COURSE OVERVIEW PE0531
Flare, Blowdown & Pressure Relief Systems

Course Title
Flare, Blowdown & Pressure Relief Systems

Course Reference
PE0531

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

3.0 CEUs (30 PDHs) AWARD

Course Date/Venue

Session(s)	Date	Venue
1	May 05-09, 2024	Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey
2	August 04-08, 2024	Oryx Meeting Room, Doubletree By Hilton Doha-Al Sadd, Doha, Qatar
3	December 08-12, 2024	The Kooh Al Noor Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE
4	January 06-10, 2025	Hampstead Meeting Room, London Marriott Hotel Regents Park, London, United Kingdom

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

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.

Course Objectives

Upon the successful completion of this course, each participant 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

Who Should Attend

This course provides systematic techniques on the design, operation and maintenance of flare, blowdown and pressure relief systems. Operations personnel, supervisors, engineers, maintenance personnel, senior plant supervisors, operations process support engineers, design engineers and process engineers will gain an outstanding knowledge from the practical and operational aspects of the course.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Mike Poulos, MSc, BSc, is a **Senior Process Engineer** with over **35 years** of industrial experience within the **Utilities**, **Refinery**, **Petrochemical** and **Oil & Gas** industries. His expertise lies extensively in the areas of **Process Equipment Design & Troubleshooting**, **Petroleum Processing**, **Process Design Specifications**, **Process Calculation Methods**, **Equipment Sizing & Selection**, **Piping**, **Pumps**, **Compressors**, **Heat Exchangers**, **Air Coolers**, **Direct-Fired Heaters**, **Process Vessels**, **Fractionator Columns**, **Reactors, Ancillary Equipment**, **Mechanical & Safety Aspects**, **Cost Estimation**, **Commissioning & Start-Up**, **Production & Cost Reduction**, Reactor Building Ventilation System, **PVC** Initiators Storage Bunkers, **PVC** Modernization & Expansion, **PVC** Reactor, **PVC** Plant Reactors Pre-Heating, **PVC** Plant Start-Up & Commissioning, **PVC** Plant Shutdown, **PVC** Driers Automation, **VC**M Recovery, **VCM** Sphere Flooding System, **VCM** Storage Tanks, Steam Tripping Facilities, Solvents Plant Automation Commissioning & Start-Up and Inferential Properties System. Further, he is also well-versed in Advanced Process Control Technology, Designing Process Plant Fail-Safe Systems, Quantitative Risk Assessment, On-Line Statistical Process Control, Principles and Techniques of Contemporary Management, Rosemount RS3, Polymer Additives, Polymer Reaction Engineering, Polymer Rheology and Processing, GRID Management and Batch Process Engineering.

During his career life, Mr. Poulos held significant positions as the **Chemical Plants Technology Engineer**, **PVC Plant Production Engineer**, **PVC Plant Shutdown Coordinator**, **PVC Plant/CC Solvents Plants Acting Section Head** and **Chemical Distribution Section Head** from Hellenic Petroleum, wherein he was responsible for the development of integrated system.

Mr. Poulos has **Master**'**s** and **Bachelor**'**s** degrees in **Chemical Engineering** from the **University of Massachusetts** and **Thessaloniki Polytechnic** respectively. Further, he is a **Certified Instructor/Trainer, a** and a **member** of the **Greek Society of Chemical Engineers** and **Greek Society of Engineers**.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

Istanbul	**US$ 6,000** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Doha	**US$ 6,000** per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	**US$ 5,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
London	**US$ 8,800** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Product Specification*** *LP-Gas Specification Parameters ● Vapor Pressure ● Moisture Content ● Sulfur Content ● Volatile Residue ● Non-Volatile Residue ● Non-Specification Contaminants ● Odorization*
0930 – 0945	*Break*
0945 – 1100	***Flow Measurement*** *Flow Calculation Guide ● Gas Measurement & Pipe Rupture ● Liquid Measurement ● Mass Measurement ● Steam Measurement ● Miscellaneous Measurement Devices ● Auxiliary Equipment and Common Terms*
1100 – 1230	***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*
1230 – 1245	*Break*
1245 – 1420	***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*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Relief Systems*** *Relief Device Design ● Blocked Discharge ● Fire Exposure ● Tube Rupture*
0930 – 0945	*Break*
0945 – 1115	***Relief Systems (cont'd)*** *Control Valve Failure ● Thermal Expansion ● Utility Failure*
1115 – 1230	***Relieving Devices*** *Safety Relief Valves ● Rupture Disk ● Sizing of Relief Devices*
1230 – 1245	*Break*
1245 – 1420	***Relieving Devices (cont'd)*** *Relief Valve Installation ● Relief System Piping Design ● Knockout Drums*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Flare Systems*** *Types of Flare Systems ● Thermal Radiation ● Smokeless Operation ● Pilots and Ignition*
0930 – 0945	*Break*
0945 – 1115	***Flare Systems (cont'd)*** *Seals ● Location and Regulations ● Special Relief System Considerations ● Low Temperature Flaring*
1115 – 1230	***Applicable Codes, Standards & Recommended Practices*** *ASME Codes ● ANSI Codes ● API Publications*
1230 – 1245	*Break*
1245 – 1420	***Applicable Codes, Standards & Recommended Practices (cont'd)*** *NFPA Publications ● OSHA Publications ● CGA (Compressed Gas Association) Publications*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

