

SSME FIRE/IGIL
REDUNDANCY SCREEN

Component Group: Propellant Valves
CIL Item: D600-07
Component: Recirculation Isolation Valve
Part Number: RS010161
Failure Mode: Fretting of internal parts.

Prepared: P. Lowrmore
Approved: T. Nguyen
Approval Date: 6/30/99
Change #: 1
Directive #: CCBD ME3-01-5226
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Phase	Failure / Effect Description	Criticality Hazard Reference
PSMCD 4.1	Fire from ignition of internal parts. Loss of vehicle. Redundancy Screens: SINGLE POINT FAILURE: N/A.	1 ME-C3S, ME-C3M, ME-C3P,D, ME-C3A,C

SSMF - A/CIL
DESIGN

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Design / Document Reference

FAILURE CAUSE: A: Relative motion of: Poppet/Retainer, Poppet/Spring/Plate, Dynamic Seal Retainer/Housing

THE POPPET (1) IS MADE FROM HEAT TREATED 440C CRES BAR. THE POPPET RETAINER (2) IS MADE FROM HEAT TREATED INCONEL 718. THE DIFFERENTIAL HARDNESSES BETWEEN THE POPPET AND RETAINER MINIMIZE ANY POTENTIAL FOR FRICTIONAL HEATING AND FRETTING BETWEEN THE TWO SURFACES. THE POPPET IS LOADED AGAINST THE RETAINER BY A SPRING WASHER. SPRING LOADING PREVENTS RELATIVE MOTION OF THE POPPET TO THE RETAINER. THE POPPET SPRING (3) IS CONTAINED BETWEEN THE ASSEMBLY PLATE (2) AND THE POPPET. THE POPPET SPRING IS MADE FROM HEAT TREATED BERYLLIUM COPPER. THE POPPET ASSEMBLY PLATE (2) IS MADE FROM HEAT TREATED INCONEL 718. BE-CU IS USED FOR ITS STRENGTH, RESISTANCE TO STRESS CORROSION CRACKING (4), AND DIFFERENTIAL HARDNESS WITH THE INCONEL 718 PLATE AND THE 440C POPPET. THE DIFFERENTIAL HARDNESS PREVENTS GALLING AND MINIMIZES FRICTIONAL HEATING AND FRETTING POTENTIAL BETWEEN THE SURFACES. THE SPRING LOADING PREVENTS RELATIVE MOTION BETWEEN THE ASSEMBLY PIECES. THE DYNAMIC SEAL RETAINER (5) IS MADE FROM 303F CRES BAR. THE HOUSING (6) IS MADE FROM HEAT TREATED INCONEL 718. THE DIFFERENTIAL HARDNESS OF THE HOUSING AND RETAINER MINIMIZES FRICTIONAL HEATING AND FRETTING POTENTIAL. THE SPRING LOADING FROM THE DYNAMIC SEAL SPRINGS PREVENTS RELATIVE MOTION BETWEEN THE RETAINER, HOUSING, AND RETAINER RING. ALL MATERIALS MEET THE 10 KG-METER LOX/GOX IMPACT REQUIREMENT (7). THE RIV HAS COMPLETED DESIGN VERIFICATION SPECIFICATION TESTING (8), INCLUDING VIBRATION (9), AND ENDURANCE (10).

(1) RS010164; (2) RS010166; (3) RS010165; (4) RSS-8582; (5) RS010168; (6) RS010162; (7) RL10017; (8) DVS-SSMF-49; (9) RSS-517-41, RSS-517-58, RSG-ECF-579; (10) RSS-517-49

**SSME FMEA/CIL
INSPECTION AND TEST**

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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	HOUSING POPPET POPPET SPRING POPPET ASSEMBLY RETAINER		RS010162 RS010164 RS010165 RS010166 RS010168
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING REQUIREMENTS. HEAT TREATMENT OF THE MATERIALS IS VERIFIED PER DRAWING REQUIREMENTS.	RS010162 RS010164 RS010165 RS010166
	ASSEMBLY INTEGRITY	PROPER ASSEMBLY IS VERIFIED DURING POPPET ASSEMBLY INSPECTIONS AND ASSEMBLY AND FUNCTIONAL TESTING.	RS010166 RL00442
	HOT-FIRE ACCEPTANCE TESTING (GREEN RUN)	VALVE OPERATION IS VERIFIED THROUGH HOT-FIRE ACCEPTANCE TESTING. (LAST TEST)	RL00461

D-211

Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRACA)
 Reference: NASA letter SA21/88/308 and Rocketdyne letter BBRC09761.
 Operational Use: Not Applicable.

SSME / RA/CIL
WELD JINTS

Component Group: Propellant Valves
 CIL Item: 0600
 Component: Recirculation Isolation Valve
 Part Number: RS010161

Prepared: P. Lowmore
 Approved: T. Nguyen
 Approval Date: 8/30/99
 Change #: 1
 Directive #: CCBO ME3-01-5228
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Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side No Access	Critical Initial Flaw Size Not Detectable		Comments
						HCF	LCF	
BELLOWS	RS010163	1,2	GTAW	II	X			
BELLOWS	RS010163	5	GTAW	II	X			
BELLOWS	RS010163	6	EBW	II	X			
POPPET	RS010166	1 PLACE	EBW	II	X			
BELLOWS	RS010171	1 PLACE	EBW	II	X			