



Piping System Fundamentals

2014 Class Registration

The Piping System Fundamentals courses focus on the skills needed to fully understand fluid piping systems and successfully troubleshoot changes or additions to any piping system situation. Our emphasis is on understanding the relationship between the components that make up a piping system and what happens when changes are made to the piping system.

Each attendee is given a course handbook, the *Piping System Fundamentals* book, and a copy of the Crane Technical Paper No. 410 (TP410) in order to maximize the value of your learning experience.

TRAINING OUTLINE

The course length is two days. Class starts at 8:00 AM each day and ends at 5:00 PM with a break for lunch. Example problems are provided so bring a calculator if you want to test out your new skills.

DAY 1 – BASIC TRAINING

Introduction

- What is a Piping System?
- Value of a Clear Picture of a Piping System
- Understanding the Total Piping System

Terminology, Units, and Physical Laws

- Fluid Properties
- Flow Rate, Pressure, Head, and Head Loss
- Physical Laws that Govern Fluid Flow

Tanks and Vessels

- Types of Tanks and Vessels
- Key Hydraulic Measurements
- Measuring & Controlling Tank Level, Pressure, & Temp.
- Common and Abnormal Tank Operations

Centrifugal Pumps

- Major Pump Parts
- Theory of Operation
- Understanding the Pump Curve
- Pump Power & Cost of Operation
- Net Positive Suction Head and Cavitation
- Pump Affinity Laws
- Parallel and Series Pump Operation
- Fluid Considerations
- Pump Selection
- Operating Pumps Properly

Pipelines

- Pipeline Terminology
- Head Loss Calculations
- Head Loss for Series and Parallel Piping
- Factors Affecting Head Loss
- Pipe Sizing and Selection

DAY 2 – SYSTEM EXAMPLES

Valves and Fittings

- Purpose of Valves and Fittings
- Valve and Fitting Losses
- Hydraulic Performance of Valves and Fittings
- Valve Applications
- Cost of Valve Head Loss

Control Valves

- Types of Control Valves
- Control Valve Operation
- Characteristic Curves
- Control Valve Applications
- ASME Ratings and ANSI Valve Classes
- Cavitation, Choking, and Flashing
- Sizing and Selecting Control Valves
- Control Valve Equations

Process Measurement and Controls

- Instruments Used to Measure Processes
- The Typical Process Control Loop
- The PID Controller and Controller Tuning
- Control Schemes

Piping System Processes and Process Equipment

- Types of Processes
- Process Equipment
- Hydraulic Performance of Equipment

The Total System

- Types of Piping Systems
- Key Concepts to Understand the System
- Calculating Flow Between Two Pressure Sources
- Series Piping, Parallel Piping & Branching Piping
- The Siphon Effect
- System Static and Dynamic Head
- Visualizing Energy Addition and Losses
- Troubleshooting Piping Systems

Class Registration

To register: Fax (360) 412-0672, call (800) 786-8545, or email register@fluidfundamentals.com This registration form does not guarantee that a seat is held for the registrant(s). Call to confirm seating availability.

Course fee: The early registration fee of \$895 includes the two-day seminar, course workbook and Crane's TP410. The registration fee on the day of the class is \$995.

Cancellation Policy: If notification is received at least two weeks prior to the start of the course, credit may be granted to a later seminar date. No refunds are available for cancellations made less than 30 days prior to the start of the scheduled course. If for any reason we are required to cancel a class, our liability is limited to the return of the registration fee.

Guarantee: Engineered Software offers the highest quality training available. If you are dissatisfied for any reason, notify the instructor prior to the end of the first day and you may withdraw and receive a 100% tuition refund.

Class size: Limited to 40.

Continuing Education Unit (CEU): Completion of the Piping System Fundamentals Training is credited as 1.5 CEU's.

Courses are offered on the following 2014 schedule:

Houston, TX - September 17-18, 2014 Tampa, FL - October 15-16, 2014

Columbus, OH - November 12-13, 2014

Method of Payment (Check one):

Visa MC Amex Purchase Order* Check (Payable to Engineered Software)

Card Number: _____ Exp. Date: _____ Security Code: _____

Name On Card: _____

Signature: _____

Attendee Information **

Requested Class Date (check one):

- Houston, TX - September 17-18, 2014
 Tampa, FL - October 15-16, 2014
 Columbus, OH - November 12-13, 2014

*In order to notify you of class changes or cancellations, contact information **MUST** be completely filled out.*

Name: _____ Email: _____

Company: _____ Title: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ PE #: _____

Please select the version of the **CRANE TP410** you would prefer US Edition Metric Edition

Please select the version of **Piping System Fundamentals** you would prefer US Edition Metric Edition
Please **Mail** this form to: _____ For your convenience you may also:

Engineered Software, Inc.
c/o Fluid Fundamentals Training
4529 Intelco Loop SE
Lacey, WA 98503-5941

Fax to: (360) 412-0672
E-mail to: register@fluidfundamentals.com
Phone Registration is available from
7am to 3:30pm PDT: (800) 786-8545

* Invoice to be paid prior to beginning of class.

** For additional attendees, a second sheet has been provided. If you need more spaces to register additional people please make a copy of the following attendee registration sheet and use it to include all attendee registrations and return with the Payment Method form.

Additional Attendee(s) Form

Attendee Information

Name: _____ Email: _____

Company: _____ Title: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ PE #: _____

Plases select the version of the **CRANE TP410** you would prefer US Edition Metric Edition

Plases select the version of **Piping System Fundamentals** you would prefer US Edition Metric Edition

Attendee Information

Name: _____ Email: _____

Company: _____ Title: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ PE #: _____

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