



Piping System Fundamentals

Fall 2008 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 (360) 292-4070, or email register@flowoffluids.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 2012 schedule:

Houston, TX - Feb 28-29, 2012
Portland, OR - Mar 14-15, 2012
Denver, CO - Mar 28-29, 2012

Birmingham, AL - Apr 18-19, 2012
Chicago, IL - Apr 24-25, 2012

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 (circle one):

Houston, TX - Feb 28-29, 2012
Portland, OR - Mar 14-15, 2012
Denver, CO - Mar 28-29, 2012

Birmingham, AL - Apr 18-19, 2012
Chicago, IL - Apr 24-25, 2012

*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: _____

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:

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

For your convenience you may also:

Fax to: (360) 412-0672
E-mail to: register@flowoffluids.com
Phone Registration is available from
7am to 3:30pm PDT: (360) 292-4070

* 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: _____

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: _____

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