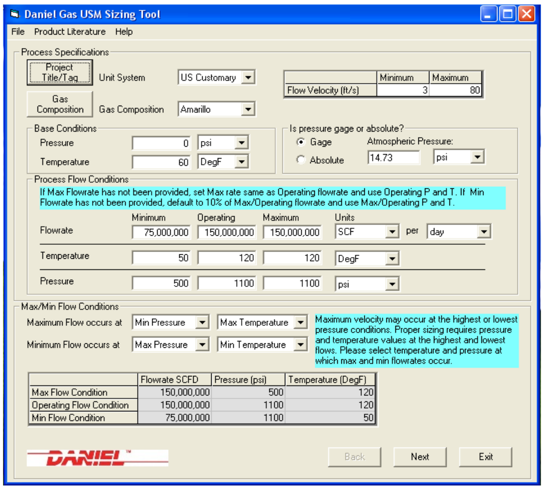
0730 – 0930	***Product Storage & Tanks*** *Storage Classification ● Working Pressures ● Types of Storage ● Materials of Construction ● Protective Coatings ● Insulation ● Appurtenances ● Site Preparation and Installation ● Cathodic Protection*
0930 – 0945	*Break*
0945 – 1100	***Product Recovery*** *Product Losses ● Vapor Recovery Systems ● Separators and Filters ● Fired Equipment ● Hot Oil System*
1100 – 1230	***Waste Heat Recovery*** *Heat Exchangers Overview ● Heat Balances ● Shell and Tube Exchangers ● Fouling Resistances ● Film Resistances ● Performance Evaluation with Sensible Heat Transfer ● Condensers*

1230 – 1245	Break
1245 – 1420	**Waste Heat Recovery** Reboilers and Vaporizers ● Selection of Exchanger Components ● Nomenclature ● Shell Size and Tube Count Estimation ● Operating Characteristics ● Inlet Gas Exchanger ● Hairpin Heat Exchangers
1420 – 1430	**Recap**
1430	Lunch & End of Day Four

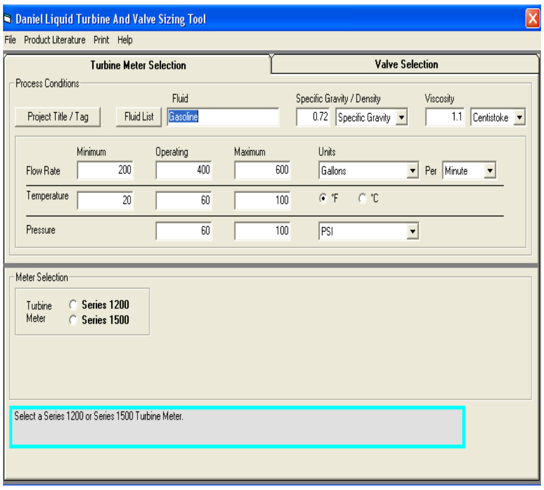
Day 5

0730 – 0930	**Operation, Maintenance & Troubleshooting**
0930 – 0945	Break
0945 – 1100	**Operation, Maintenance & Troubleshooting (cont'd)**
1100 – 1230	**Operation, Maintenance & Troubleshooting (cont'd)**
1230 – 1245	Break
1245 – 1345	**Operation, Maintenance & Troubleshooting (cont'd)**
1345 – 1400	**Course Conclusion**
1400 – 1415	**POST-TEST**
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

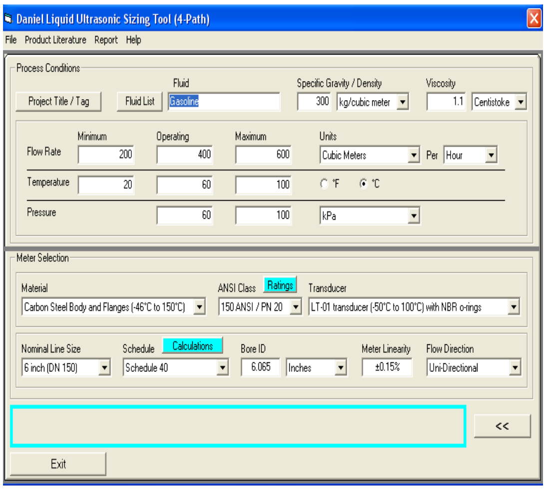
Simulators (Hands-on Practical Sessions)
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our “Valve Demo Kit”, “Gas Ultrasonic Meter Sizing Tool”, “Liquid Turbine Meter 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 “PRV^{2}SIZE Simulator”.



