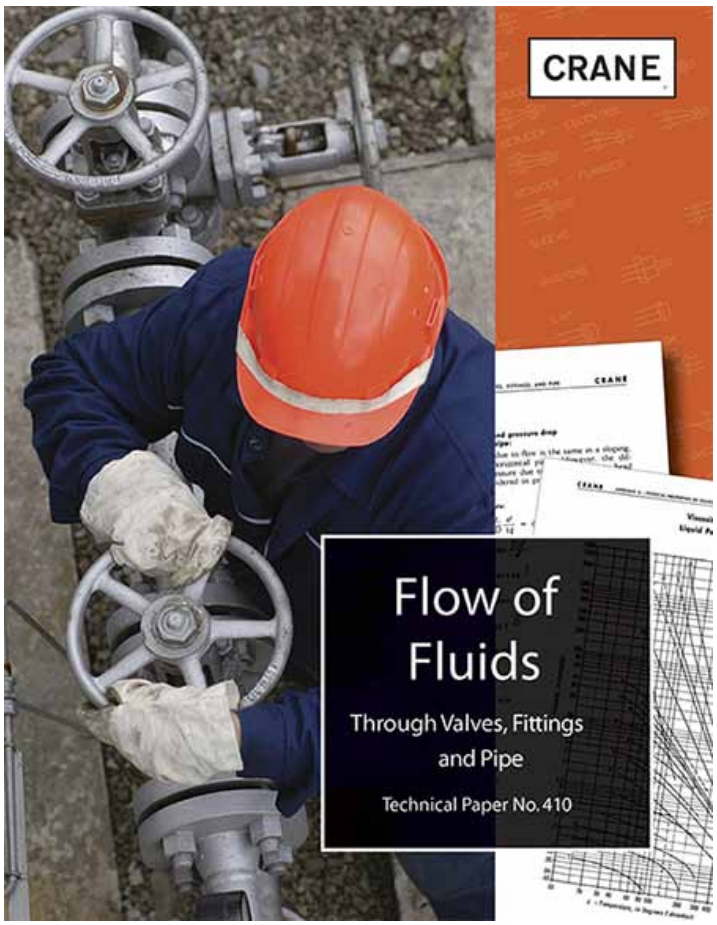
A timeless resource for the engineering community



Since its first publication in 1942, Crane's Technical Paper 410 has been an indispensable resource for engineers, designers and engineering students worldwide. Containing comprehensive calculations and information about the flow of fluids through valves, pipes and fittings, the guide is essential in determining the correct equipment for piping systems.

Richard Beyak, engineering manager at Lantic in Vancouver, BC, is just one person who has relied on TP410 for more than 20 years in the practical application of engineering equations to pipeline designs and pump and control valve selection in Lantic's processing facilities.

With refineries in eastern Canada and another in Montreal, Quebec, Lantic's products include granulated, icing, cube, liquid, yellow and brown sugars. In western Canada, Lantic is the leading refiner, processor, distributor and marketer of sugar products, with two sugar processing facilities – a cane sugar refinery in Vancouver, British Columbia and a sugar beet processing facility in Taber, Alberta.

When the sugar beet processing facility in Taber required a jet pump replacement, Beyak was faced with a challenge—he had to select a pump that would maintain the critical proper flow rate and ensure that the beets were properly 'floated into' the factory via the flume system without causing damage to the system or the product.

Today, the Taber, Alberta beet factory can produce up to 150,000 tonnes of sugar annually from locally-grown sugar beets, a number that attests to the success of TP410 in meeting the fluid handling needs of the engineering community, decade after decade.

Chapter highlights

The most recent comprehensive revision of TP410 took place in 2009, when the book was updated with all-new accompanying software and special additions to its content.

Theory of flow in pipe

Chapter 1: 'Theory of flow in pipe', reviews the physical properties of fluids, including viscosity, density and vapor pressure. The Reynolds number equation, Bernoulli's Theorem, Darcy equation and different methods for determining pipe friction factor are included in the introductory chapter, which ends with a lengthy review of the principles of compressible flow. This chapter provides the foundation upon which mechanical engineers around the world base their pipeline head loss calculations.

Flow of fluids through valves and fittings

In Chapter 2: 'Flow of fluids through valves and fittings', Crane Co relies upon decades of experience with laboratory tests and field applications of valve and fittings to explain the principles of pressure drop. The chapter reviews the resistance coefficient K, equivalent length L/D and flow coefficient Cv, and explains the Bends, Tee, and Wyes equations. Concluding with 24 cut-away pictures of different types of valves, the pressure drop information in this chapter is very import to consider when designing a complete piping system, like an HVAC system in commercial buildings.

Regulating flow with control valves

Diving deeper into the design of control valves, Chapter 3: 'Regulating flow with control valves', analyses the different valve characteristic curves and the pressure, velocity and energy profile of a fluid as it passes through the valve body. Cavitation, choked flow and flashing are reviewed before the chapter ends with control valve sizing and selection equations.

Measuring flow with differential pressure meters

Chapter 4,: 'Measuring flow with differential pressure meters', reviews the equations used for orifice plates, flow nozzles and venturi nozzles. Vital information about each equation's 'limits of use' is contained in this chapter, as it is imperative that engineers know the boundaries of equations to accurately predict flow rate. Also included is a review of the equation for compressible flow through orifices, nozzles and venturis.

Pumping fluid through piping systems

Centrifugal pump operation, the pump curve, net positive suction head, pump affinity rules and power calculations are all addressed in Chapter 5, 'Pumping fluid through piping systems.' Positive displacement pumps are also included, and of great importance is a detailed review of the pump curve, a thorough understanding of which is vital to the selection and operation of a centrifugal pump.

For more information:
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