Pressure Relief Systems Design in Chemical Engineering Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Pressure relief systems are critical components in chemical process industries, safeguarding equipment, personnel, and the environment from overpressure incidents. Pressure Relief Systems Design in Chemical Engineering Training Course provides an in-depth understanding of pressure relief device selection, sizing, and installation, emphasizing compliance with ASME, API, and OSHA standards. Participants will gain practical insights into process hazard analysis, risk mitigation, and safety optimization to ensure operational reliability in high-pressure chemical systems.

The course integrates advanced process safety engineering concepts, real-world case studies, and hands-on design simulations, enabling participants to apply theoretical knowledge to practical scenarios. With a focus on dynamic overpressure scenarios, flare system integration, and pressure vessel safety, this program empowers chemical engineers and process safety professionals to enhance plant safety, efficiency, and regulatory compliance.

Programme Curriculum

Pressure Relief Systems Design in Chemical Engineering Training Course

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of pressure relief systems and their role in chemical safety.
2. Learn pressure relief device selection criteria for various process fluids and conditions.
3. Master API 520/521 sizing and design calculations for relief devices.
4. Analyze overpressure scenarios and risk mitigation strategies.
5. Design pressure relief systems for chemical reactors, storage tanks, and pipelines.
6. Implement flare and vent system integration with relief systems.
7. Evaluate dynamic relief requirements under fire, blocked outlet, and equipment failure scenarios.
8. Apply computational tools and simulation software for relief system design.
9. Conduct Process Hazard Analysis (PHA) and HAZOP for relief systems.
10. Ensure regulatory compliance with OSHA, NFPA, and European standards.
11. Investigate case studies of industrial overpressure incidents and lessons learned.
12. Optimize plant safety and reliability through preventive relief system design.
13. Develop documentation, inspection, and maintenance strategies for relief devices.

Target Audience

1. Chemical Engineers
2. Process Safety Engineers
3. Mechanical Engineers in process industries
4. Plant Operations Managers
5. Maintenance and Reliability Engineers
6. Safety Compliance Officers
7. Engineering Consultants
8. Graduate Engineering Students specializing in Process Safety

Course Modules

Module 1: Introduction to Pressure Relief Systems

- Types of pressure relief devices: PSV, rupture discs, and safety valves
- Process safety fundamentals and regulatory overview
- Roles and responsibilities in relief system management
- Overpressure scenarios in chemical plants
- Case Study: Historical industrial overpressure accidents

Module 2: Codes, Standards, and Regulatory Compliance

- ASME, API 520/521, NFPA standards overview
- OSHA and EPA requirements for pressure relief systems
- Documentation and certification requirements

- International standards for chemical process safety
- Case Study: Compliance audit in a chemical plant

Module 3: Relief Device Selection and Sizing

- Determining inlet and outlet conditions
- Calculating required relieving capacity
- Material selection for process compatibility
- Handling multiphase fluids and two-phase relief scenarios
- Case Study: Sizing PSV for an ammonia storage tank

Module 4: Overpressure Scenario Analysis

- Fire, blocked outlet, and runaway reactions
- Accidental overpressure evaluation
- Dynamic vs. static relief considerations
- Risk assessment and mitigation strategies
- Case Study: Reactor runaway incident analysis

Module 5: Flare and Vent System Design

- Types of flare systems and their applications
- Integration with relief devices
- Environmental considerations and emission control
- Pressure drop and backpressure effects
- Case Study: Flare system optimization in a refinery

Module 6: Process Hazard Analysis (PHA) & HAZOP

- PHA methodology for relief systems
- HAZOP study for pressure safety
- Identifying failure scenarios and safeguards
- Documenting and implementing recommendations
- Case Study: HAZOP for a chemical reactor relief system

Module 7: Computational Tools and Simulation

- Overview of simulation software
- Modeling two-phase relief events
- Pressure relief system optimization using software
- Scenario testing and validation
- Case Study: Simulated flare system performance analysis

Module 8: Maintenance, Inspection, and Reliability

- Preventive maintenance schedules
- Inspection techniques and standards
- Reliability-centered maintenance (RCM)
- Troubleshooting common relief device issues
- Case Study: Root cause analysis of PSV failure

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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