



PROJECT REPORT (PR-035)

RFCC UNIT – LPG RECOVERY PLANT REVAMP

Plant Location: Major Refinery in Asia

Project: LPG Recovery Plant Revamp

Date of Revamp: 2009

PROJECT BACKGROUND AND OBJECTIVES

The subject LPG Recovery Plant is designed to separate a mixture from the top condenser of the RFCC Main Fractionator into dry gas, LPG and stabilized gasoline. The dry gas has no value and is sent to the furnace while the LPG is sent to the LPG Fractionation Unit to recover propylene, considered a high value product. The process schematic for the RFCC LPG Recovery Plant is shown in the figure for reference.

Due to poor absorption efficiency, the LPG components in the dry gas were significantly high so the customer wanted to revamp the Plant to improve the LPG recovery. A process simulation study and hydraulic evaluation of the existing equipment was performed in order to successfully revamp three columns in the Plant in 2009.

The objectives of the revamp were:

1. To decrease propylene in the dry gas to less than 1%;
2. To decrease LPG components in the dry gas to less than 1.5%; and
3. To minimize entrainment rate in the Sponge Absorber.

PERFORMANCE BEFORE AND AFTER REVAMP

Before Revamp:

The existing four columns in the RFCC LPG Recovery Plant: the Absorber, Sponge Absorber, Stripper and Debutanizer consisted of conventional valve trays. The LPG components in the dry gas

were as high as 4% with 2.4% propylene. When the recycle rate of stabilized gasoline into the Absorber was increased during operation, LPG became lost in the dry gas and the Stripper would flood due to the high liquid loading. The operation of the Debutanizer was adequate, but significant amounts of entrainment were often found in the Sponge Absorber overhead.

After Revamp:

ADV[®] Pinnacle Performance Trays were installed in the Absorber, Sponge Absorber, and Stripper, while reusing most of the existing tower attachments. It was determined that the existing Debutanizer was adequate for reuse.

The Stripper was revamped from 2-pass conventional valve trays to 4-pass high performance and high capacity ADV[®] Trays to handle the increased liquid loading without flooding. The Sponge Absorber was revamped with a combination of ADV[®] Pinnacle Performance Trays and structured packing in the top section to minimize liquid entrainment.

After revamp, the LPG components and propylene in the dry gas were decreased to 1.32% and 0.92%, respectively. Hydraulic flooding in the Stripper and entrainment in the Sponge Absorber have been successfully eliminated since the revamp.

