Hazop Worksheet

TRECON TRAINING ENGINEERING CONSULTING

Project	**API Manufacturing Plant**	*Session n°*	
Company	**Sterling Chemical Malta Ltd**	*Date*	**06/11/2013**
		Chairman/secretary	**Taviani Cristiano**
Unit	**Production Area (L1 and L2 lines)**	*Team members*	**Sgrò Giuseppe (Sterling); Topa Fabrizio (Trecon); Paci Andrea (Trecon), Bolognini Mauro (Trecon).**
System/Section Description	**Process flue gas abatement (washing)**	*Drawings*	**6799-2012-071-P09-02 Schematic ventilation process**
Facility	**Scrubber, active carbons filters**		
Hazardous characteristics	**Presence of flammable substances**		

Key word	Deviation	Cause	Deviation detection	Possible effects/consequences	Provided protection	Top Event identified
More/High	Flue gas temperature input	Increased flue gas temperature from reactor or non-condensable solvents	Flue gas temperature gauge	Increasing the temperature of the washing liquid of the scrubber	High&Low temperature alarms	None
				Higher evaporation of the liquid in the scrubber		
				Increased temperature flue gas		
	Temperature Liquid of scrubber	increased flue gas temperature in input	Scrubber's liquid temperature gauge	Lower pollution abatement	Management procedure. Regulation system and emergency block system.	Top Event 18
		Lower level of the liquid in the column		Increased fluid loss		None
	Temperature active carbon filter	increased flue gas temperature	Flue gas temperature gauge	Lower active carbon absorption	High&Low temperature alarms	Top Event 18
	Pressure in column or active carbon filter	Fan malfunction		Possible leakage of small amounts of flue gas from flanges and nozzles	Management procedure. Regulation system and emergency block system.	Top Event 19
		clogging flue gas line until chemney		Possible breakage with leaking gas and steam with washing solution		Top Event 20
	flue gas flow rate	Increased flow of flue gas from the reactor / condenser (non-condensable solvents)	None	increases temperature of liquid and active carbons	Management procedure. Regulation system and emergency block system.	None
	Replenishing liquid column	Malfunction level sensor	None	Higher level of liquid in the column	None	None
	Liquid Level in column's bottom	Most replenishing of liquid in the column	Visual level indicator	there is an increase of upstream pressure (reactor + condenser)	None	None
	Liquid flow rate for absorption	mistake flowrate control system (worker mistake)	Flowmeter	possible clogging columns with efficiency loss and increase liquid carried	None	None
		Malfunction flowmeter				
	amount active carbon	worker mistake during loading phase	None	None	Active carbons loading procedure	None
Less/Low	Flue gas temperature input	lower flue gas temperature from reactors and non-condensable solvents	Flue gas temperature monitor	Lower temperatur of the liquid in column	Management procedure. Regulation system and emergency block system.	None
				Lower evaporation of the liquid in the column		
				lower temperature active carbons		
	Active carbon temperature	input flue gas at lower temperature	Flue gas temperature gauge	None	None	None
	Column's liquid temperature	input flue gas at lower temperature	Indicatore temperatura liquido	None	Management procedure. Regulation system and emergency block system.	None
		Higher level of liquid in the column				
	Pressione in colonna o filtro carboni attivi	fan malfunction	None	Not possible input air in column	None	None
	flue gas flow rate	lower flue gas flow rate from the reactor / condenser (condensable)	None	None	None	None
	Replenishing liquid column	Malfunction indicator level	None	Lesser Liquid Level in column's bottom	None	None
	Liquid Level in column's bottom	loss of the liquid as it flows through the nozzle	Visual level indicator	column's liquid temperature rising	Management procedure. Regulation system and emergency block system.	None
		partially opened purge valve(worker mistake)				
		Less or nothing replenishing liquid level				
	Liquid flow rate for absorption	Washing water pump malfunction	Flowmeter	Lack purification and cooling flue gas + High temperature in column with column's material temperature rising	Management procedure. Regulation system and emergency block system.	None
		Partial obstruction of the pipe				
		Lack flow rate regulation (worker mistake)				
		Partial rupture of the pipe	Flowmeter (if upstream break)	Discharge washwater solution		Top Event 21
	The amount of activated carbons	worker mistake during loading phase	None	Less activated carbons absorption	Active carbons loading procedure	Top Event 18

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Key word	Deviation	Cause	Deviation detection	Possible effects/consequences	Provided protection	Top Event identified
No	flue gas flow rate	ruptured flue gas input pipe	None	hot flue gas emissions at low height ground	Management procedure. Regulation system and emergency block system.	Top Event 22
		No flue gas flow rate from the reactor / condenser (incondensabili)		None		None
	Liquid Level in column's bottom	Level indicator malfuction	Visual level indicator	None	Management procedure. Regulation system and emergency block system.	None
		No replenishig liquid level in column		High temperatur in column with column's material temperature rising		
		unclosed column's bottom cleaning (worker mistake)				
		leak fluid from nozles or flanges				
	liquid flowrate for absorption	Washing water pump malfunction or their indicators	Flowmater	Lack purification and cooling flue gas + High temperature in column with column's material temperature rising	Management procedure. Regulation system and emergency block system.	None
		Clogged pipe				
		Ruptured pipe	Flowmeter (if upstream break)	Discharge washwater solution		Top Event 21
	The amount og activated carbons	worker mistake during loading phase	None	Nessun assorbimento carboni attivi	Active carbons loading procedure	Top Event 18
		worker mistake during carbons substitution		Less activated carbon absorption	Active carbons loading procedure	Top Event 18
Other	activated carbon type	Worker mistake (actived carbons out-off specification)	None	Non-activated carbon absorption	Active carbons loading procedure	Top Event 18