



**PSE OIL & GAS
PRESSURE RELIEF, FLARE & BLOWDOWN
CENTRE OF EXPERTISE**

Training:

Understanding overpressure protection, depressuring and flare systems

DURATION:

3 days

COST:

Contact PSE

Evolving industry guidelines are changing the way Oil & Gas companies approach process safety in pressure relief, blowdown and flare systems. Engineers and operators should keep up-to-date with best practices and current requirements.

PSE's Centre of Expertise in pressure relief, flare and blowdown offers training courses to improve understanding in this important area. These training courses are complemented by free webinars and public seminars offered as part of PSE's worldwide Oil & Gas seminar series.

This 3-day course provides detailed, comprehensive training. Participants receive a copy of all course materials.

Day 1 – Introduction to pressure relief devices, causes of overpressure, industry codes of practice and standards

Day 2 – Sizing and selection of relief devices, depressurisation systems for fire protection and loss of containment, impact on flare systems and materials of construction

Day 3 – Flare systems and their applications, layout and plot considerations, environmental considerations and smokeless flaring, gas seals, purging and flare gas recovery.

The course concludes with a short test to check participants' understanding. Participants will receive a certificate of training.

See psenterprise.com/oil-and-gas for dates and locations.

WHO SHOULD ATTEND

This training course is suitable for process engineers, chemical engineers and all those with responsibility for design and operation in the Oil & Gas upstream or downstream sectors.

The course will equip participants with the required knowledge of how to design flare and relief systems. The exercises and tests are based on the course content and can be completed without the need for calculators.

Course agenda – Day 1

The training course includes lunch and refreshments.

- 08:30 Registration**
- 09:00 Module 1.1 - Purposes and overview of typical relief and flare systems and key components**
- Requirement for relief and flare systems
 - Key components / Flare system overview - types and key features
- Module 1.2 - Safety implications and the causes of overpressure**
- Examples of safety incidents - risks of overpressure and underpressure
 - Concept of operating pressure and MAWP
 - Definitions of accumulation, overpressure, set pressure
 - Group exercise / feedback In relief system notation
- 10:10 Break**
- 10:30 Module 1.2 (cont'd)**
- Case study: Grangemouth overpressure incident
 - Group exercise and feedback: Gas scrubber overpressure
- 11:00 Module 1.3 - Design codes and standards as well as good practices typical in Oil & Gas facilities**
- Industry standards - API / ISO
 - API guidelines development - current issues
 - Industry guidelines from oil majors, technical authorities and standards
 - Best practices
- 11:30 Module 1.4 - Overpressure protection philosophy incl. source isolation and relief**
- Overpressure protection philosophy typical contents
 - PSV safety documentation
 - Hierarchy of design safety documents from subcontractors
 - Critical safety information and what to expect in each document
- Module 1.5 - Types and applications of common relief devices**
- Types of common relief devices and their application
- 12:00 Lunch**
- 13:30 Module 1.6 - Determination of relief requirements and defining set pressure**
- API rules for set pressure and multiple valve installations
 - Causes of overpressure (e.g. fire, control valve failure, blocked outlets, heat exchanger tube failure)
- 14:30 Break**
- 14:50 Module 1.6 (cont'd)**
- Exercise on overpressure and relief / feedback
 - Determination of relieving rates / governing scenarios
- 16:30 Test questions on overpressure protection**
- 17:00 End of Day 1 - Questions and closing remarks**



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Course agenda – Day 2

The training course includes lunch and refreshments.

- 09:00** **Reprise of Day 1 - Questions and answers**
- 09:15** **Module 2.1 - Design and specification considerations for relief valves and header systems**
- Relief valve sizing to API 520 Pt. 1 & 2
 - Backpressure limitations
 - Relief valve specifications and datasheets
 - Procurement workflow
- 10:15** **Break**
- 10:30** **Module 2.1 (cont'd)**
- Installation and isolation, rules for multiple relief valves
 - 3% inlet pressure drop criteria
 - Video: Pressure relief valve chattering and instability
 - API recommendations and engineering analysis
- 12:00** **Lunch**
- 13:30** **Module 2.2 - Blowdown and depressuring - purpose and design / operational considerations**
- API guidelines / requirements for depressuring
 - Fire zones and sectionalisation
 - Depressuring theory / simulation approaches
 - Staged blowdown
 - Fire survivability and stress mitigation for vessels
- 14:30** **Break**
- 14:50** **Module 2.3 - Fluid characteristics, service conditions, material selection and header sizing**
- Material selection for low temperatures
 - Identifying brittle fracture
 - Cold front propagation through flare networks
 - Project workflows to eliminate or mitigate risks
 - Case study for gas processing plant
- 16:00** **Module 2.3 (cont'd)**
- Identification of flow induced and acoustically induced vibration
 - Header sizing considerations for governing flare capacity
- 16:30** **Test questions on relief valves, blowdown and material selection**
- 17:00** **End of Day 2 - Questions and closing remarks**



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Course agenda – Day 3

The training course includes lunch and refreshments.

- 09:00** **Reprise of Day 2 - Questions and answers**
- 09:15** **Module 3.1 - Environmental considerations including flare versus vent decisions, emissions, noise, radiation levels**
- Current EPA guidelines / Iranian emission STDs
 - Atmospheric venting
 - Permissible noise / radiation levels
- 10:15** **Break**
- 10:30** **Module 3.2 - Radiation calculations and the impact of flare tip design**
- Group exercise / feedback on plant layout considerations for Middle East flare
 - Radiation calculations to API 521
 - F-factor and flare tip designs
- 11:15** **Module 3.3 - Selection and sizing of key components such as KOD, seal drums, vent / flare stack**
- KOD designs / applications
 - Flare seals / seal drums
 - Sizing to API / GPA requirements
- 12:00** **Lunch**
- 13:30** **Module 3.4 - Vent / Flare tips and flare ignition systems**
- Types of flare and vent tips
 - Flare ignition system types and application
 - Monitoring and controls
- 14:00** **Module 3.5 - Defining need and quantity of purge gas**
- Purges and discussion of types
 - Calculation of requirements and controls
- 14:30** **Break**
- 14:50** **Module 3.6 - Use of environmentally friendly strategies such as flare gas recovery, smokeless flaring and purge gas conservation**
- Flare gas recovery systems and types
 - Smokeless flaring technology - pros and cons
- Module 3.7 - Operational and troubleshooting tips**
- PSV pop testing and inspection
 - Maintenance of records and calculations
 - Event analysis
- 16:00** **Test questions on flare and venting technology**
- 16:30** **End of Day 3 - Final questions and closing remarks**



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