

**SSME / FA/CIL
REDUNDANCY / SCREEN**

Component Group: Propellant Valves
 CIL Item: D120-04
 Component: Main Oxidizer Valve
 Part Number: RS001255
 Failure Mode: Structural failure.

Prepared: P. Lowmore
 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	Oxidizer flow to engine reduced; high pressure oxidizer leakage into aft compartment. Loss of vehicle. Redundancy Screens SINGLE POINT FAILURE: N/A.	↑ ME-C3P,D, ME-C3S, ME-C3M, ME-C3A,C

SSME FMEA/CIL
DESIGN

Component Group: Propellant Valves
CIL Item: D120-04
Component: Main Oxidizer Valve
Part Number: RSD08255
Failure Mode: Structural failure.

Prepared: P. Lowmore
Approved: T. Nguyen
Approval Date: 5/30/99
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Design / Document Reference

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

THE MOV 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 MOV MEETS CEI REQUIREMENTS (6). THE MINIMUM FACTORS OF SAFETY FOR THE MOV MEET CEI REQUIREMENTS (7). THE MOV WAS CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH, SINCE IT CONTAINS NO FRACTURE CRITICAL PARTS (8). THE MOV HAS COMPLETED DESIGN VERIFICATION TESTING (9), INCLUDING VIBRATION (10), AND ENDURANCE TESTS (11).

(1) RS008087; (2) RS008272; (3) RSS-8575; (4) RL00183; (5) RL00435; (6) RL00532, CP320R0003B; (7) RSS-8546, CP320R0003B; (8) NASA TASK 117; (9) DV5-SSME-515; (10) RSS-515-24; (11) RSS-515-17

**SSME FMF OIL
INSPECTION AND TEST**

Component Group: Propellant Valves
 CIL Item: D120-04
 Component: Main Oxidizer Valve
 Part Number: RS008255
 Failure Mode: Structural failure.

Prepared: P. Lowrimore
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 Approval Date: 6/30/99
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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	HOUSING		RS008087
	CAP		RS008272
	HOUSING FORGING		RS008164
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING REQUIREMENTS.	
		TWO STANDARD TENSILE SPECIMENS ARE TAKEN FROM THE HOUSING FORGING AT EACH OF THE TWO AXES TRANSVERSE TO THE FORGING GRAIN FLOW DIRECTION. SPECIMENS ARE TESTED TO ESTABLISH CONFORMANCE TO THE REQUIRED MECHANICAL PROPERTIES.	RS008154
		THE HOUSING AND CAP HEAT TREAT IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RA0611-020
	THE HOUSING IS PROOF PRESSURE TESTED AFTER ROUGH MACHINING.	RL00183	
	THE HOUSING AND CAP ARE PENETRANT INSPECTED AFTER FINAL MACHINING.	RA0115-116	
	ASSEMBLY INTEGRITY	THE ASSEMBLED VALVE IS PROOF PRESSURE, FUNCTIONAL, AND LEAK TESTED	RL003435
	HOT-FIRE ACCEPTANCE TESTING (GREEN RUN)	VALVE OPERATION IS VERIFIED THROUGH HOT-FIRE ACCEPTANCE TESTING.	RL00461
		THE VALVE IS HELIUM SIGNATURE LEAK TESTED AND VALVE OPERATION IS VERIFIED DURING PRE-LAUNCH CHECKOUTS. (LAST TESTS)	OMRSD S00000.950 OMRSD S00FA0.211

D-26

Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRAGA)

Reference: NASA letter SA21/B6/30B and Rocketdyne letter B8RC09761.

Operational Use: Not Applicable.

SSME / FA/CIL
WELD JOINTS

Component Group: Propellant Valves
 CIL Kent: D120
 Component: Main Oxidizer Valve
 Part Number: RS008255

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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	RS008211	3,4	EBW	II	X	X	X	
BELLOWS	RS008211	5-8	GTAW	I				
SHAFT	RS008271	1,2	EBW	II	X	X		