BULLETIN 12.50-1
APRIL 2021

DeZURIK

VALVE SOLUTIONS FOR PUMP STATIONS

The DeZURIK Difference

Throughout our 250 years of combined history, DeZURIK, APCO, HILTON and Willamette have been recognized worldwide as the industry leaders in providing design assistance to engineers and owners by recommending valve solutions that provide superior performance and value. Each company was founded by an innovator who set out to solve a customer's problem application. Today, the DeZURIK, APCO, HILTON and Willamette brands continue the tradition of partnering with our customers to provide the newest innovations for pump stations.

Designed for Maximum Value

DeZURIK's Application, Technical Sales and Design Engineers have decades of collective experience in the field listening to customers so that they fully understand the requirements of each application and incorporate that knowledge into each valve design. Using the latest advancements in technology such as solid modeling, finite element analysis, 3D rapid prototyping and computational fluid dynamics, DeZURIK engineers create valves that offer superior performance in a wide variety of pump station applications.

Full-Featured Valve Solutions for Today's Pump Stations

DeZURIK manufactures over 50 different types of valves for pump discharge service to provide the best solution for your pumping application. Valve designs include features for superior performance in modern pump stations such as low head loss to reduce pumping costs; resilient seat facings for tight shutoff; metal seats that provide longevity and resistance to cavitation; and pneumatic, hydraulic or electric actuators that can fail closed on power loss. Also available are control systems to sequence pump startup and valve operation to bring the pumping system up efficiently, minimizing the potential for surge, pressure transients (water hammer) and slam.

Quality-Centered Manufacturing

DeZURIK's dedication to quality is exemplified in all aspects of the business, but foremost in our manufacturing capabilities. Our state-of-the-art CNC machining centers and large valve fabrication facilities allow us to produce in excess of 100,000 valves annually that range in size from 1/2" to 144" and weigh up to 40 tons. DeZURIK's dedication to outstanding practices is ingrained in its culture and exemplified in our quality system. DeZURIK has been certified to the ISO 9001 standard since 1996. To further demonstrate our confidence in our product quality, DeZURIK offers a two-year manufacturer's warranty as standard - double the length of time offered by most other manufacturers.

Application Expertise You Can Trust

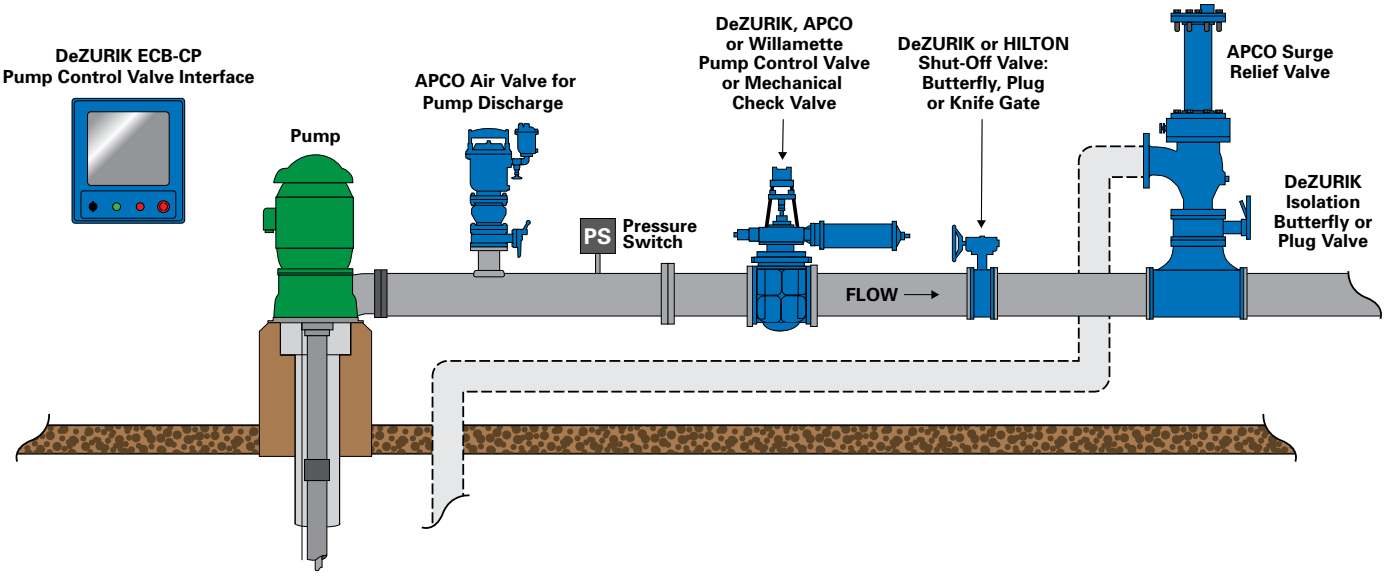
The application expertise of DeZURIK technical sales representatives, located throughout the world, will ensure you receive the personalized and complete service you need to keep your pump stations performing at optimum levels. Our independent representatives are backed by over 500 DeZURIK employees at our factories, service centers and offices whose primary goal is customer satisfaction and maintaining long-term relationships.

