Haward Technology Middle East

COURSE OVERVIEW FE0027
API 521: Pressure Relieving & De-Pressuring Systems

Course Title
API 521: Pressure Relieving & De-Pressuring Systems

Course Reference
FE0027

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

3.0 CEUs (30 PDHs) AWARD

H-STK© INCLUDED

Course Date/Venue

Session(s)	Dates	Venue
1	January 26-30, 2025	Al Khobar Meeting Room, Hilton Garden Inn, Al Khobar, KSA
2	April 27-May01, 2025	Oryx Meeting Room, Double Tree by Hilton Al Saad, Doha, Qatar
3	July 14-18, 2025	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
4	October 20-24, 2025	Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt in the class will be applied using the following practical methods:

(**1**) **Valve Demo Kit:** Various safety relief valves will be distributed in the class to the participants by the course instructor for hands-on demonstration. These demo kits will be returned to the instructor at the end of the training day.

(**2**) **Valve Simulator:** Participants will use in the class our state-of-the-art valve simulators to practice some of the skills learnt.

This course is applicable to pressure-relieving and vapor depressuring systems. Although intended for use primarily in oil refineries, it is also applicable to petrochemical facilities, gas plants, liquefied natural gas (LNG) facilities, and oil and gas production facilities. The information provided is designed to aid in the selection of the system that is most appropriate for the risks and circumstances involved in various installations.

This course specifies requirements and gives guidelines for examining the principal causes of overpressure; determining individual relieving rates; selecting and designing disposal systems including such component parts as piping, vessels, flares and vent stacks.

This course is designed to provide participants with a detailed and up-to-date overview of pressure relieving and de-pressuring systems in accordance with API 521. It covers the causes of overpressure and their relieving rates; the overpressure protection philosophy; the determination of individual relieving rates; the individual overpressure causes and their relieving rates; the causes for vacuum and protection against vacuum; the vapor depressuring; and the relief system design and flare header design documentation.

During this interactive course, participants will learn the special considerations for individual PRDs including disposal systems and fluid properties that influence selection and design of disposal systems; the system design load, system arrangement, piping and disposal to a lower-pressure system; and the disposal to flare, disposal to atmosphere and design details for seal and knockout drum.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on pressure relieving and de-pressuring systems in accordance with API 521
- Discuss the causes of overpressure and their relieving rates
- Explain the overpressure protection philosophy including the determination of individual relieving rates as well as the individual overpressure causes and their relieving rates
- Identify the causes for vacuum and protection against vacuum
- Describe vapor depressuring and review relief system design and flare header design documentation
- Recognize the special considerations for individual PRDs including disposal systems and fluid properties that influence selection and design of disposal systems
- Illustrate system design load, system arrangement, piping and disposal to a lower-pressure system
- Discuss disposal to flare, disposal to atmosphere and design details for seal and knockout drum

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of pressure relieving and de-pressuring systems in accordance with API 521 for process engineers involved in relief and flare selection and sizing; operation engineers who have oversight responsibility for flare design and operation; and technical personnel and supervisors involved in supporting relief flare operation.

