Design of a three phase separator in oil and gas

Engineering

Design of a Three Phase Separator in Oil and Gas The liquid conveyed by combined pipe systems in many oil and gas industries primarily contains water, heavy hydrocarbons in liquid form and light gaseous hydrocarbons or acid gases mixed in it like H2S mixture. The liquid mixture routing is into a small horizontal pressure vessel whose design is a primary intention to flash off the trapped gas and the oil which carries along over skims in the open sump down the vessel. Increasing the flow rate of the close drain flash system decreases the retention time (Lyons, William, and Gary 131-134). The reduced retention time allows for adequate flashing of the less dense hydrocarbons and acid gases.

Three-phase separators efficiently separate the effluents from gas oil and water to allow for individual treatment of the mixed fluids (Lyons, William, and Gary 165-173). The three-phase separator is for processing manufactured fluids from an oil sump. Its division is into an emulsion, oil separator, and water compartments. The separator includes a water dyke and control system that mechanically regulates the position of the water weir to retain the oil emulsion interface in the emulsion section significantly constant. The separator operating parameters and standards vary in accordance with the target fluid and the type of separation.

According to the CDS separation technologies, the standard of a three-phase separator is in relation to the extent of its applications (Lyons, William, and Gary 185-197). The three common standards include the horizontal three-phase separator with a weir it is the lowest standard. The second standard, the separator with oil bucket and water dyke it is more advanced and requires no active interface control and a high standard separator is the one with the boot for moderate waters.

The design of hydrodynamic of liquid-liquid separation in the three-phase separator is basing on the rules laid by the American Petroleum Institute design principles. Peng-Robinson equations of stage and successive substitution deem useful during the modeling phase of the separators (Arnold, Ken, and Stewart 129-134). The design appreciates the Monnery and Svrcek model in determining critical parameters of the vertical and horizontal separators like the diameters and lengths at different pressures. The design pressure decreases at every stage of the process.

Modeling for optimizing the pressure of the three separators reduces the amount of gasses produced with oil in the multistage separators. Optimizing this model applies a written computer simulator with the use of Hysys and the Mat-lab software (Sayda, and Taylor 134-145). By altering the different variables including the plus fraction splitting type and the temperature of the three separators, the condition with the least difference between empirical data of crude oil separator test is selected. The selection is of the best type of use is mainly basing on the optimal weight of the separators that minimizes the GOR function is calculated.

The project is intended to develop a new technology that allows for separation of the processed hydrocarbons in oil gas mixtures (Lyons, William, and Gary 125-132). The new technology target a three phase system that separates the hydrocarbon mixtures into three, the heavy hydrocarbons, gaseous and liquid through development of a revolutionary next generation three-phase separator tool for the gas and oil industry.

The projected outcome of this project is to have a three phase separator model developed. The developed three-phase separator helps in mitigating the complex dynamics in the oil production facilities (Lyons, William, and

Gary 135-145). The separator must maintain optimum pressure and liquid seal in the lower portion of the vessel to allow for efficient separation.

Works cited

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