

HAZOP Guide Words

Deviations	Guide Word	Process Deviation (Examples of Cause)	Area of Application
Flow			
1.1 No Flow	Flow	Incorrect routing – blockage – burst pipe – large leak – equipment failure (C.V., isolation valve, pump, vessel, etc.) – incorrect pressure differential	
1.2 More/HighFlow	Flow	Increased pumping capacity – reduced delivery head increased suction pressure – static generation under high velocity – pump gland leaks –etc.	
1.3 Less/Low Flow	Flow	Line blockage– filter blockage – fouling in vessels – defective pumps – restrictor or orifice plates –etc.	
1.4 Reverse Flow	Flow	Incorrect pressure differential – two-way flow – emergency venting – incorrect operation – in-line spare equipment –etc.	
1.5 MisdirectedFlow	Flow	Flow directed to stream other than intended due to misalignment of valves –etc.	
Level			
4.1 Less/Low Level	Level		
4.1 More/High Level	Level		
Other Then			
5.1 Composition Change	Other Then		
5.10 External Fire/Explosion	Other Then		
5.11 Safety&Human Error	Other Then		
5.12 Optional Guidelines	Other Then		
5.2 Contamination	Other Then		
5.3 Leakage(Heat Exchanger)	Other Then		
5.4 Reaction	Other Then		
5.5 Start Up/Shut Down	Other Then		
5.6 Vent/Drain/Purge	Other Then		
5.7 Maintenance/Inspection	Other Then		
5.8 Corrosion/Erosion	Other Then		
5.9 Utilities Service Failure	Other Then		
Pressure			
2.1 More/High Pressure	Pressure	Surge problems (line and flange sizes) – relief philosophy (process / fire etc.) – connection to high pressure system – gas breakthrough (inadequate	
2.2 Less/Low Pressure	Pressure	Generation of vacuum condition – restricted pump/ compressor suction line – vessel drainage –etc.	
Temperature			
3.1 More/High Temperature	Temperature	Ambient conditions – fire situation – high than normal temperature – fouled cooler tubes – cooling water temperature wrong –cooling water failure	
3.2 Less/Low Temperature	Temperature	Ambient conditions – reducing pressure – loss of heating – depressurization of liquefied gas – Joule Thompsonseffect – line freezing –etc.	
Viscosity			
5.1 More Viscosity	Viscosity		
5.2 Less Viscosity	Viscosity		