

**SSME FMEA/CIL  
REDUNDANCY SCREEN**

Component Group: Ducts and Lines  
CIL Item: K560-01  
Part Number: R055610  
Component: FPB Purge Supply Line  
FMEA Item: K518, K544, K560, K561  
Failure Mode: Fails to contain purge gas.

Prepared: D. Early  
Approved: T. Nguyen  
Approval Date: 7/25/00  
Change #: 2  
Directive #: CCBD ME3-01-5638

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Phase	Failure / Effect Description	Criticality Hazard Reference
P 4.1	GN2 Leakage into aft compartment. Leakage causes loss of flow to downstream system reducing purge flow below acceptable limits for inerting propellant leakage at ICD limit. Potential open air fire. Loss of vehicle.  Redundancy Screens: SINGLE POINT FAILURE: N/A	1 ME-A1P

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

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Design / Document Reference

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**FAILURE CAUSE:** A: Parent material failure or weld failure.

THE LINE ASSEMBLY (1) IS MANUFACTURED UTILIZING INCONEL 625 TUBE AND BAR. INCONEL 625 WAS SELECTED FOR ITS WELDABILITY, FORMABILITY, RESISTANCE TO STRESS CORROSION CRACKING, AND CORROSION RESISTANCE (2). INCONEL 625 POSSESSES THE REQUIRED STRENGTH WITHOUT REQUIRING HEAT TREAT. ALL MATERIALS USED IN THE LINE FABRICATION ARE LOX COMPATIBLE (2). FLANGE SECTIONS INCORPORATE RADIUS JOINTS TO REDUCE STRESS CONCENTRATIONS. OFFSET LIMIT REQUIREMENTS ARE ESTABLISHED TO REDUCE STRESS CONCENTRATIONS AND IMPROVE WELD GEOMETRY. TUBING STOCK IS DRAWN TO MAINTAIN SURFACE REGULARITY. INSTALLATION IS CONTROLLED FOR ANGULARITY AND OFFSET PER SPECIFICATION REQUIREMENTS (3). MINIMUM FACTORS OF SAFETY FOR THE LINE ASSEMBLY MEET CEI REQUIREMENTS (4). HIGH AND LOW CYCLE FATIGUE LIFE MEET CEI REQUIREMENTS (5). THE LINE ASSEMBLY HAS COMPLETED PRESSURE CYCLING AND ULTIMATE PRESSURE IS VERIFIED BY SIMILARITY TO THE ORIGINAL LINE CONFIGURATION (6). THE LINE ASSEMBLY PARENT MATERIALS WERE CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH, SINCE THEY ARE NOT FRACTURE CRITICAL PARTS (7). TABLE K560 LISTS ALL THE FMEA/CIL WELDS AND IDENTIFIES THOSE WELDS IN WHICH THE CRITICAL INITIAL FLAW SIZE IS NOT DETECTABLE, AND THOSE WELDS IN WHICH THE ROOT SIDE IS NOT ACCESSIBLE FOR INSPECTION. THESE WELDS HAVE BEEN ASSESSED AS ACCEPTABLE FOR FLIGHT BY ANALYSIS AND SIMILARITY (6).

(1) R055610 (2) RSS-8582; (3) RA0102-003; (4) RSS-8546, CP320R0003B; (5) RL00532, CP320R0003B; (6) VRS-0562; (7) NASA TASK 117

**SSME FM CIL**  
**INSPECTION AND TEST**

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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	LINE ASSEMBLY		R055610
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING REQUIREMENTS.	R055610 R055609 RS007147
	WELD INTEGRITY	FLANGE AND ELBOW DETAILS ARE PENETRANT INSPECTED PER SPECIFICATION REQUIREMENTS.	RA0115-116
		ALL WELDS ARE INSPECTED TO DRAWING AND SPECIFICATION REQUIREMENTS PER WELD. CLASS INSPECTIONS INCLUDE: VISUAL, DIMENSIONAL, PENETRANT, RADIOGRAPHIC, ULTRASONIC, AND FILLER MATERIAL, AS APPLICABLE.	RL10011 RA0607-094 RA0115-116 RA0115-006 RA1115-001 RA0115-127
	ASSEMBLY INTEGRITY	THE ASSEMBLY IS PROOF PRESSURE TESTED PER DRAWING REQUIREMENTS.	R055610
FLIGHT FLOW TESTING	THE EXTERNAL SURFACE IS VISUALLY INSPECTED PRIOR TO EACH LAUNCH. (LAST TEST)	OMRSD V41BU0.030	

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.

**SSME FMEA/CIL**  
**WELD JOINTS**

Component Group: Ducts and Lines  
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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	
LINE	R055610	1,2	GTAW	I	X	X	X	

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