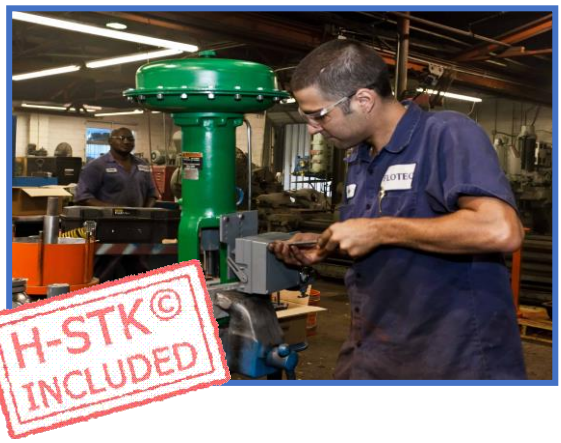
COURSE OVERVIEW ME1019
PSV Overhauling, Inspection & Testing

Course Title
PSV Overhauling, Inspection & Testing

Course Date/Venue
November 03-07, 2024/Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA

Course Reference
ME1019

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



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.

A safety or pressure relief valve can be considered the most important single safety device on a boiler or pressure vessel. If it fails to function in the manner for which it was intended and an overpressure condition develops, the result could be catastrophic.

This course is designed to provide participant with a detailed and up-to-date overview of PSV overhauling, inspection and testing. It covers the pressure relief valve principles including the application of PRVS and pilot operated PRVS; the development of valve designs; the materials for pressure relief valves, valve spring design and fabrication; the various types of safety valve designs; and the PSV operational malfunctions and testing facilities and other typical causes of valve malfunctions.

Further, the course will also discuss the PSV repair and non-destructive examination; the PSV overhauling and inspection; the pressure relief valves disassembly, cleaning procedure, inspection, testing and sealing; and the PRV repair flow chart, inspector's role, measurement and test equipment.

During this interactive course, participants will learn the two critical elements of PRV operation; the purpose of lapping, balance of lapping, ring laps and lapping materials; the lap selection, nozzle seat width, PRV lapping procedure, PRV bearing points and assembly operation; the valve testing and sealing in accordance with the API 527 & ASME standards; and the inspection and testing of pressure-relieving devices as per API 576 standard; valve calibration; and the various types of instruments requiring calibration.

Course Objectives

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

- Apply systematic techniques on pressure safety valve overhauling, inspection and testing
- Discuss pressure relief valve principles including the application of PRVS and pilot operated PRVS
- Recognize the development of valve designs as well as the materials for pressure relief valves, valve spring design and fabrication and the various types of safety valve designs
- Identify the PSV operational malfunctions and testing facilities covering operational malfunctions, system malfunctions, valve - mechanical caused, other system malfunctions and causes and other typical causes of valve malfunctions
- Carryout PSV repair and non-destructive examination as well as PSV overhauling and inspection
- Employ pressure relief valves disassembly, cleaning procedure, inspection, testing and sealing
- Review PRV repair flow chart, inspector's role, measurement and test equipment
- Identify the two critical elements of PRV operation and explain the purpose of lapping, balance of lapping, ring laps and lapping materials
- Apply lap selection, nozzle seat width, PRV lapping procedure, PRV bearing points and assembly operation
- Carryout valve testing and sealing in accordance with the API 527 & ASME standards
- Inspect and test pressure-relieving devices as per API 576 standard
- Employ valve calibration and identify the various types of instruments requiring calibration

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 safety relief valve overhauling, inspection and testing for process engineers, mechanical engineers, piping engineers, pipelines and pressure vessels engineers and supervisors, inspection and QA & QC engineers, boilers and process plant equipment owners, maintenance staff who inspect and install pressure relief devices and engineers involved in plant turnaround and upgrade projects.