Sales Order Project Management

DeZURIK is dedicated to providing industry-leading customer service and support. To ensure that large and/or complex projects are expertly managed, DeZURIK has formed a dedicated Project Management Department to help deliver the on-time, on-budget results you require. DeZURIK's proactive Project Managers have the knowledge, skills, tools, and techniques to ensure complex projects are guided smoothly from order conception through post-shipment.

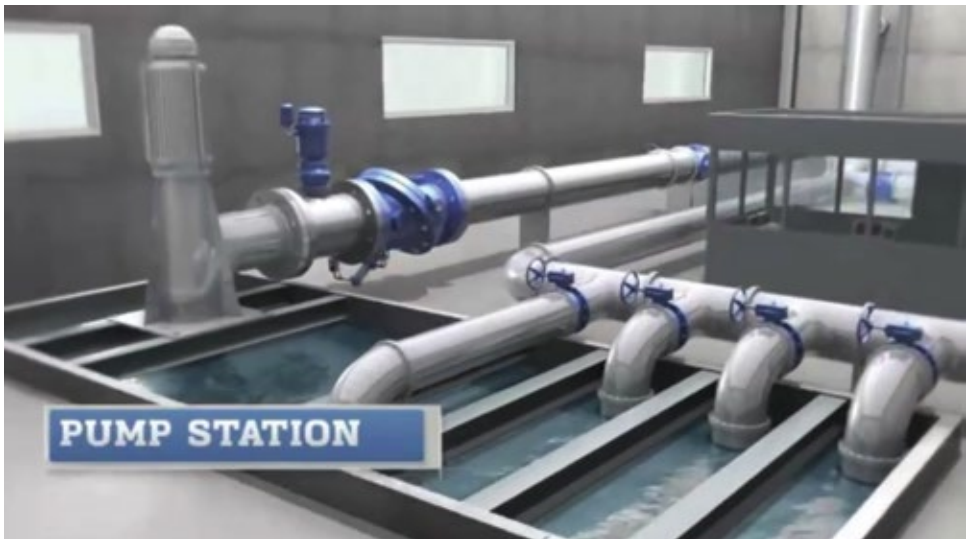
Pump Control Systems

Pump station valve selection can present a challenge to the engineer and owner. Common considerations include preventing the damaging consequences of surge pressure transients (water hammer), related safety issues, pipeline breaks, fitting failures, cross connection, flooding and water loss. Additional concerns may include minimizing check valve slam, elimination of air pockets and vacuum conditions, surge relief valve necessity and size, pump control valve considerations and options, valve operating speeds, reducing pumping energy costs and dependable isolation valve service.



Solution Assistance for Pump Station Challenges

DeZURIK offers applications assistance and valve solutions specifically for pump station design challenges. DeZURIK's broad range of valves under the DeZURIK, APCO, Hilton and Willamette brands, combined with in-depth expertise of our technical staff, uniquely positions DeZURIK to conduct pumping system basic surge investigations and to provide options for practical, cost effective check valve, pump control valve, surge relief valve, air valve and isolation valve solutions.



To see the animation of DeZURIK valves in pump stations visit the DeZURIK web site, YouTube Channel or scan the QR code.

