

Vapour Recovery

From oil storage (and other) tanks

*Specialists in Liquid Ring
Vapour Recovery Systems*

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Oil storage tanks are used throughout the oil and pipeline industries to store product prior to pumping to the plant or pipeline. The two common types of tanks used are fixed roof and floating roof. Of these, the fixed roof provides reduced environmental impact as the gas/ vapour padding between the liquid and roof can be positively contained (fig 1)

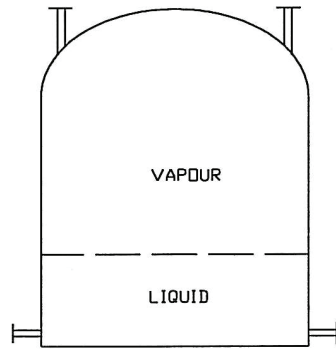


FIG 1

A gas blanket is provided to fill the void between the liquid and tank roof. This is generally maintained at a very small pressure above atmospheric, typically a few ounces, to prevent air, and consequently oxygen, entering the system and possibly creating a more explosive mixture. During filling, the liquid rises and compresses the gas blanket thereby raising its pressure. This increase in pressure has to be relieved to prevent tank damage, and it is drawn off the tank by the Vapour Recovery Unit or VRU (fig2). If the VRU does

not operate or provide sufficient capacity, the increase in pressure will be relieved directly to atmosphere through relief valves on the tank. It is essential therefore that the VRU be reliable and be capable of handling the varying capacities and compositions of the vapours coming from the tank.

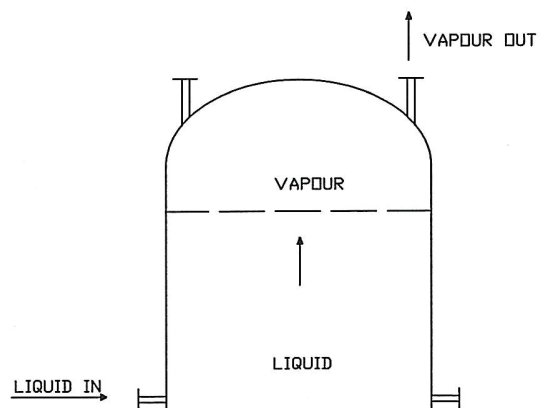


FIG 2

The vapour coming from the tank consists of the blanket gas (typically natural gas) and constituents from the liquid that have migrated into it. These constituents could be water vapour, light hydrocarbons, H₂S, CO₂ and asphaltines. The VRU takes this vapour and raises it to a usable pressure for further applications. In heavy oil applications, where there is often elevated temperatures and the potential of high concentrations of the constituents mentioned, a liquid ring compressor has been found to be extremely reliable when incorporated in a VRU module. Other types of compressors such as vane and screw have the inherent disadvantage of having difficulties compressing a wet vapour, which during the compression cycle may condense liquid which can be damaging to the compressor either as an incompressible fluid, asphaltine build up, or the hydrocarbon liquid diluting the lubricating fluid of the compressor.

An added advantage of the liquid ring compressor is the low temperature rise experienced during compression. This allows for the liquids condensed to be captured in the VRU and transferred by pumps on the VRU module to the plant for use in the process. The condensed hydrocarbons can be separated in the VRU, which is particularly useful for diluent recovery. When the tank is being emptied, blanket gas is added (fig3) and the VRU capacity is reduced accordingly.

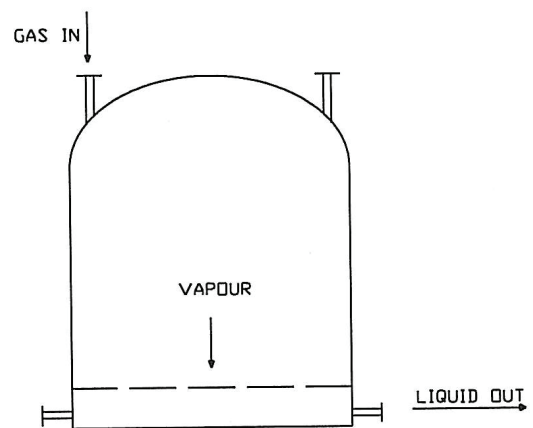


FIG 3

A properly designed liquid ring compressor VRU module must have the following capabilities

- Fully automated stop start on one or multiple compressors without operator intervention

- 0% to 100% fully automatic capacity control

- Be able to handle a wide variety of potential inlet vapour compositions

- Have ease of maintenance and serviceability

- Be a complete integrated modular unit allowing all control functions, internal piping and wiring to be the suppliers responsibility within the guidelines of the customers specifications.

- Proven module function.

- Very high reliability (on stream factor)

HC Piper Manufacturing Inc. (www.hcpiper.com) has over 20 years experience in designing and building liquid ring compressor VRU packages for Heavy Oil, SAGD and other applications. Packages are built as road transportable modules, and available with single or multiple compressors with or without a building. Compressors are available up to 3000 Am³/h and 1400 kPaa discharge pressure.

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