

Your Company Header

Example Project

IEC 61511-3:2016 Annex F

SAFETY INTEGRITY LEVEL VERIFICATION

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1. EXECUTIVE SUMMARY

1.1. List of SIFs

Table 1 gives a summary of the SIFs and the corresponding Hazard IDs.

Table 1. List of SIFs

PHA ID	SIF Tag	SIF Description
HAZOP	SIF	Safety Instrumented Function will close shut-off valve in steam supply in case of high high pressure in column overhead.

1.2. Assumptions

Table 2 summarises the assumptions applied in the analysis.

Table 2. Summary of Assumptions

Assumptions
Example Assumption 1
Example Assumption 2

1.3. Recommendations

Table 3 summarises the recommendations are proposed for consideration:

Table 3. Summary Recommendations

PHA ID	SIF Tag	SIL Target	Recommendation
HAZOP	SIF	SIL 1	Example Recommendation 1 Example Recommendation 2

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2. RESULTS

2.1. Results

Table 4 presents the results of the random hardware reliability and architectural assessment of each of the SIFs, alongside their corresponding SIL targets.

Table 4. Summary of Results

SIF Tag	Selected PFD Target	PFD Achieved	Selected SIL Target	Max Allowable SIL (Architectural Constraints)	Result	Status
SIF	9.1E-2	1.8E-2	SIL 1	SIL 1	Passed	Closed

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APPENDIX A
SIF DEFINITIONS

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SIF Tag	SIF Description	Sensor Subsystem	Sensor Subsystem Configuration	Logic Subsystem	Logic Subsystem Configuration	Final Element Subsystem	Final Element Subsystem Configuration
SIF	Safety Instrumented Function will close shut-off valve in steam supply in case of high high pressure in column overhead.	PT-001	1oo1	PLC-001	1oo1	SDV-001	1oo1

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APPENDIX B

RELIABILITY BLOCK DIAGRAMS

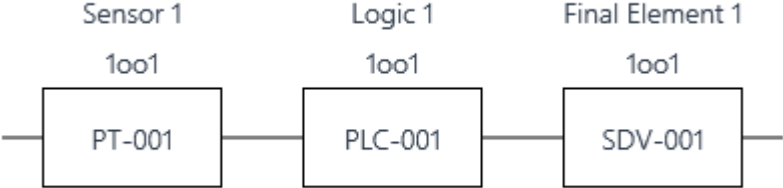
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PHA ID	HAZOP		
SIF Tag	SIF		
Drawing Numbers			
SIF Description	Safety Instrumented Function will close shut-off valve in steam supply in case of high high pressure in column overhead.		
Hazardous Event (Deviation)	High / More Pressure leading to: (Safety) Temperature increase in distillation column condenser. Loss of condensation capacity. Pressure increase in column overhead system exceeding design conditions. Column rupture. Flammable material release leading to flammable pool/dispersion. Potential fire leading to fatalities, AND (Safety) Excessive heat input to column reboiler leading to increase in vapour generation. Capacity of the condenser is surpassed. Pressure increase in column overhead system exceeding design conditions. Column rupture. Flammable material release leading to flammable pool/dispersion. Potential fire leading to fatalities		
Nodes	Node 1		
Mode Of Operation	Low Demand		
Notes	Example Note 1 Example Note 2		
	1001	1001	1001
Configuration	8.0E-5	8.6E-3	9.0E-3
PFD			
PFD Achieved (Total)	1.8E-2		
Selected PFD Target	9.1E-2		
Subsystem Allowable SIL (Architectural Constraints)			
Max Allowable SIL (Architectural Constraints)	SIL 1		
Selected SIL Target	SIL 1		
Result	Passed		

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Device Tag	Manufacturer	Device	Proof Testing Interval (Months)	Proof Testing Coverage (%)	Periodic Automatic Testing Interval (Months)	Periodic Automatic Testing Coverage (%)	MRT (Hours)	Dangerous Failure Mode	λ_{DD} (/hr)	λ_{DU} (/hr)	λ_S (/hr)	SFF (%)	Data Source	Type
PLC-001	Generic	Typical simplex loop (AI-DO, NE)	12	95	12	95	48	Fail to initiate action	4.9E-6	1.9E-6	1.1E-5	89.5	Exida Safety Equipment Reliability Handbook, 2003, ISBN 0-9727234-0-4	B
PT-001	GE Druck	GE Druck PTX400, Digital Pressure Transmitter	12	95	12	95	48	Fail to detect high pressure	1.3E-7	1.7E-8	6.8E-8	92.1	ESC Report A109_SV001_(2.0)	B
SDV-001	Generic	ESV/XV incl. actuator (ex. Pilot)	12	95	12	95	48	Fail to close	0	2.0E-6	3.3E-6	62	Application of IEC 61508 and IEC61511 in the Norwegian Petroleum Industry, No. 070, Oct. 2004, Rev. 2, OLF.	A

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APPENDIX C

FAILURE RATES, TESTING STRATEGY AND REPAIR TIME DATA

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Device Tag	Manufacturer	Device	Proof Testing Interval (Months)	Proof Testing Coverage (%)	Periodic Automatic Testing Interval (Months)	Periodic Automatic Testing Coverage (%)	MRT (Hours)	Dangerous Failure Mode	λ_{DD} (/hr)	λ_{DU} (/hr)	λ_S (/hr)	SFF (%)	Data Source	Type
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