Request a Surge Investigation and Valve Suggestions Report

Early in the pump station design process, DeZURIK collects information from the engineer in order to determine the technical parameters of the particular pumping application and to develop an understanding of the customer requirements. DeZURIK's Basic Surge Investigation Input Data Form, available on the Pump Stations page of the DeZURIK website or by scanning the QR code below, is used to efficiently provide the pertinent information.

The potential for surge pressure transients (water hammer) is examined utilizing governing fluid mechanics equations. A report will be provided that includes: the maximum surge pressure potential, the surge period, surge wave speed, pipeline constant, and total system head potential during a surge event.

DeZURIK's Surge Investigation and Valve Suggestions Report will include suggestions for applying check valves, pump control valves, surge relief valves, and air valves to minimize surge pressure. The potential for check valve slam is addressed and valve solution options are provided. Pump control valve actuation options are also evaluated. Surge relief valve sizing will be provided if applicable.

An analysis can also be provided that takes into account pumping costs (head loss), valve budgetary pricing and relative maintenance costs of different valve types to help choose valves that provide the lowest cost of ownership over the project life. Alternatively, if there is a preferred valve design, DeZURIK is available to confirm its suitability for a particular project. Suggested specifications for the valves selected for the project by the engineer and tailored to the particular application will be provided. A professionally complied report containing the above information will be provided at no charge.

Factors to Consider When Selecting a Check Valve or Pump Control Valve

Fluid media type
- Water
- Raw Sewage
- Industrial Fluids & Wastewater
- Other

Type of pump drive
- Soft start
- VFD (Variable Frequency Drive)
- Constant speed

Head loss

Flow rate
- Min
- Normal
- Max

Pressure
- Pumping discharge head
- System static head
- Pump suction head

Available valve sizes

Check valve slam potential

Seat material
- Resilient
- Metal

Throttling capability

Costs
- Initial
- Operating/pumping costs
- Maintenance

Space Constraints

Check valve
- Closure device
  - None
  - Spring
    - Adjustable
    - Non-adjustable
  - Lever & weight

System surge potential
- Cushion
  - Air
  - Oil
    - Bottom mount
    - Side mount
    - Top mount

Pump control valve
- Actuation
  - Pneumatic: available pressure
  - Water hydraulic: available pressure
  - Oil hydraulic: available pressure and type
  - Electric motor: voltage
- Operating speed
  - Normal opening
  - Normal closing
  - Emergency closing

Compliance to NSF/ANSI-61 and NSF/ANSI-372

Pump Control Valves

A pump control valve is normally closed to prevent reverse flow when the pump is off. It then opens at a controlled rate of speed just after pump start, gradually accelerating the fluid, to minimize pressure surges. To initiate a normal pump shut down, the pump control valve is closed against a running pump at a controlled rate of speed, gradually decelerating the fluid, to minimize pressure surges. Upon seating, a limit switch on the pump control valve turns off the pump. When an electrical power failure occurs during pumping, the pump control valve automatically closes, usually at a faster than normal rate, to minimize back flow. Optionally, pump control valves can throttle during pumping, to control system pressure or flow.

DeZURIK Eccentric Plug Pump Check Valves (PEC & PEF)

The Pump Check Plug Valve is commonly selected for overall performance and value for pump control valve applications in sewage pump stations but is equally well suited for other fluids as well.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: ½ - 72" (15-1800mm)
Pressure Rating: 125-450 psi (860-3100 kPa) CWP
Average K Factor: PEC = 0.856; PEF = 0.332
Relative Price: $$$

APCO SmartCHECK Pump Control Valve (CPC)

The SmartCHECK is an electric motor actuated swing check valve that provides complete pump control valve functionality and fails closed on power failure. It provides rugged, affordable, dependability and efficiency while eliminating the need for hydraulic actuation. No hydraulics are required. There are no pressurized lines to leak and no solenoids, pilot lines or strainers to maintain. The SmartCHECK often yields the most economical solution, the lowest cost of ownership and the least maintenance in small to mid-size pump stations.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 4-20"
Pressure Ratings: to 640 psi (4400 kPa) CWP
Average K Factor: 1.000
Relative Price: $$$

