

Feed Devices

Obtaining desired tower performance requires the proper handling of liquid and vapor entering the column. The types of feeds or inlets into a column can generally be classified into three major categories:

- ▶ Liquid only (contains less than 1% of vapor by volume)
- ▶ Mixed liquid and vapor, flashing or suppressed flash
- ▶ Vapor

The selection criteria for each category of feed device is unique.

Liquid-Only Feeds

Among the factors that Koch-Glitsch engineers consider when designing a liquid feed device are:

- ▶ Type of tray
- ▶ Expected tray performance
- ▶ Flow rate
- ▶ Operating range
- ▶ Degree of sub-cooled liquid
- ▶ Requirements for mixing

The feed arrangement for these conditions depends on the tray type. Please consult with a Koch-Glitsch technical representative for recommendations.

Liquid-Vapor and Flashing Feeds

For mixed liquid-vapor or flashing feed devices above a tray, the selection depends on:

- ▶ Tray type
- ▶ Liquid and vapor flow rates
- ▶ Turndown
- ▶ Column height needed for disengagement and vapor distribution
- ▶ Requirements for mixing

In all cases, separating the vapor and the liquid phases is a primary concern. In some cases, the requirements for additional pre-distribution may alter certain tray designs.

Vapor-Only Feeds

Two factors must be considered when choosing the proper device for a vapor-only feed.

- ▶ The kinetic energy of the inlet vapor in relation to the pressure drop across the trays, the feed nozzle arrangement, and the tower separation requirements.
- ▶ If there is a large difference in the composition and/or temperature between the inlet vapor stream and bulk vapor flow, mixing the two vapors optimizes the performance of the trays.

Specific equipment for vapor distribution may not be required if sufficient column height is available for equalization or if the pressure drop across the trays is sufficient to provide proper vapor distribution.

CFD Modeling

Good vapor distribution is essential to achieve superior separation efficiency. Poor vapor distribution is often a major source of problems.

Koch-Glitsch combines modern Computational Fluid Dynamics (CFD) modeling technology with its engineering expertise to analyze vapor and liquid distribution when evaluating the performance of existing equipment and developing new, improved designs. This involves computer modeling of the 3-dimensional configuration of the column internals to provide detailed predictions of fluid flow (velocity profiles and so forth) as shown in the figure below.

Koch-Glitsch offers CFD services for the following tasks:

- ▶ Development and optimization of new mass transfer equipment
- ▶ Troubleshooting or analysis of existing equipment
- ▶ Confirmation of equipment designs prior to fabrication and installation

