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# Theory and Practical Application of Valve Technology

## Course No. 825

**FOR WHOM INTENDED** This course is intended for personnel involved in specifying, selecting, purchasing or using valves. Degreed engineers whose primary training is not in this field will benefit, as will technicians, quality assurance inspectors and manufacturing engineers. Course 825 will also benefit managers and supervisors in charge of these functions.

**BRIEF DESCRIPTION OF COURSE** The course introduces valves and valve components, and then discusses flow dynamics as related to valves.

The construction of valves and materials is covered, along with valve leakage. The course then covers in detail different types of valve available, with a description and discussion of how each type functions. This is followed by a general discussion of valve trim, characteristics, actuators and positioners.

A more detailed discussion of globe valves and gate valves covers valve variations and component options. The instructor covers these valves in application and use including the selection of valves, valve bodies, valve trim, valve actuator and valve packing.

Valves in a control system are covered next, including sizing and selection of valves. This is followed with a discussion of check valves and some variations available. Types of relief and safety valves are covered along with selection, sizing and standards.

The final section addresses codes and standards for valve safety and performance. ASME, European and Petroleum industry codes will be discussed.

**DIPLOMA PROGRAMS** This course is required for TTI's Piping, Valves and Pump Specialist (PV&PS) Diploma Program. It may be used as an optional course for any [TTi specialist diploma program](#).

**RELATED COURSES** TTI's pipes and valves curriculum (under development), includes Courses 631, on safety lockout and tagout procedures, 651 on Piping and Instrumentation Diagrams (P&ID), 652 on piping system layout and design, 652 on pipe support design, 654 on pipe inspection and maintenance and 820 on pump technology.

**PREREQUISITES** There are no definite prerequisites. This course is aimed toward individuals actively involved in related technical fields.

**TEXT** Each student will receive 180 days access to the on-line electronic course workbook. Renewals and printed textbooks are available for an additional fee.

**COURSE HOURS, CERTIFICATE AND CEUS** On-site courses can vary from 14–35 hours over 2–5 days as requested by our clients. Upon successful course completion, each participant receives a certificate of completion and one Continuing Education Unit (CEU) for every ten class hours.

## Course Outline

### Introduction to Valves

Description • Components • Characteristics

### Valves & Flow Dynamics

Control Theory • Velocity Profiles • Energy • Phase Diagrams

### Valve Construction and Materials

Introduction • Standards • Leakage Classification

### Valve Types

Angle • Needle • Bar Stock Body • Pinch  
Diaphragm • Ball Valves • Butterfly • Plug • Air Valve  
Emergency Shut Down Valves

### Valve Trim & Characteristics

Seats and Seals • Flow Characteristics • Profiling  
Installed Characteristics • Cavitation Control

### Actuators & Positioners

Actuators • Flapper-Nozzle Assembly • I/P Converters  
Actuator Types • Positioner Types

### Globe Valves

Description • Packing Box And Packing • Valve Trim  
Seat And Retainer • Guiding

### Gate Valves

Description • Uses • Flow Characteristics And Trim  
Body And Bonnet • Stem Design • Specifications  
Materials Of Construction • Wedge Pinch  
Sliding Gate Valves • Repair And Operation

### Control Valves (including basics)

Description • Control Loop • Control Valve Selection  
Control Valve Sizing

### Check Valves

Attributes • Horizontal Lift • Vertical Lift • Ball • Diaphragm  
Application • Repair • Selection

### Relief Valves

Principles • Pop Type • Direct Operated Type  
Pilot Operated Type • Pilot Operated with Internal Relief Type  
Selection and Sizing Criteria

### Safety Relief Valves

Safety Valve History • Safety Valves • Huddling And Blowdown  
Pop Type Relief Valves • Direct-Operated Relief Valves  
Pilot-Operated Relief Valves  
Selection And Sizing Of Relief Valves • Terminology  
Standards • Rupture/Burst Disks • Downhole Safety Valve

### Codes and Standards

ASME Boiler and Pressure Vessel Code history  
Individual Volumes, ASME B&PV Code  
American Petroleum Institute Application Codes  
Codes and Standards • ASME and API Codes for Relief Valves  
Inspection and Maintenance Codes • Testing and Repair

### Final Review

### Certificates for Successful Completion



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