AND FUNCTIONAL INSPECTION.	RL00460
	HOT-FIRE ACCEPTANCE TESTING (GREEN RUN)	VALVE OPERATION IS VERIFIED THROUGH HOT-FIRE ACCEPTANCE TESTING. (LAST TEST)	RL00461

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Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRACA)  
 Reference: NASA letter SA21/88/308 and Rocketdyne letter 88RCD9751

Operational Use: Not Applicable.

**SSME / TA/CIL  
WELD JOINTS**

Component Group: Propellant Valves  
 CIL Item: D300  
 Component: Anti-flood Valve  
 Part Number: RS007083

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Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side Not Access	Critical Initial Flaw Size Not Detectable		Comments
						HCF	LCF	
ANTI-FLOOD VALVE	RS007083	5	EBW	II	X			
ANTI-FLOOD VALVE	RS007083	6	EBW	II	X			