Willamette Series 2600 AWWA Metal Seated Ball Valves (VBL)

With seats designed for the life of the valve, the Metal Seated AWWA Ball Valve is commonly selected for its low maintenance operation. Significantly lower head loss ensures low cost of ownership for long run cycles normally associated with mid-sized to large pump stations.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 6-54" (150-1400mm)
Pressure Ratings: 125, 150, 300 psi (860, 1030, 2070 kPa) CWP service
Average K Factor: 0.045
Relative Price: $$$$

Willamette Series 2200 Metal Seated Cone Valves (VMC)

Often considered the ultimate pump control valve, the Cone Valve is known for its long service life of 50 plus years. It is ideally suited for applications that require the longest service life and lowest pumping costs and performs well in high pressure and throttling pump control applications.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 6-48" (150-1200mm)
Pressure Ratings: Standard 125, 150, 300 psi (860, 1030, 2070 kPa) CWP service
Consult factory for higher pressure ratings.
Average K Factor: 0.080
Relative Price: $$$$$

Pump & Control Valve Interface

A pre-programmed controller that properly sequences and controls the pump and pump control valve start-up and shut-down procedure for normal operation. It includes a special sequence with time delay to protect the pumping system from damage due to mechanical, hydraulic or power failure.

DeZURIK Pump & Control Valve Interface (ECB)

The DeZURIK ECB Pump & Control Valve Interface is designed to provide control between the pump and pump control valve. The pre-programmed controller is designed to be used with electric motor-operated or solenoid-operated pump control valves.

Check Valves

Check valves are used to prevent the backflow of fluid though the pump by closing before flow reversal can occur. Check valves are installed on clean and dirty applications. Various closure devices are available which include air cushion, oil control, bottom buffers, lever and weight, external lever and spring or internal spring.

APCO Swing Check Valves CVS-6000/6000A, CVS-250/250A and CVS-EDV)

Swing Check Valves are the most popular check valve choice due to their wide range of application, great value, comparatively low head loss and flexibility to be fitted with different types of closure devices that minimize slam. The lever and weight design with an air cushion is a popular choice for sewage lift station applications. When the application is likely to produce check valve slam (surge tanks, high static heads, vertical pipe run, etc.), the bottom buffer option is suggested to control final disc closure speed.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 2-66" (50-1700mm)
Pressure Ratings: to 640 psi (4400 kPa) CWP
Average K Factor: 1.000
Relative Price: $$

APCO Rubber Flapper Check Valves (CRF)

Rubber Flapper Swing Check Valves feature a unique, simple design with only one moving part. The flapper does not swing from a hinge pin; it simply flexes open. The seat is on a 45° angle. The flapper travels 35° from open to closed, usually before fluid column reversal can occur. It has non-slam characteristics and requires no regular maintenance.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 2-48" (50-1200mm)
Pressure Ratings: 175 (1210 kPa) or 250 (1720 kPa) psi CWP
Average K Factor: 1.300
Relative Price: $$

APCO Slanting Disc Check Valves (CSD)

APCO CSD Slanting Disk Check Valves are ruggedly designed with superior flow characteristics, minimal head loss and maximum slam resistance. Slanting disc check valves are the most reliable and efficient check valves available.

Service: Water, Industrial Fluids
Size Range: 2-72" (50-1800mm)
Pressure Ratings: to 740 psi CWP
Average K Factor: 0.360
Relative Price: $$$

APCO Silent Check Valve (CSC)

Silent Check Valves are resistant to slam and are commonly used on well pump discharges. They are low in cost, reliable and require no regular maintenance. When the pump stops, the spring forces the disc closed against the slight pump head at zero velocity which results in silent closure.

Service: Water, Industrial Fluids
Size Range: Wafer 1-10" (25-250mm); Globe 3-42" (80-1100mm)
Pressure Ratings: to 640 psi CWP
Average K Factor: 3.000
Relative Price: $

APCO Double Door Check Valves (CDD)

Double Door Check Valves have a cost-efficient design and non-slam properties. The low weight and short laying length saves initial cost, requires less space, and is easier to install when compared to full-body, swing-type check valves.