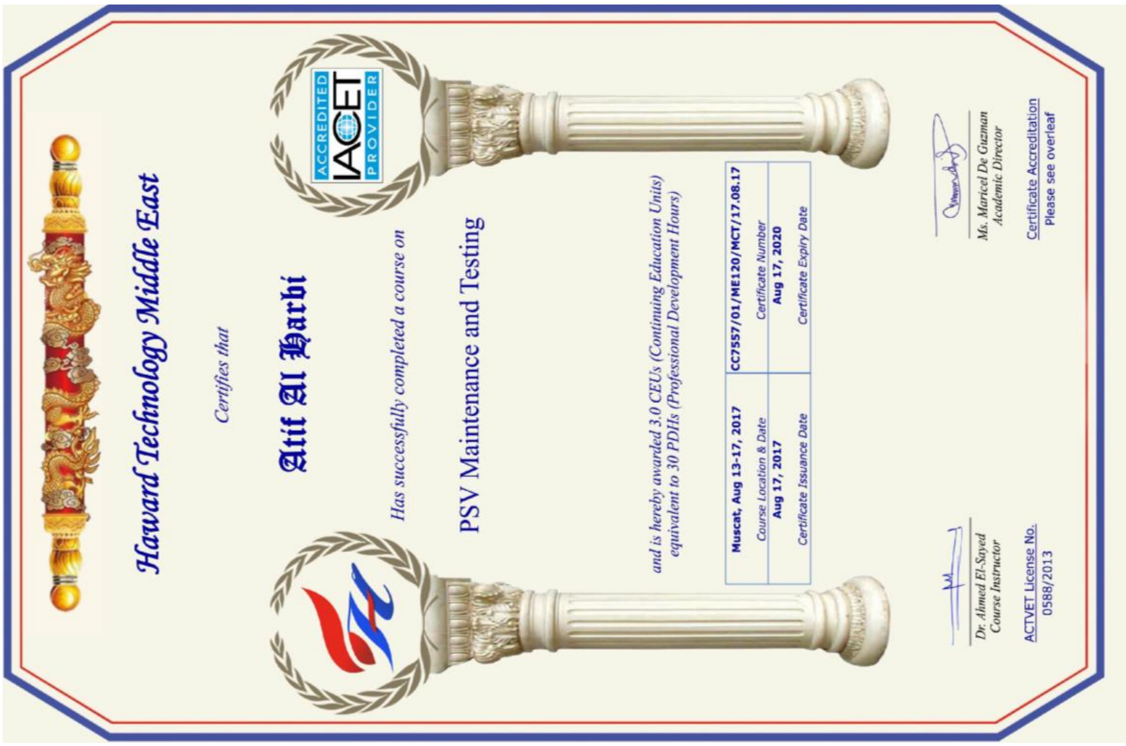
Course Certificate(s)

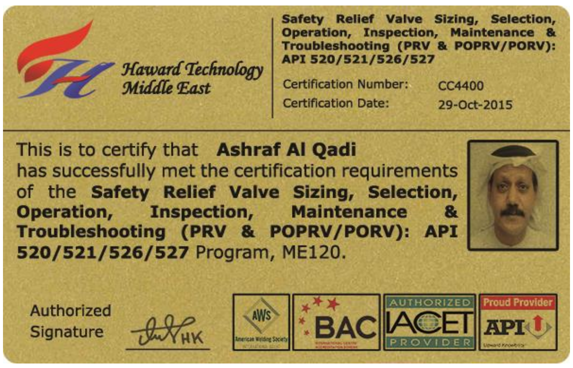
(1) Internationally recognized Wall Competency Certificates and Plastic Wallet Card Certificates will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Certificates are valid for 5 years.

Recertification is FOC for a Lifetime.

Sample of Certificates

The following are samples of certificates that will be awarded to course participants:-





(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

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Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

CEU Official Transcript of Records

TOR Issuance Date: **28-Sep-17**

HTME No. **PAR213250**

Participant Name: **Taher Al Mazrouei**

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
ME120	Safety Relief Valve Sizing, Selection, Operation, Inspection, Maintenance & Troubleshooting (PRV & POPRV/PORV): API 520/521/526/527	September 24-28, 2017	30	3.0

Total No. of CEU's Earned as of TOR Issuance Date **3.0**

TRUE COPY

Maricel De Guzman
Academic Director

Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 11130 Sunrise Valley Drive, Suite 350 Reston, VA 20191, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2013 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2013 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 Association 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 is accredited by

