

SSME FA/CIL  
REDUNDANCY / SCREEN

Component Group: Propellant Valves  
 CIL Item: D140-D4  
 Component: Oxidizer Preburner Oxidizer Valve  
 Part Number: RSD08258  
 Failure Mode: Structural failure.

Prepared: P. Lowrimer  
 Approved: T. Nguyen  
 Approval Date: 6/30/99  
 Change #: 1  
 Directive #: CCBD MEJ-01-5228  
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Phase	Failure / Effect Description	Criticality Hazard Reference
PSMCD 4.1	Oxidizer flow to preburner reduced; high pressure oxidizer leakage into aft compartment. Loss of vehicle.  Redundancy Screens: SINGLE POINT FAILURE: N/A.	1 ME-C3P,D, ME-C3S, ME-C3M, ME-C3A,C

**SSME FMEA/CIL**  
**DESIGN**

Component Group: Propellant Valves  
CIL Item: D140-04  
Component: Oxidizer Preburner Oxidizer Valve  
Part Number: RS008258  
Failure Mode: Structural failure.

Prepared: P. Lowmore  
Approved: T. Nguyen  
Approval Date: 6/30/99  
Change #: 1  
Directive #: CCB0 ME3-01-5226  
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Design / Document Reference

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**FAILURE CAUSE: A: Fracture of housing or end cap.**

THE OPOV HOUSING (1) AND CAP (2) ARE MADE FROM HEAT TREATED INCONEL 718 (1). THE HIGH STRENGTH AND RELATIVELY LOW THERMAL EXPANSION-CONTRACTION CHARACTERISTICS ARE PRIMARILY THE REASON FOR SELECTING INCONEL 718. INCONEL 718 EXHIBITS CRYOGENIC DUCTILITY AND HIGH MODULUS OF ELASTICITY. IT IS CORROSION RESISTANT AND HAS HIGH RESISTANCE TO STRESS CORROSION CRACKING (3). THE ROUGH MACHINED HOUSING IS HYDROSTATIC PRESSURIZED (4) AND THE FINAL MACHINED HOUSING AND CAP ARE PROOF PRESSURE TESTED TO ASSURE PART INTEGRITY (5). THE HIGH CYCLE AND LOW CYCLE FATIGUE LIFE OF THE OPOV MEETS CEI REQUIREMENTS (6). THE MINIMUM FACTORS OF SAFETY FOR THE OPOV MEET CEI REQUIREMENTS (7). THE OPOV WAS CLEARED FOR FRACTURE MECHANICS/DE FLAW GROWTH, SINCE IT CONTAINS NO FRACTURE CRITICAL PARTS (8). THE OPOV HAS COMPLETED DESIGN VERIFICATION TESTING (9), INCLUDING VIBRATION (10), AND ENDURANCE TESTS (11).

(1) RS008236; (2) RS008266; (3) RSS-8582; (4) RL00185; (5) RL00472; (6) RL00532 CP320R0003B; (7) RSS-8546, CP320R0003B; (8) NASA TASK 117; (9) DVS-55ME-515; (10) RSS-515-24; (11) RSS-515-17

**SSME FMF OIL  
INSPECTION AND TEST**

Component Group: Propellant Valves  
 CIL Item: D140-04  
 Component: Oxidizer Preburner Oxidizer Valve  
 Part Number: RS008258  
 Failure Mode: Structural failure.

Prepared: P. Lowrmore  
 Approved: T. Nguyen  
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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	HOUSING		RS008236
	CAP		RS008256
	HOUSING FORGING		RS008303
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING REQUIREMENTS.	
		TWO TRANSVERSE AND ONE LONGITUDINAL TENSILE SPECIMENS ARE TAKEN FROM THE HOUSING FORGING AT LOCATIONS SPECIFIED ON DRAWING. SPECIMENS ARE TESTED TO ESTABLISH CONFORMANCE TO THE REQUIRED MECHANICAL PROPERTIES.	RS008303
		THE HOUSING AND CAP HEAT TREAT IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RA0611-020
		THE HOUSING IS PROOF PRESSURE TESTED AFTER ROUGH MACHINING	RLC0185
		THE HOUSING AND CAP ARE PENETRANT INSPECTED AFTER FINAL MACHINING.	RA0115-116
	ASSEMBLY INTEGRITY	THE ASSEMBLED VALVE IS PRESSURE, FUNCTIONAL, AND LEAK TESTED.	RL00472
		HOT FIRE TESTING AND 2ND E & M VERIFY SATISFACTORY VALVE OPERATION.	RL00050-04 RL00056-06 RI 00056-07
HOT-FIRE ACCEPTANCE TESTING (GREEN RUN)	VALVE OPERATION IS VERIFIED THROUGH HOT-FIRE ACCEPTANCE TESTING.	RL00461	
	THE VALVE IS HELIUM SIGNATURE LEAK TESTED.	OMRSD S00000.950	
	VALVE OPERATION IS VERIFIED DURING PRE-LAUNCH CHECKOUTS (LAST TEST)	OMRSD V41AS0 030 OMRSD S00FA0.211	

Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRACA)  
 Reference: NASA letter SA21/88/308 and Rocketdyne letter 88RC09761.

Operational Use: Not Applicable.

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**SSME TTA/CIL  
WELD JOINTS**

Component Group: Propellant Valves  
 CIL Item: D140  
 Component: Oxidizer Preburner Oxidizer Valve  
 Part Number: RS008258

Prepared: P. Low/more  
 Approved: T. Nguyen  
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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	
BELLOWS	RS008230	3,4	GTAW	II	X	X		
BELLOWS	RS008230	5-7	GTAW	I				
SHAFT	RS008263	1,2	EBWJ	II	X	X		