SSME FMEA/CIL
REDUNDANCY SCREEN

Component Group:	**Ducts and Lines**	**Prepared:**	**D. Early**
CIL Item:	**K562-01**	**Approved:**	**T. Nguyen**
Part Number:	**R055613**	**Approval Date:**	**7/25/00**
Component:	**Main Injector Purge Supply Line**	**Change #:**	**2**
FMEA Item:	**K509, K530, K562**	**Directive #:**	**CCBD ME3-01-5638**
Failure Mode:	**Fails to contain GN2.**	**Page:**	**1 of 1**

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 limits. Potential open air fire. Loss of vehicle. Redundancy Screens: SINGLE POINT FAILURE: N/A	1 ME-A1P

SSME FMEA/CIL
DESIGN

Component Group:	**Ducts and Lines**	**Prepared:**	**D. Early**
CIL Item:	**K562-01**	**Approved:**	**T. Nguyen**
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		Page:	**1 of 1**

Design / Document Reference

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

THE LINE ASSEMBLY (1) IS MANUFACTURED UTILIZING INCONEL 625 TUBE AND BAR FOR FLANGE AND ELBOW. INCONEL 625 WAS SELECTED FOR ITS WELDABILITY, FORMABILITY, RESISTANCE TO STRESS CORROSION CRACKING, AND CORROSION RESISTANCE (2). INCONEL 625 POSSESSES THE REQUIRED STRENGTH WITHOUT REQUIRED HEAT TREAT. ALL MATERIALS USED IN THE LINE FABRICATION ARE LOX COMPATIBLE (2). FLANGE SECTIONS AND ELBOW 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 MEET CEI REQUIREMENTS (4). HIGH AND LOW CYCLE FATIGUE LIFE MEET CEI REQUIREMENTS (5). THIS LINE ASSEMBLY WAS VERIFIED TO SATISFY PRESSURE CYCLING AND ULTIMATE PRESSURE IS VERIFIED BY SIMILARITY TO THE ORIGINAL FLIGHT CONFIGURATION (6). THE LINE ASSEMBLY PARENT MATERIALS WERE CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH, SINCE THEY ARE NOT FRACTURE CRITICAL PARTS (7). TABLE K562 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) R055613 (2) RSS-8582, RSS-8575; (3) RA0102-003; (4) RSS-8546, CP320R0003B; (5) RL00532, CP320R0003B; (6) VRS-0562; (7) NASA TASK 117

SSME FM CIL
INSPECTION AND TEST

Component Group:	**Ducts and Lines**	**Prepared:**	**D. Early**
CIL Item:	**K562-01**	**Approved:**	**T. Nguyen**
Part Number:	**R055613**	**Approval Date:**	**7/25/00**
Component:	**Main Injector Purge Supply Line**	**Change #:**	**2**
FMEA Item:	**K509, K530, K562**	**Directive #:**	**CCBD ME3-01-5638**
Failure Mode:	**Fails to contain GN2.**		
		Page:	**1 of 1**

Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	LINE ASSY		R055613
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING REQUIREMENTS.	R055613 R055609 RS007159
		FLANGE AND ELBOW DETAILS ARE PENETRANT INSPECTED PER SPECIFICATION REQUIREMENTS.	RA0115-116
	WELD INTEGRITY	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
	DIMENSIONAL INTEGRITY	PHYSICAL CHARACTERISTICS OF THE ORIFICE ARE VERIFIED PER DRAWING REQUIREMENTS.	R055613
	ASSEMBLY INTEGRITY	THE ASSEMBLY IS PROOF PRESSURE TESTED PER DRAWING REQUIREMENTS.	R055613
	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
CIL Item: K562
Part Number: R055613
Component: Main Injector Purge Supply Line
FMEA Item: K509, K530, K562

Prepared: D. Early
Approved: T. Nguyen
Approval Date: 7/25/00
Change #: 1
Directive #: CCBD ME3-01-5638
Page: 1 of 1

Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side Not Access	Critical Initial Flaw Size Not Detectable HCF	Critical Initial Flaw Size Not Detectable LCF	Comments
LINE	R055613	1,2	GTAW	1	X	X	X	