



Cryogenic Ethylene Vaporizers, Supercritical Exchangers, Process Design, Pressure Relief, and Instrumentation

SHORT ABSTRACT

Three types of direct steam heated equipment are commonly required in Ethylene Plants: Emergency Ethylene Vaporizers, Cold Flare Vaporizers, and Cold Flare Superheaters. The equipment, processes and fundamental need for these systems will be described. The safety advantages and the design calculations associated with these systems will be explained.

LONG ABSTRACT

Three types of direct steam heated equipment are commonly required in Ethylene Plants: Emergency Ethylene Vaporizers, Cold Flare Vaporizers, and Cold Flare Superheaters. Occasionally propylene, ethane, or hydrocarbon mixtures are processed in this equipment. The equipment, processes and fundamental need for these systems will be described. The special requirements for determining the safety relief flow in this equipment will be explained. An overview of the calculations required to size a system consisting of a Cold Flare Vaporizer, Knock-out Drum and its thermosyphon loop will be provided. The concept of controlling outlet temperature using a cold fluid bypass will be explored, and the unusual control valve sizing requirements associated with process turndown will be discussed. For supercritical systems, an Emergency Supercritical Ethylene Heater is required in place of an Emergency Ethylene Vaporizer, and the special requirements and hardware for this scenario will be discussed. Suggested control narratives for these processes will be provided.

Comparisons will be made to alternate technologies, specifically indirect systems using a methanol bath and indirect systems using a water/glycol bath. The installed economics of the different technologies will also be discussed.

The following safety issues will be presented: a hardware solution to the problem of thermal turbulent cycling during hot/cold stream mixing, the problems associated with tubesheets with significant thermal gradients across the tubesheet, and a review of the explosion in France that resulted in 18 deaths and changed the industry.

Kind regards,
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