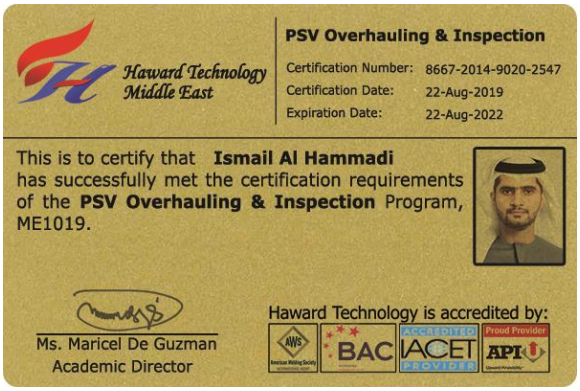
Course Certificate(s)

(1) Internationally recognized 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.

Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

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CEU Official Transcript of Records

TOR Issuance Date: 22-Aug-19

HTME No. 8667-2014-9020-2547

Participant Name: Ismail Al Hammadi

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
ME1019	PSV Overhauling & Inspection	August 18-22, 2019	20	2.0

Total No. of CEU's Earned as of TOR Issuance Date **2.0**

TRUE COPY

Maricel De Guzman
Academic Director

Haward Technology has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, 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

P.O. Box 26070, Abu Dhabi, United Arab Emirates | Tel.: +971 2 3091 714 | Fax: +971 2 3091 716 | E-mail: info@haward.org | Website: www.haward.org

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.

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 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. Eric Roper is a **Senior Mechanical & Maintenance Engineer** with over **30 years** of extensive experience within **Oil**, **Gas** and **Petrochemical** industries. His expertise lies extensively in the areas of **Maintenance & Reliability** Management, **Maintenance Excellence Framework**, **Maintenance Strategy** Development, **Productive Maintenance**, Equipment Failure Patterns, **Failure Analysis & Root Cause**, **Maintenance** Management, **Maintenance Business Model**, **Maintenance** Objective Setting, Equipment Plans Development, **Preventive Maintenance & Condition Monitoring**, **Work Selection & Execution**, **Work Planning & Scheduling**, **Performance Metrics & KPIs**, **Quality Assurance & Continuous Improvement**, Human Reliability Analysis, **Asset Management**, Computerized Maintenance Management Systems (**CMMS**), **Failure Analysis** Methodologies, Machinery Root Cause Failure Analysis (**RCFA**), **Preventive Maintenance** & **Condition Monitoring**, Reliability Centred Maintenance (**RCM**), Root Cause Analysis (**RCA**), **Planning & Managing Plant Turnaround**, **Scheduling Maintenance**, **Data Archive Maintenance**, Preventive & Predictive Maintenance (**PPM**) **Maintenance**, Condition Based Monitoring (**CBM**), Risk Based Assessment (**RBA**), Planning & Preventive Maintenance, **Maintenance** Management (**Preventive**, **Predictive**, **Breakdown**), **Reliability** Management, Rotating Equipment, Scheduling & Cost Control, **Asset Management** Best Practices, Resource Management, Work Management, **Heat Exchanger**, **Gas & Steam Turbine Maintenance**, **Pumps & Compressors**, Turbo-Expanders, Fractional Columns, **Boilers**, **Bearing & Rotary Machine**, **Blower & Fan**, Shaft Repair, **Safety Relief Valves**, **Pipelines**, **Piping**, **Pressure Vessels**, Process Equipment, **Tanks & Tank Farms**, Pneumatic System and Static Equipment.

During his career life, Mr. Roper has worked with several prestigious companies occupying numerous challenging managerial and technical positions such as being the **Lead Business Project Manager**, **Managing Director**, **General Manager**, **Operations Manager**, **Managing Director**, **PVC Operations Manager**, **Section Production Manager**, **Section Engineer**, **Development Engineer** and **Civil Engineering & Construction Engineer** from various international companies such as **Sasol** Secunda Chemicals, Arya **Sasol** Polymer Company, **Chevron Oil Nigeria Ltd**., **Sasolburg**, **Sasol** Polymers, PVC Compounds (Pty) Ltd, Polifin Ltd, **AECI Ltd** and John Laing Construction Company.

