



		Hazop Worksheet					
Project Company	API Manufacturing Plant Sterling Chemical Malta Ltd		Session n° Date	06/11/2013			
Unit	Production area (Lines L1 e L2)		Chairman/secretary Team members	Taviani Cristiano Sgrò Giuseppe (Sterling); Topa Fabrizio (Trecon); Paci Andrea (Trecon), Bolognini Mauro (Trecon).			
System/Section Description	Load and unload to reactor		Drawings	0000-2012-000-P01-00 Schema P&I Linea 1			
Facility	Reactor						
Hazardous characteristics	Inflammable substance presence						
Key word	Deviation	Cause	Deviation detection	Possible effects/consequences	Provided protection	Top Event identified	
More/High	Reagents flow rate	Human error	Weighing tank/drum/IBC. Level switch probe into reactor	Production APIs out-off specifications	Wighing procedure, loading/unlopading raw material into reactor procedure or operative instruction	Top Event 8	
				Uncontrolled chemical reactions		Top Event 9	
	Reagents temperature	Cooling system malfunction	Thermocouple inside to reactor's jacket	Production APIs out-off specifications	Wighing procedure, loading/unlopading raw material into reactor procedure or operative instruction Regulation systems and emergency shutdown system	Top Event 8	
				Uncontrolled chemical reactions		Top Event 9	
		Heating system malfunction	Thermocouple inside to reactor's jacket	Production APIs out-off specifications	Wighing procedure, loading/unlopading raw material into reactor procedure or operative instruction Regulation systems and emergency shutdown system	Top Event 8	
				Uncontrolled chemical reactions		Top Event 9	
		Malfunction agitator of the ractor	None	Production APIs out-off specifications	Wighing procedure, loading/unlopading raw material into reactor procedure or operative instruction Regulation systems and emergency shutdown system	Top Event 8	
			Uncontrolled chemical reactions		Top Event 9		
	Incorrect combination reagents	Weighing drum/tank/IBC	Production APIs out-off specifications	Wighing procedure, loading/unlopading raw material into reactor procedure or operative instruction	Top Event 8		
			Uncontrolled chemical reactions		Top Event 9		
		Reagents Pressure	Temperature rise inside reactor	Thermocouple inside to reactor's jacket	Production APIs out-off specifications	Contol procedure. Regulation systems and emergency shutdown system	Top Event 8
				Uncontrolled chemical reactions		Top Event 9	
				Pressure gauge	Increase steam-flow to the condensator	disc rupture presence inside reactor. Management procedure pressure rise inside reactor	None
		Reactor opened safety rupture disc	Reactor opened safety rupture disc	disc rupture presence inside reactor. Management procedure pressure rise inside reactor	Top Event 10		
	Full of liquid in head condensator	Pressure gauge	Reactor opened safety rupture disc	disc rupture presence inside reactor. Management procedure pressure rise inside reactor	Top Event 10		
		Reagents level	wrong increase reagent flow-rate	Level switch	Production APIs out-off specifications	Wighing procedure, loading/unlopading raw material into reactor procedure or operative instruction	Top Event 8
	Wrong/lack discharge reactor		Uncontrolled chemical reactions			Top Event 9	
	Level switch malfunction		None	Uncontrolled spill out	Contol procedure. Regulation systems and emergency shutdown system	Top Event 11	
	inerting nitrogen flow rate	High pressure nitrogen circuit	Pressure gauge	Reactor opened safety rupture disc	disc rupture presence inside reactor. Management procedure pressure rise inside reactor	Top Event 10	

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<i>Unit</i>		Production area (Lines L1 e L2)		<i>Date</i>		
<i>System/Section Description</i>		Load and unload to reactor		<i>Chairman/secretary</i>		
<i>Facility</i>		Reactor		<i>Team members</i>		
<i>Hazardous characteristics</i>		Inflammable substance presence		<i>Drawings</i>		
Key word	Deviation	Cause	Deviation detection	Possible effects/consequences	Provided protection	Top Event Identified
Less/Low	Reagents flow-rate	Human error	Weighing tank/drum/IBC. Level switch probe into reactor	Production APIs out-off specifications	Wighing procedure, loading/unlopadng raw material into reactor procedure or operative instruction	Top Event 8
		Drums emptyng pump malfunction		Uncontrolled chemical reactions		Top Event 9
	Reagents temperature	Cooling system malfunction	Thermocouple inside to reactor's jacket	Production APIs out-off specifications	Wighing procedure, loading/unlopadng raw material into reactor procedure or operative instruction Regulation systems and emergency shutdown system	Top Event 8
		Heating system malfunction	Thermocouple inside to reactor's jacket	Uncontrolled chemical reactions		Top Event 9
		Malfunction agitator of the ractor	None	Production APIs out-off specifications	Wighing procedure, loading/unlopadng raw material into reactor procedure or operative instruction Regulation systems and emergency shutdown system	Top Event 8
				Uncontrolled chemical reactions		Top Event 9
	Incorrect combination reagents	Weighing tank/drum/IBC.	None	Production APIs out-off specifications	Control procedure. Regulation systems and emergency shutdown system	Top Event 8
				Uncontrolled chemical reactions		Top Event 8
				Uncontrolled chemical reactions		Top Event 9
	Reagents pressure	Decrease in temperature inside reactor	Thermocouple inside to reactor's jacket	Production APIs out-off specifications	Contol procedure. Regulation systems and emergency shutdown system	Top Event 8
			Pressure gauge	Uncontrolled chemical reactions		Top Event 9
	Reagents level	wrong increase reagent flow-rate	Level switch	Production APIs out-off specifications	Wighing procedure, loading/unlopadng raw material into reactor procedure or operative instruction	Top Event 8
		wrong/lack reactor discharge		Uncontrolled chemical reactions		Top Event 9
		Level switch malfunction	None	Uncontrolled spill out	Control procedure. Regulation systems and emergency shutdown system	Top Event 11
Inerting nitrogwn flow rate	Low pressure nitrogen circuit	Pressure gauge	Inerting means preventing the initiation of combustion of a flammable or explosive atmosphere insufficient	Control procedure. Regulation systems and emergency shutdown system	Top Event 12	
No	Reagents flow-rate	Human error	Weighing tank/drum/IBC. Level switch probe into reactor	Production APIs out-off specifications	Wighing procedure, loading/unlopadng raw material into reactor procedure or operative instruction	Top Event 8
		Drums emptyng pump malfunction		Uncontrolled chemical reactions		Top Event 9
	Reagents pressure	Breaking load line	None	Uncontrolled spill out	Maintenance program for control nitrogen inerting system, procedure/operative instruction	Top Event 11
	Inerting nitrogen flow rate	wrong use nitrogen valve (it's closed)	Pressure gauge	Lack inerting reactor with development a flammable or explosive atmosphere.	Maintenance program for control nitrogen inerting system, procedure/operative instruction	Top Event 13
		Lack valve maintenance				
Lack nitrogen (lack utilities)						
Other	Reagents composition	Error evaluation of the operator for lack or unclear labelling substance	None	Production APIs out-off specifications	Defining a step-by-step procedure for creating Legally adequate warning label- products and waste	Top Event 8
				Uncontrolled chemical reactions		Top Event 9
Reverse	Flusso inverso linea	Pressure rises inside reactor	Pressure gauge	Uncontrolled spill out	Control procedure. Regulation systems and emergency shutdown system	Top Event 11
Level liquid rises inside reactor	Level switch					