Service: Water, Industrial Fluids
Size Range: 2-36" (50-900mm); larger sizes available on application
Pressure Ratings: to 740 psi CWP
K Factor: 1.25 average
Relative Price: $

HILTON Check Valves

HILTON Check Valves include Swing Check, Slanting Disc, Wafer Swing Check and Tilting Disc models. They can be constructed of solid alloy or with alloy wetted parts. They are available in any weldable alloy including stainless steel, Hastelloy, nickel-chromium alloy, nickel-copper alloy or Titanium. Optional abrasion and corrosion resistant designs with hard facing available.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 3-60" (80-1500mm)
Pressure Ratings: to 300 psi (2070 kPa)
Relative Price: $$$$

Surge Relief Valves

The surge relief valve is typically installed downstream of the check or pump control valves on the pump discharge header with the valve inlet connected to the side outlet of a tee and the valve outlet piped back to the sump. The normally-closed surge relief valve opens quickly when the system pressure rises above its adjustable relief pressure setting, allowing fluid to be discharged from the system through the open surge relief valve to atmosphere. While the surge relief valve is open, the system is no longer contained, fluid compression is limited and surge pressure is controlled. The valve will remain open as long as the system pressure exceeds the valve's relief pressure setting. The valve will slowly begin to close at an adjustable rate as the surge pressure subsides and the system pressure falls below the valve's relief pressure setting.

APCO Surge Relief Angle Valves (SRA)

Surge Relief Angle Valves are designed to prevent damage from surge pressure transients in the system by opening when the system pressure exceeds the set shut-off pressure of the valve disc. As the disc opens, the surge pressure rise that caused it to open is spilled and dissipated through the open valve. When system pressure drops below the set shut-off pressure, the valve disc slowly closes against the oil contained in the cushion chamber and cylinder.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 2-16" (50-400mm)
Pressure Relief Range: to 200 psi (1380 kPa) CWP, depending on valve size
Relative Price: $$$

Air Valves

Air Valves remove air when air pockets form, exhaust air when pipelines are filled and admit air when pipelines are drained.

APCO Air Release Valves (ARV, ASR)

APCO Clean Water & Sewage Air Release Valves function to release air pockets that collect at each high point of a pressured pipeline and are essential for pipeline efficiency and water hammer protection. System operation can be disrupted when air pockets develop. Corrosion in the pipe material is accelerated when pipe is exposed to the air pocket, which contributes to premature failure of the pressurized pipeline. Pipeline efficiency will suffer because air pockets create a restriction in the pipeline. This restriction results in additional head loss that was not calculated during the pump station design.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 1/2 - 6" (15-150mm)
Pressure Rating: to 1500 psi CWP (10,340 kPa)

APCO Air/Vacuum Valves (AVV, ASV)

Air/Vacuum Valves for Clean Water or Sewage/Wastewater allow large volumes of air to be exhausted from or admitted into a pipeline as it is being filled or drained. During pipeline draining, air/vacuum valves protect the pipeline from possible pipeline collapse or damaging water column separation. Slow Closing Air Vacuum Valves are also available.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 1-14" (25-350mm)
Pressure Rating: to 1480 psi CWP (10,200 kPa)

APCO Combination Air Valves (ASU, AVC, ASD)

Single Body or Dual Body Style Combination Air Valves, available for Clean Water or Sewage/Wastewater, provide air/vacuum and air release functions. Air Release function prevents air buildup and resultant flow restrictions during operation. Air/Vacuum provides high volume air flow for rapid venting during pipeline filling and allows high volumes of air to enter the pipeline during draining. Slow Closing Combination Air Valves are also available.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 1-14" (25-350mm)
Pressure Rating: to 300 psi CWP (2070 kPa)

APCO Vacuum Relief/Air Inlet Valves (AVR)

Vacuum Relief/Air Inlet Valves allow air into the system when pressure becomes negative to prevent a vacuum from building. When system pressure returns to positive, the Vacuum Relief/Air Inlet Valve closes air tight.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 1-14" (25-350mm)
Pressure Rating: to 405 psi CWP (3100 kPa)

APCO Double-Acting Throttling Device (DAT)

The APCO Double-Acting Throttling Device (DAT) is designed to regulate air venting from the discharge orifice of Air/Vacuum Valves or Combination Air Valves. The DAT features an exclusive throttling air-out/full flow air-in design. On pump start, the device establishes a pressure load on the rising column of water to eliminate shock to the pump, controls and check valve. On pump stop, the DAT device automatically opens to allow full line, unrestricted air reentry to prevent a vacuum and water column separation in the pump.