Mr. Roper is a **Registered Professional Engineer** and has a **Bachelor's** degree with **Honours** in **Mechanical Engineering** from the **Brunel University**, **England**. Further, he holds a Management Development Programme (**MDP**) in General Management, an Advanced Executive General Management Program and a South African Government Certificate of Competency (**GCC**). Moreover, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), an active member of South African Council of Professional Engineers and has delivered numerous trainings, courses, workshops, conferences and seminars internationally.

Course Fee

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: Sunday, 03rd of November 2024

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0815 – 0930	***PSV Principles & Development*** *Pressure Relief Valve Principles of Operation ● Internal Parts of Safety Valve ● Where is the Action of Force? ● Area, Force, Pressure Relationship ● Static Force Balance ● Forces Applied to Disc ● Spring Force ● Dynamic Force Balances ● Reaction Force = FR ● Huddling Chamber- Nozzle Ring Adjustment*
0930 – 0945	*Break*
0945 – 1100	***PSV Principles & Development (cont'd)*** *Effect of Blowdown Ring ● Safety Valves - Field Example ● Safety Valves – Superheater ● Pilot Operated Pressure Relief Valves ● Development, Application of PRVs & Pilot Operated PRVs ● Development of Valve Designs ● Valve Spring Design & Theory ● Materials for Pressure Relief Valves ● Valve Spring Design & Fabrication ● Types of Safety Valve Designs*
1100 - 1230	***PSV Operational Malfunctions & Testing Facilities*** *Operational Malfunctions ● System Malfunctions ● Valve - Mechanical Caused ● Other System Malfunctions & Causes ● Erratic Set Pressure ● Blowdown ● Closing Pressure ● Blowdown or Closing Pressure are not met ● Valve - Mechanically Caused ● Installation & System Caused ● Back Pressure ● Other Typical Causes of Valve Malfunctions ● Testing Facilities for PRV*
1230 – 1245	*Break*
1245 – 1330	***PSV Repair & Non-Destructive Examination*** *Pressure Relief Valve Repair ● PRV Terminology – PTC 25 – 2008 ● Low Pressure Safety Valves (LPSV) ● Pressure Relief Valve Repair ● Static Force Balance ● Dynamic Force Balance ● Flanged Safety Valve ● Threaded Safety Valve ● Threaded Safety-Relief Valve*
1330 – 1420	***PSV Repair & Non-Destructive Examination (cont'd)*** *Flanged Safety-Relief Valve ● Safety-Relief Valve (Cage Type) ● Pilot Operated Pressure Relief Valves ● Cap & Lever Styles ● ASME Code Application ● Non-Code Applications ● Safety Valve Adjustments & Repairs ● Nondestructive Examination*
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: Monday, 04th of November 2024

0730 – 0930	***PSV Overhauling & Inspection*** *Disassembly of Pressure Relief Valves ● Shop Repair Advice ● "As Found" Conditions may Aid in Troubleshooting ● Cleaning Procedure*
0930 – 0945	*Break*
0945 – 1100	***PSV Overhauling & Inspection (cont'd)*** *PRV Cleaning in Progress ● PRV Cleaning Process Completed ● Pilot Operated Pressure Relief Valves ● Recommended Procedures for Repairing Pilot Operated Pressure Relief Valves*
1100 - 1230	***PSV Overhauling & Inspection (cont'd)*** *Disassembly ● Cleaning ● Inspection*
1230 – 1245	*Break*
1245 – 1420	***PSV Overhauling & Inspection (cont'd)*** *Testing ● Sealing ● Nameplate*
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 Two*

Day 3: Tuesday, 05th of November 2024

0730 – 0930	***PSV Overhauling & Inspection (cont'd)*** *Objectives of an Inspection Job ● PRV Repair Flow Chart ● Inspector's Role ● Measurement & Test Equipment*
0930 – 0945	*Break*
0945 – 1100	***PSV Overhauling & Inspection (cont'd)*** *Inspection Methods ● PRV Spindle Inspection Points ● Disk & Nozzle Inspection ● PRV Guide & Disc Holder*
1100 - 1230	***PSV Overhauling & Inspection (cont'd)*** *PRV Spring Inspection Points ● Spring Rate ● 900 Series Disc Criteria Data Sheet ● 6000 Series Stem Concentricity Disc & Guide Clearance*
1230 – 1245	*Break*
1245 – 1420	***PSV Overhauling & Inspection (cont'd)*** *6000 Series Disc Criteria ● 6000 Nozzle Criteria ● Critical Inspection*
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 Three*