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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. Manuel Dalas MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with over **25 years** of industrial experience in **Oil**, **Gas**, **Refinery**, **Petrochemical**, **Power** and **Nuclear** industries. His wide expertise includes **Gas Turbines & Compressors** Troubleshooting, **Gas Turbines** Performance, Maintenance & Testing, **Gas Turbine Performance** and Optimization, **Gas Turbine Control** Systems, **Advanced Gas Turbine**, **Gas Turbine Design** and **Analysis**, **Air Compressor** & **Gas Turbines** Selection and Design, **Material Cataloguing**, **Maintenance Planning & Scheduling**, Reliability Centered Maintenance (**RCM**), **Reliability Maintenance**, **Condition Based Maintenance & Condition Monitoring**, **Asset & Risk** Management, **Vibration Condition Monitoring & Diagnostics** of Machines, **Vibration & Predictive** Maintenance, Reliability Improvement & Vibration Analysis for Rotating Machinery, Effective Maintenance **Shutdown & Turnaround** Management, **Engineering Codes & Standards**, **Rotating Equipment** Maintenance, **Mechanical** Troubleshooting, **Static Mechanical Equipment** Maintenance, **Machinery** Failure Analysis, **Machinery Diagnostics & Root Cause Failure** Analysis, **Plant Reliability & Maintenance** Strategies, **Boiler** Operation & Water Treatment, **Pumps** Maintenance & Troubleshooting, **Fans**, **Blowers & Compressors**, **Process Control Valves**, Piping Systems & Process Equipment, Advanced **Valve** Technology, **Pressure Vessel** Design & Analysis, **Steam & Gas Turbine**, **High Pressure Boiler** Operation, **FRP Pipe** Maintenance & Repair, **Centrifugal & Positive Displacement Pump** Technology Troubleshooting & Maintenance, **Rotating Machinery** Best Practices, **PD Compressor & Gas Engine** Operation & Troubleshooting, **Hydraulic Tools & Fitting**, **Mass & Material Balance**, **Water Distribution & Pump Station**, **Tank Farm & Tank Termin**al Safety & Integrity Management, **Process Piping** Design, Construction & **Mechanical Integrity**, **Stack & Noise** Monitoring, **HVAC & Refrigeration** Systems, BPV Code, Section VIII, Division 2, **Facility Planning & Energy** Management, Hoist - Remote & Basic **Rigging & Slinging**, **Mobile Equipment** Operation & Inspection, **Heat Exchanger**, **Safety Relief Valve**, **PRV & POPRV/PORV**, **Bearing & Lubrication**, **Voith Coupling** Overhaul, **Pump & Valve** Technology, **Lubrication** Inspection, **Process Plant** Optimization, Rehabilitation, Revamping & Debottlenecking, Engineering Problem Solving and **Process Plant** Performance & Efficiency. Currently, he is the **Technical Consultant** of the **Association of Local Authorities of Greater Thessaloniki** where he is in charge of the mechanical engineering services for piping, pressure vessels fabrications and ironwork.

During his career life, Mr. Dalas has gained his practical and field experience through his various significant positions and dedication as the **Technical Manager**, **Project Engineer**, **Safety Engineer**, **Deputy Officer**, **Instructor**, **Construction Manager**, **Construction Engineer**, **Consultant Engineer** and **Mechanical Engineer** for numerous multi-billion companies including the **Biological Recycling Unit** and the **Department of Supplies** of **Greece**, **Alpha Bank Group**, **EMKE S.A**, **ASTE LLC** and **Polytechnic College of Evosmos**.

Mr. Dalas has a **Master's** degree in **Energy System** from the **International Hellenic University, School of Science & Technology** and a **Bachelor's** degree in **Mechanical Engineering** from the **Mechanical Engineering Technical University of Greece** along with a **Diploma** in **Management & Production Engineering** from the **Technical University of Crete**. Further, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), a **Certified Project Manager Professional** (**PMI-PMP**), a **Certified Instructor/Trainer**, a **Certified Energy Auditor** for **Buildings**, **Heating & Climate Systems**, a **Member** of the **Hellenic Valuation Institute** and the **Association of Greek Valuers** and a **Licensed Expert Valuer Consultant** of the **Ministry of Development and Competitiveness**. He has further delivered numerous trainings, courses, seminars, conferences and workshops internationally.

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

Al Khobar	**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.
Duha	**US$ 5,500** 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
Abu Dabi	**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.