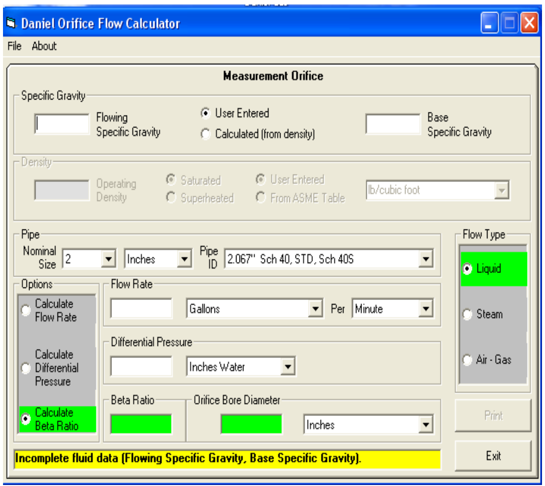
Gas Ultrasonic Meter (USM) Sizing Tool Simulator



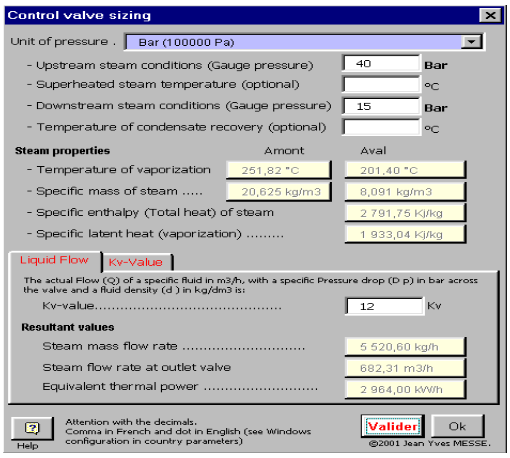
Liquid Turbine Meter and Control Valve Sizing Tool Simulator



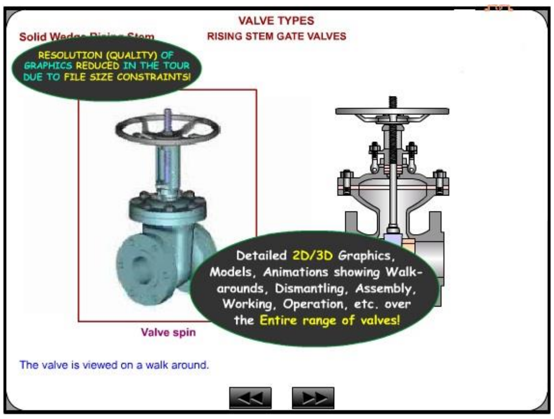
Liquid Ultrasonic Meter Sizing Tool Simulator



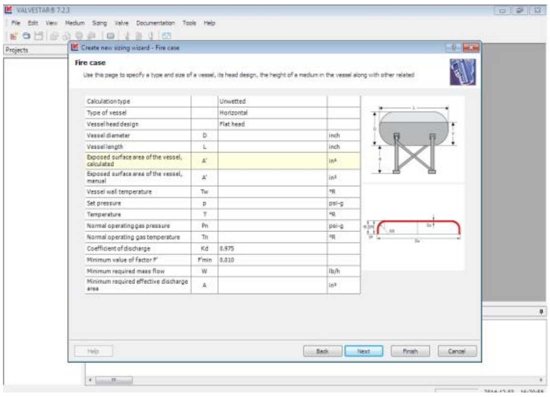
Orifice Flow Calculator Simulator



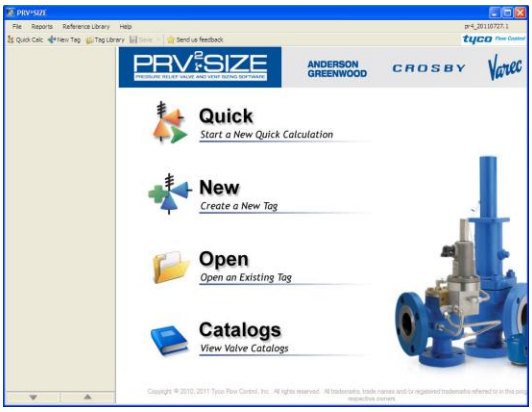
Valve Sizing Simulator



Valve Simulator 3.0



Valvestar 7.2 Simulator



PRV²SIZE Simulator

Course Coordinator

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