

## KNOCK OUT DRUMS

The Knock out drum is a vessel in the flare header designed to remove & accumulate condensed & entrained liquids from the relief gases.

Both the horizontal & vertical design is a common consideration for the Knock out drum, which is determined based on the operating parameters as well as other plant conditions. If a large liquid storage capacity is desired and the vapour flow is high, a horizontal drum is often more economical. Also, the pressure drop across horizontal drums is generally the lowest of all the designs. Vertical knockout drums are typically used if the liquid load is low or limited plot space is available. They are well suited for incorporating into the base of the flare stack.

### DESIGN FEATURES

Although horizontal and vertical knockout drums are available in many configurations, the differences are mainly in how the path of the vapour is directed. The various configurations include the following:

- a) Horizontal drum with the vapour entering one end of the vessel and exiting at the top of the opposite end (no internal baffling);
- b) Vertical drum with the vapour inlet nozzle entering the vessel radially and the outlet nozzle at the top of the vessel's vertical axis. The inlet stream should be baffled to direct the flow downward;
- c) Vertical vessel with a tangential nozzle. Vertical centrifugal separators differ from vertical settling drums in that the flow enters tangentially and spins around a centre tube, which extends below the liquid inlet nozzle. The gas and liquid flow radially downward through the annulus causing liquid droplets to coalesce along the walls and collect in the bottom of the drum. The vapour changes direction once below the centre tube and flows upward to the outlet nozzle. To avoid liquid re-entrainment, vapour velocity has to be kept low in the turnaround section of the drum. An additional measure to prevent liquid re-entrainment is a baffle plate below the turnaround section of the drum. The maximum liquid level is the same as vertical settling drums;
- d) Horizontal drum with the vapour entering at each end on the horizontal axis and a centre outlet;
- e) Horizontal drum with the vapour entering in the centre and exiting at each end on the horizontal axis
- f) Combination of a vertical drum in the base of the flare stack and a horizontal drum upstream to remove the bulk of the liquid entrained in the vapour. This combination permits the use of larger values for the numerical constant in the velocity equation.