Accommodation

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

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	***Introduction*** *Terms, Definitions, Acronyms & Abbreviations • Cause of Overpressure & their Relieving Rates*
0930 – 0945	*Break*
0945 – 1100	***Overpressure Protection Philosophy*** *Hierarchy of Protective Measures • Use of Administrative Controls if Corrected Hydrotest Pressure Not Exceeded • Double Jeopardy • Latent Failures • Operator Error/Effect of Operator Response • Role of Instrumentation in Overpressure Protection*
1100 – 1215	***Determination of Individual Relieving Rates*** *General Philosophy • Effects of Pressure, Temperature, & Composition • Dynamic Simulation*
1215 – 1230	*Break*

1230 – 1420	***Individual Overpressure Causes & their Relieving Rates*** *General ● Closed Outlets ● Cooling or Reflux Failure ● Absorbent Flow Failure ● Accumulation of Noncondensables ● Entrance of Volatile Material into the System ● Overfilling ● Failure of Automatic Controls ● Abnormal Process Heat or Vapor Input ● Internal Explosions or Transient Pressure Surges ● Chemical Reaction ● Hydraulic Expansion ● Fires ● Heat Transfer Equipment Failure ● Utility Failure ● Overpressure Prevention During Maintenance*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Guidance on Vacuum Relief*** *General ● Causes for Vacuum ● Protection Against Vacuum*
0930 – 0945	*Break*
0945 – 1100	***Vapor Depressuring*** *General ● Initiation of Depressuring ● Low Temperatures During Depressuring ● Application Criteria ● Acceptance & Design Criteria ● Depressuring Rate ● Vapor Flows*
1100 – 1215	***Relief System Design Documentation*** *General ● Purpose of Documentation ● Potential Elements of Relief System Design Documentation*
1215 – 1230	*Break*
1230 – 1420	***Flare Header Design Documentation***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Special Considerations for Individual PRDs*** *General ● Liquid-Vapor Mixture & Solids Formation ● Location of a PRD in a Normally Liquid System ● Multiple PRDs*
0930 – 0945	*Break*
0945 – 1215	***Fluid Properties that Influence Selection & Design of Disposal Systems*** *Physical, Chemical, & Reactive Properties ● Temperature ● Hazardous & Nuisance Properties ● Viscosity & Solidification ● Miscibility ● Recovery Value*
1215 – 1230	*Break*
1230 – 1330	***System Design Load*** *General ● Loads from Pressure Systems ● Establishing Design Load for the Disposal System ● Refinement of the Disposal System Design Load*
1330 - 1420	***System Arrangement*** *General ● Single-device Disposal Systems ● Multiple-device Disposal System ● Header Segregation*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Piping*** *General ● Backpressure ● Line Sizing ● Multiple-relief Scenarios ● Isothermal Pressure Drop Calculation Method ● Lapple Pressure Drop Calculation Method ● Fanno Lines Pressure Drop Calculation Method ● Nonideal Gas Behavior ● Frictional Resistance of Fittings (K-factors) ● Mixed Phase Fluids ● Mechanical Design of the Disposal System ● Acoustic Fatigue ● Setting the Mechanical Design Temperature for Flare Headers ● Reaction Forces ● Shock Loading ● Pipe Anchors, Guides, and Supports ● Self-draining/Heat Tracing ● Routing of Discharge Piping/Sloping*
0930 – 0945	*Break*
0945 – 1100	***Disposal to a Lower-pressure System***
1100 – 1215	***Disposal to Flare*** *General ● Combustion Properties ● Combustion Methods ● Flare Systems Designs ● Sizing ● Purging ● Ignition of Flare Gases ● Liquid Seal Drum ● Flare Knockout Drum ● Siting Considerations for the Flare ● Flare Gas Recovery Systems*
1215 – 1230	*Break*
1230 – 1420	***Disposal to Atmosphere*** *Formation of Flammable Mixtures ● Exposure to Toxic Vapors or Corrosive Chemicals ● Ignition of a Relief Stream at the Point of Emission ● Excessive Noise Levels Vent Stacks Air Pollution ● Knockout Drums Venting to Atmosphere ● Disposal Through Common Vent Stack ● Sewer ● Vent Stacks*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

