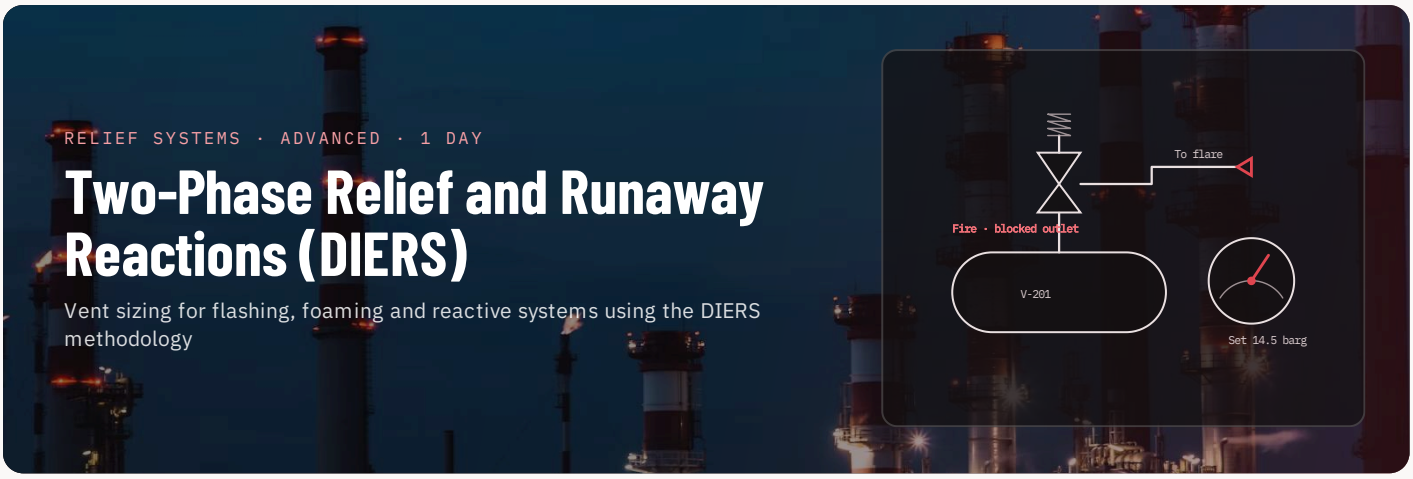

RELIEF SYSTEMS · ADVANCED · 1 DAY

Two-Phase Relief and Runaway Reactions (DIERS)

Vent sizing for flashing, foaming and reactive systems using the DIERS methodology

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Advanced	On-site classroom · virtual instructor-led	English	16

4 reactive systems characterised

3 two-phase sizing methods compared

1 runaway-reaction case study

Overview

Single-phase vapour sizing under-predicts the required area by a factor of several when the vessel swells and vents a two-phase mixture. The course explains when two-phase flow must be assumed, how to characterise a reactive system from calorimetry data, and how to size the vent with the DIERS methods: Omega, homogeneous equilibrium, Leung and the tempered/gassy/hybrid classification. A runaway reaction case study runs from calorimeter trace to vent area and effluent handling.

Learning outcomes

- Judge when two-phase venting must be assumed: level swell, foaming, reactive and viscous systems
- Interpret adiabatic calorimetry (ARC, VSP2) data for onset, adiabatic temperature rise and pressure rate
- Classify systems as vapour, gassy or hybrid and choose the sizing basis accordingly
- Size vents with the Omega method, HEM and the Leung equation for tempered systems
- Handle flashing and non-flashing flow through valves, discs and inlet lines
- Design effluent handling: catch tanks, quench and separation to avoid a second release

Who should attend

Relief and process safety engineers in petrochemical, polymer and specialty-chemical plants; engineers responsible for reactor and batch relief design

Course outline

MORNING

Why single-phase sizing fails: incidents and DIERS history · level swell and flow regimes · thermal runaway fundamentals · reading calorimetry data · vapour, gassy and hybrid system classification

AFTERNOON

Omega method and HEM · Leung and tempered-system sizing · gassy and hybrid systems · inlet line, disc and valve behaviour in two-phase flow · effluent handling and catch-tank design · runaway case study in CeraVent

Standards referenced

CCPS Guidelines for Pressure Relief and Effluent Handling Systems · DIERS Project Manual · API 520 Part I · API 521 · ISO 4126-10 · ASME BPVC Section VIII

Tools & exercises

Two-phase and reactive sizing exercises worked in CeraVent

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Relief sizing basics (TR-C01 or equivalent); chemical engineering degree

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.