APCO Surge Check Valves (CSV)

The Surge Check Valve is designed for installation to the inlet of the existing Air/Vacuum Valve. It consists of a body, seat, flow-disc and compression spring. In systems where water level may rise rapidly, such as vertical turbine pumps, the surge check unit reduces the rate of flow of water into the air valve by means of throttling orifices in the disc to ensure gentle closing of the air valves.

Isolation Valves

DeZURIK Eccentric Plug Valves (PEC & PEF)

DeZURIK Eccentric Plug Valves feature a rectangular port design that provides wide tolerance seating geometry for lasting superior shutoff. The eccentric plug action and resilient plug facings assure lasting dead-tight shutoff. Port area options include 100% of standard pipe area for applications where highest flow is required (such as pumped systems), and 70/80% area for general duty applications.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: .5 - 72" (15 - 1800mm)
Temperature Range: to 300°F (150°C)
Pressure Rating: 175 psi (1210 kPa); 250 psi (1700 kPa) or higher
Average K Factor: PEC = 0.856; PEF = 0.332

DeZURIK AWWA Butterfly Valves (BAW)

AWWA Butterfly Valves meet the requirements of AWWA C504 and C516 standards. They are used for shutoff on clean water and gases. Offset disc design, corrosion resistant shaft, stainless steel disc edge, and self-compensating shaft seals are features on all DeZURIK AWWA valves.

Service: Water, Industrial Fluids
Size Range: 3-144" (80-3600mm)
Temperature Range: to 290°F (143°C)
Pressure Rating: 25 psi (170 kPa); 75 psi (520 kPa); 150 psi (1030kPa); 250 psi (1700 kPa)
Average K Factor: 3-42" .570; 48-72" .415

DeZURIK Cast Knife Gate Valves

DeZURIK manufactures a wide variety of metal-seated, resilient-seated and urethane-lined knife gate valves to cost effectively meet the requirements of most applications. Valve styles also include both uni-directional and bi-directional valves. In addition, ASME Class 150/300 Severe Service Knife Gate Valves with hardened seat rings are available for higher pressure or abrasive/erosive services.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 2-52" (50-1300mm)
Temperature Range: to 1000°F (540°C)
Pressure Rating: to 740 psi (5100 kPa)
Average K Factor: 0.102 – 0.160 depending on valve style

HILTON Custom Fabricated Knife Gate Valves

Hilton Knife Gate Valves provide performance, economy and rugged construction for a broad range of water and industrial applications. A leader in fabricated valve technology, Hilton offers standard or bonneted Knife Gate Valves in sizes 2-96", and custom fabricated valves to 144" with higher pressures and temperature capabilities to meet particular application requirements.

Service: Water, Raw Sewage, Industrial Fluids and Wastewater
Size Range: 2-144" (50-3700mm)
Temperature Range: -40°F to 2000°F (-40°C to 1050°C)
Pressure Rating: to 400 psi (2800 kPa)
Average K Factor: 0.160

"DeZURIK Valve Solutions" Engineering Seminars

DeZURIK Valve Solutions seminars are designed for Consultants, Municipal Engineers and Operations Managers involved with design and valve selection for any type of fluid handling system. Presented by DeZURIK personnel with in-depth practical experience, these half-day seminars include surge and slam theory and show how using the right valves and controls will make your systems work better. These no cost seminars feature pump control valves, check valves, surge relief valves, isolation valves, air valves and the pump/valve interface panel. A four (4) hour certificate of training will be presented to all participants. Contact your local DeZURIK representative to schedule a seminar in your area today.

Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:
Web Site: www.dezurik.com E-Mail: info@dezurik.com

DeZURIK

250 Riverside Ave. N. Sartell, Minnesota 56377 • Phone: 320-259-2000 • Fax: 320-259-2227

Printed in the U.S.A.