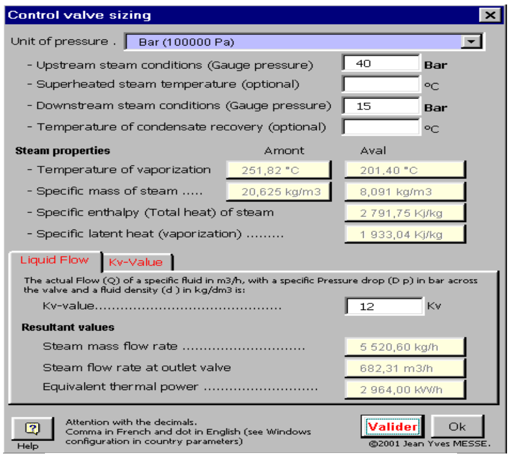
0730 – 0930	***Design Details for Seal & Knockout Drum***
0930 – 0945	*Break*
0945 – 1100	***Analytical Methodology for Fire Evaluations***
1100 – 1215	***Special System Design Considerations & Calculations***
1215 – 1230	*Break*
1230 – 1300	***High-Integrity Protection System (HIPS)***
1300 – 1315	***Course Conclusion***
1315 – 1415	***COMPETENCY EXAM***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Valve Demo Kit

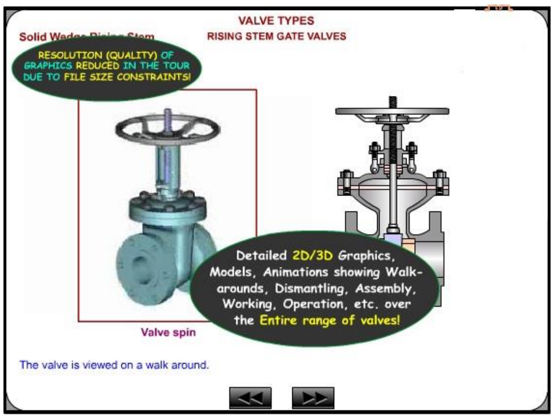
Hands-on demonstration will be held during the course. Proto-type safety relief valves will be temporary given to course participants for demonstration purposes as part of this course.

Simulator (Hands-on Practical Sessions)

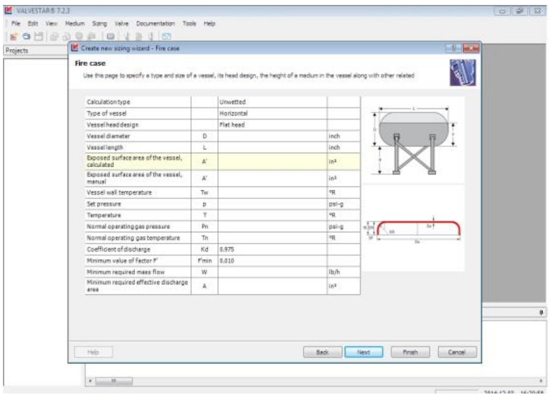
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the state-of-the-art “Valve Sizing Software”, “Valve Software 3.0”, “Valvestar 7.2 Software” and “PRV2SIZE Software”.



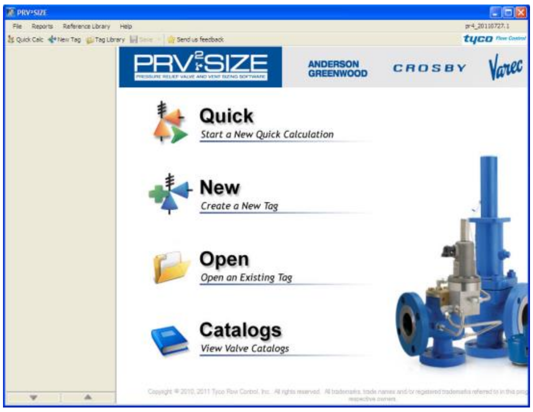
Valve Sizing Software



Valve Software 3.0



Valvestar 7.2 Software



PRV²SIZE Software

Course Coordinator

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