Day 4: Wednesday, 06th of November 2024

0730 – 0930	***PSV Overhauling & Inspection (cont'd)*** *Lapping Objectives ● Two Critical Elements of PRV Operation ● Purpose of Lapping ● Balance of Lapping*
0930 – 0945	*Break*
0945 – 1100	***PSV Overhauling & Inspection (cont'd)*** *Ring Laps ● Lapping Materials ● Cleanliness ● Lap Selection*
1100 - 1230	***PSV Overhauling & Inspection (cont'd)*** *Nozzle Seat Width ● PRV Lapping Procedure ● PRV Bearing Points*
1230 – 1245	*Break*

1245 – 1420	***PSV Overhauling & Inspection (cont'd)*** *Assembly Objectives ● Assemblers Responsibility ● Assembly Operation*
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 Four*

Day 5: ***Thursday, 07th of November 2024***

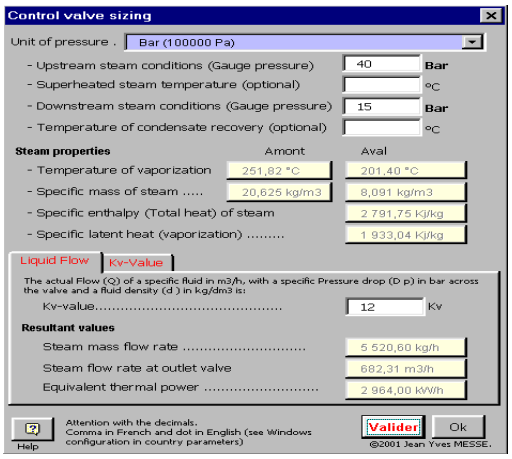
0730 – 0830	***Valve Testing & Sealing (API 527 & ASME)*** *Testing Objectives ● ASME Requirements ● RV & PSV Testing & Adjustments ● Testing & Sealing ● Definition of Set Pressure ● Liquid Test – Definition of Open ● PRV Set Pressure on Liquid ● Prior to Opening Pressure on Liquid ● Definition of Set Pressure on Liquid ● Above Opening Pressure ● Maximum Overpressure 110% of Set Pressure ● Air Test PRV ● Reaction Force ● Start to Discharge For PRV*
0830 – 0930	***Valve Testing & Sealing (API 527 & ASME) (cont'd)*** *ASME Requirement for PRV Seat Tightness Testing ● API 527 ● ASME Code Requirement for Secondary Pressure Zone Testing of PRVs ● PRV Adjustments ● Two Ring Design Ring Setting Chart ● One Ring Design Ring Setting Chart ● Sealing Adjustments ● Sample Traveler ● Protect your Hearing during PRV Testing ● Field Testing Advice ● On Site Safety Valves Testing Schedule ● Safety Valves Test Schedule for Boilers ● On Site Safety Valves Test*
0930 – 0945	*Break*
0945 – 1030	***API 576: Inspection of Pressure-relieving Devices*** *Scope ● Normative References ● Terms & Definitions ● General ● Pressure Relief Valve ● Direct-acting Pressure-relief Valve ● Pilot-operated Pressure-relief Valves ● Rupture Disk Device*
1030 – 1130	***API 576: Inspection of Pressure-relieving Devices (cont'd)*** *Pin-actuated Devices ● Reasons for Inspection & Testing ● Shop Inspection/Overhaul ● Inspection, Testing, Maintenance & Setting of Direct-acting Spring-loaded Valves on Equipment ● Inspection, Testing, Maintenance & Setting of Direct Spring-operated Safety Valves Used on Fired Pressure Vessels ● Inspection, Testing, Maintenance & Setting of Pilot-operated Pressure-relief Valves ● Inspection, Testing, Maintenance & Setting of Weight-loaded Pressure and/or Vacuum Vents on Tanks ● Rupture Disk Removal & Replacement*
1130 – 1200	***API 576: Inspection of Pressure-relieving Devices (cont'd)*** *Examples of Rupture Disk Failure Modes ● Rupture Disk Holder ● Inspection & Replacement of Rupture Disks ● Frequency of Shop Inspection/Overhaul ● Time of Inspection ● Inspection & Servicing Deferral ● The Need to Keep Records ● Responsibilities ● Sample Record & Report System*
1230 – 1245	*Break*
1245 – 1315	***Valve Calibration*** *Calibration ● Types of Instruments Requiring Calibration ● Pressure Gauges ● Linear Measuring Equipment ● Welding Equipment ● Temperature Measuring Equipment ● In-House Measuring Standards ● Calibration of Pressure Gauges ● Definition of Pressure ● Standards for Pressure Gauges ● Use of the Dead Weight Tester*
1315 – 1330	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1330 – 1430	***COMPETENCY EXAM***
1430	*Lunch & End of Course*

