

Your Company Header

Example Project

IEC 61511-3:2016 - Annex F

SAFETY REQUIREMENT SPECIFICATION

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1. SIF SRS

Table 1. SRS for the SIS

SIS Details	
Operator Interfaces	Operator interfaces displayed on the Programmable Logic Controller (PLC) Human Machine Interface (HMI) screens.
SIS BPCS Interfaces	Interface between SIF and PLC is achieved by using serial communications (RS485 mobus) in order to prevent fault passed through.
Process Details	
Normal Plant Operation	Normal operating mode is performing the distillation process.
Abnormal Plant Operation	There are no abnormal operating modes in which the SIS needs to provide protection.
SIL Data	
SIS SIL Target	SIL 1
SIS Target Proof Test Interval (Months)	12
SIS Mean Repair Time (Hours)	48
Trip Actions	
Specific Requirements Related To SIS Start Up / Restart	No specific start-up requirements. Following an activation the restart is achieved by manually resetting the function.
Application Software	
Logic Solver Software Type	Limited Variability Language – Function Block Diagram.
Application Software Self Monitoring	Software watchdog will alarm in the event of fault occurring.
Functions To Enable Periodic Testing	Key switch installed in order to allow periodic testing.
Additional Logic Functions	Single logic function within the PLC.
Application Software Documentation	Functional design specification, User requirement specification, PLC manual detailing configuration.
Environmental Conditions	
Material Requisition Specificatin Ref	No specific requirements.
Temperature	Must be suitable for installation within an air conditioned switch room target 20 deg C.
Humidity	Must be suitable for installation within an air conditioned switch room target 10-30% humidity.
Contaminants	No specific requirements.
Grounding	Must be suitable for installation within an air conditioned switch room with clean earth.
Electromagnetic Interference	Must meet CE requirements for EMC.
Radio Frequency Interference	Must be suitable for installation within an air conditioned switch room where portable radios are used.
Shock	No specific requirements.
Vibration	No specific requirements.
Electrostatic Discharge	No specific requirements.
Hazardous Area Classification	No specific requirements.
Water Dust Ingress Protection	Must be suitable for installation within an air conditioned switch room, must be IP4x rated.
Lightning	No specific requirements.
Other Factors	No specific requirements.

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2. SIF SRS(S)

SRS for the SIFs

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SIF Details				
SIF Tag	SIF			
PHA ID	HAZOP			
Drawing Numbers				
Hazardous Event (Deviation)	<p>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</p>			
PHA Report Reference	HAZOP, Node 1, Higher Pressure.			
SIF Description	Safety Instrumented Function will close shut-off valve in steam supply in case of high high pressure in column overhead.			
Sources Of Demand	Loss of cooling water.			
Demand Rate On SIF	Failure of temperature control fully opening steam supply control valve.			
Trip Points	1.1E-4 /yr.			
Success Criteria	Pressure measurement of 80% of design pressure.			
Functional Relationship (Between Input And Output)	Closure of the shut-off valve in steam supply.			
	Upon detection of high high pressure in a 1oo1 voting arrangement, close steam supply shut-off valve in a 1oo1 voting arrangement via the safety PLC.			
	Common Cause Failures			
Electrical Power Loss	Upon loss of power, the signal from the safety PLC shall be de-energised and the valve shall be driven / moved to closed position.			
Compressed Air Loss	Upon loss of compressed air, the valve shall be driven / moved to the closed position.			
Hydraulic Pressure Loss	No hydraulic circuits installed.			
CCF Other	No other Common Cause Failures.			
Process Details				
Safe State Definition	In order to achieve safe state, the de-energisation of the signal to the steam supply shut-off valve causing the valve to be driven / moved to closed position.			
Concurrent Safe States	No concurrent states that will create an additional hazard.			
Process Safety Time	1 minute.			
Requirement To Survive A Major Accident	No requirement to survive a major accident.			
SIL Data				
Mode Of Operation	Low demand.			
SIL	Target	SIL 1	Achieved	SIL 1
PFD / PFH	Target	9.1E-02	Achieved	1.8E-02
Spurious Trip Rate (/hr)	Target	No spurious trip rate requirement.	Achieved	HOLD
Target Proof Testing Interval (Months)	Sensor Subsystem		Final Element Subsystem	
	Pressure transmitter	12	Shut Down Valve	12
Mean Repair Time (Hours)	Sensor Subsystem		Final Element Subsystem	
	Pressure transmitter	8	Shut Down Valve	8
SIF Response Time Achieved	20 seconds			
Trip Actions				
Manual Shutdown Requirements	Not required.			
Energise / De-energise To Trip	De-energise to trip.			
Resetting After A Shutdown	Following an activation the restart is achieved by manually resetting the functions.			
Overrides / Enables / Bypasses	<p>Overrides: maintenance override required. Enables: no additional requirements. Bypasses: no additional requirements.</p>			
Dangerous Combinations Of Output States	No dangerous combinations.			
Specify Actions To Achieve / Maintain Safe State On SIS Fault Including Human Factors	SIF should trip to the safe position and be latched until the function is reset.			
Action On Valve Discrepancy	Alarm to be activated on valve discrepancy between requested and actual position.			
Desired SIF Response to Failure Modes				
Sensor Failures	Upon failure of the sensors the signal shall fail to the upscale direction (high).			
Logic Solver Failures	Upon failure of the logic solver, the output signal shall de-energise and cause the valve to be driven / move to the closed position.			

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Final Element Failures	Upon failure of any of the final element components the valve shall be driven / move to the closed position.
Maintenance Issues	
Maintenance Considerations	Sensor subsystem: proof test interval of 12 months. Logic subsystem: proof test interval of 12 months. Final element subsystem: proof test interval of 12 months.