



PE059: Flare, Blowdown & Pressure Relief Systems: *Operation, Maintenance & Troubleshooting*

Training Description:

The flare, blowdown and pressure relief systems are the most important elements for emergency and operational discharge of flammable substances in the process facilities. Safety relief and flare systems control vapors and liquids that are released by pressure-relieving devices and blow-downs. Pressure relief is an automatic, planned release when operating pressure reaches a predetermined level. Blowdown normally refers to the intentional release of material, such as blowdowns from process unit start-ups, furnace blowdowns, shutdowns, and emergencies. Vapor depressuring is the rapid removal of vapors from pressure vessels in case of fire. This may be accomplished by the use of a rupture disc, usually set at a higher pressure than the relief valve.

The principal elements of the safety relief and flare systems are the individual pressure relief devices, the flare piping system, the flare separator drum, and the flare (including igniters, tips, sealing devices, purge and steam injection for smokeless burning). Application of relief devices must comply with appropriate ASME Vessel Codes and API 520/521 standards.

Design of relief devices must comply with applicable national codes and laws as well as the requirements of the insurance covering the plant or installation. National regulations not only cover safety but also environmental considerations such as air and water pollution and noise abatement.

This course presents a convenient overview of relief system details based on the full scope of API, ASME, and other code and specification requirements. It covers all aspects of relief flare systems from the emergency relief sources through the valving and flare network right to the stack and flare tip. Descriptions and design criteria will be outlined for flare tips, seals, stacks, knockout drums, header systems, relief valves, depressurization systems and basic hazard analysis. Alternative design methods will be also described with reference to the specific nature of relief and flare systems worldwide.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Apply an in-depth knowledge and skills in the design, operation and maintenance of flare, blowdown and pressure relief systems
- ✓ Discuss product specification and identify the different types of flow measurement
- ✓ Review the various instrumentation and sensing devices used in flare, blowdown and pressure relief systems
- ✓ Carryout installation, troubleshooting and calibration of the control systems used in plant
- ✓ Determine the components and function of the relief systems and practice the sizing and installation of the relieving devices
- ✓ Identify the types, features and application of flare systems
- ✓ Determine the applicable codes, standards and recommended practices for flare, blowdown and pressure relief systems
- ✓ Acquire knowledge on product storage and tanks and recognize the importance of product recovery
- ✓ Evaluate the scope of waste heat recovery and explain its role in flare and pressure relief systems

Training Designed for:

This course is intended for those who are directly involved in supervising gas processing operations; managers and engineers involved in the planning and development of new gas processing facilities or modifying existing facilities; those who are involved in the negotiation of contracts for the sale of Natural Gas, LPG and NGL Products; and newly employed engineers and other technical staff in the oil and gas processing industry will find the course particularly relevant as well as those employed in the activities that support the gas processing industry will also receive considerable benefit from the broad overview.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.”

Practical sessions will be organized during the course for participants to practice the theory learnt. Participants will be provided with an opportunity to carryout various exercises using our “Valve Demo Kit”, “Gas Ultrasonic Meter Sizing Tool”, “Liquid Turbine Meter and Control Valve Sizing Tool”, “Liquid Ultrasonic Meter Sizing Tool” and “Orifice Flow Calculator” simulators “Valve Sizing Simulator”, “Valve Simulator 3.0”, “Valvestar 7.2 Simulator” and “PRV2SIZE Simulator”.

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- ❖ Pre-Test
- ❖ Introduction
- ❖ Product Specification Contract Terms
 - LP-Gas Specification Parameters, Vapor Pressure, Moisture Content, Sulfur Content, Volatile Residue, Non-Volatile Residue, Non-Specification Contaminants, Odorization
- ❖ Flow Measurement
 - Flow Calculation Guide, Gas Measurement & Pipe Rupture, Liquid Measurement, Mass Measurement, Steam Measurement, Miscellaneous Measurement Devices, Auxiliary Equipment and Common Terms
- ❖ Instrumentation & Sensing Devices
 - General Instrumentation Considerations, Identification, Pneumatic Power Supplies, Electronic Power Supplies, Pressure Sensors, Level Sensors, Temperature Sensors, Flow Sensors, Signal Transmitters, Pneumatic Transmitters, Electronic Transmitters, Signal Converters, Recorders and Indicators
- ❖ Control Systems
 - Control Concepts, Control Modes and Controllers, Controller Tuning, Control Valves, Liquid Service, Sizing Calculation Procedure, Installation, Troubleshooting, and Calibration, Digital Computers, Digital First-Level Control Systems, Analytical Instruments

DAY TWO:

❖ Relief Systems

- Relief Device Design
- Blocked Discharge
- Fire Exposure
- Tube Rupture
- Control Valve Failure
- Thermal Expansion
- Utility Failure

❖ Case Studies

DAY THREE:

❖ Relieving Device

- Safety Relief Valves
- Rupture Disk
- Sizing of Relief Devices
- Relief Valve Installation
- Relief System Piping Design
- Knockout Drums

DAY FOUR:

❖ Flare Systems

- Types of Flare Systems, Thermal Radiation, Smokeless Operation, Pilots and Ignition, Seals, Location and Regulations, Special Relief System Considerations, Low Temperature Flaring

❖ Applicable Codes, Standards and Recommended Practices

- ASME Codes
- ANSI Codes
- API Publications
- NFPA Publications
- OSHA Publications
- CGA (Compressed Gas Association) Publications

❖ Practical Sessions

- This hands-on, highly-interactive course includes real-life case studies and exercises

DAY FIVE:

❖ Product Storage & Tanks

- Storage Classification, Working Pressures, Types of Storage, Materials of Construction, Protective Coatings, Insulation, Appurtenances, Site Preparation and Installation, Cathodic Protection

❖ Product Recovery

- Product Losses, Vapor Recovery Systems, Separators and Filters, Fired Equipment, Hot Oil System

❖ Waste Heat Recovery

- Heat Exchangers Overview, Heat Balances, Shell and Tube Exchangers, Fouling Resistances, Film Resistances, Performance Evaluation with Sensible Heat Transfer, Condensers, Reboilers and Vaporizers, Selection of Exchanger Components, Nomenclature, Shell Size

and Tube Count Estimation, Operating Characteristics, Inlet Gas Exchanger, Hairpin Heat Exchangers

- ❖ Course Conclusion
- ❖ POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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