Valve Demo Kit

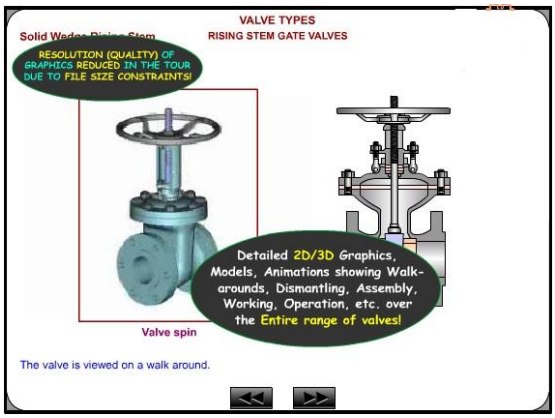
Hands-on demonstration will be held during the course. Proto-type safety relief valves will be temporary given to course participants for demonstration purposes as part of this course.

Simulator (Hands-on Practical Sessions)

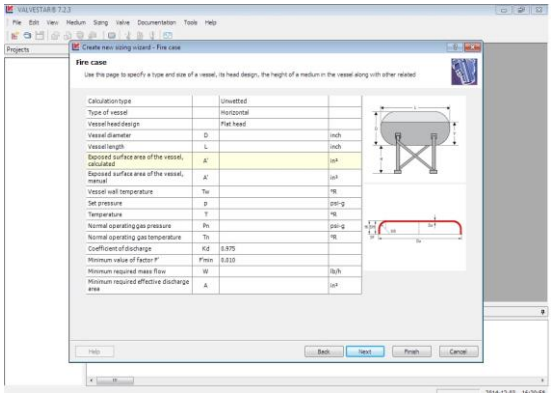
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the state-of-the-art "Valve Sizing Software", "Valve Software 3.0", "Valvestar 7.2 Software" and "PRV2SIZE Software".



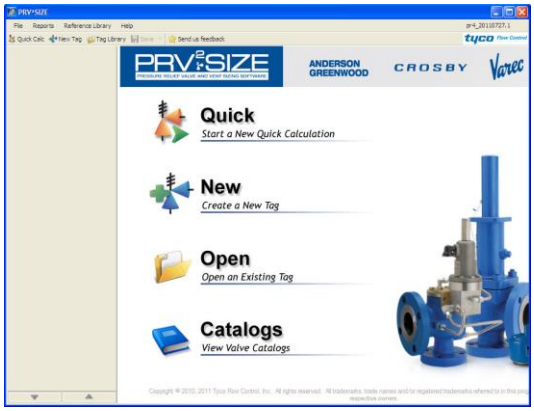
Valve Sizing Software



Valve Software 3.0



Valvestar 7.2 Software



PRV²SIZE Software

Course Coordinator

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