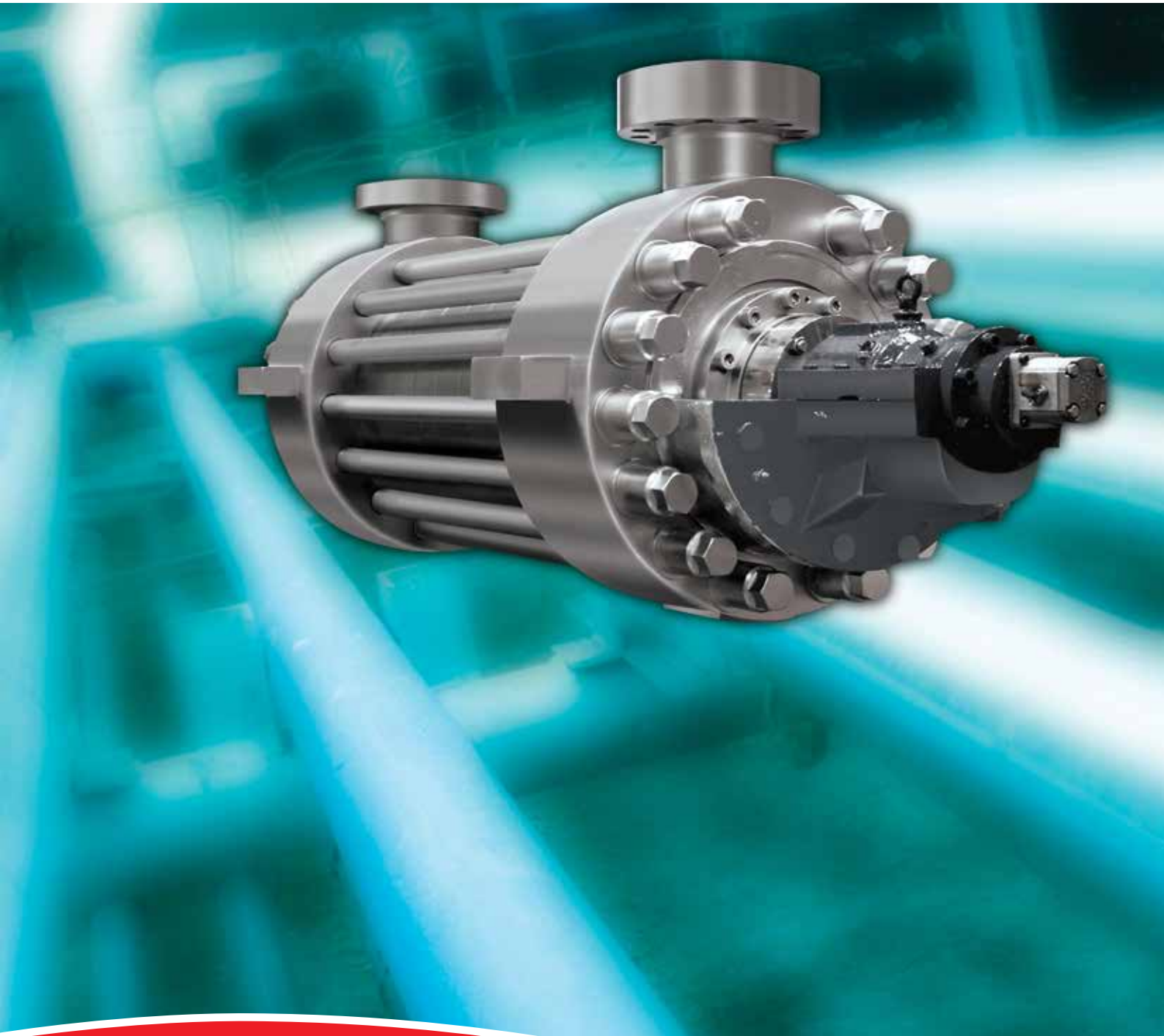
FLOWSERVE

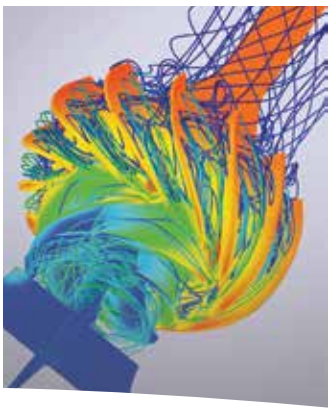
WXH

Utility Grade Multistage, Ring Section Pump



Experience In Motion






Pump Supplier to the World

Flowserve is the driving force in the global industrial pump marketplace. No other pump company in the world has the depth or breadth of expertise in the successful application of pre-engineered, engineered, and special purpose pumps and systems.

Life Cycle Cost Solutions

Flowserve provides pumping solutions that permit customers to reduce total life cycle costs and improve productivity, profitability and pumping system reliability.

Market-Focused Customer Support

Product and industry specialists develop effective proposals and solutions directed toward market and customer preferences. They offer technical advice and assistance throughout each stage of the product life cycle, beginning with the initial inquiry.

Broad Product Lines

Flowserve offers a wide range of complementary pump types, from pre-engineered process pumps to highly engineered and special purpose pumps and systems. Pumps are built to recognized global standards and customer specifications.

Pump designs include:
- Single-stage process
- Between bearings single-stage
- Between bearings multistage
- Vertical
- Submersible motor
- Positive displacement
- Nuclear
- Specialty

Product Brands of Distinction

ACEC™ Centrifugal Pumps

Aldrich™ Pumps

Byron Jackson® Pumps

Calder™ Energy Recovery Devices

Cameron™ Pumps

Durco® Process Pumps

Flowserve® Pumps

IDP® Pumps

Lawrence Pumps®

Niigata Worthington™ Pumps

Pacific® Pumps

Pleuger® Pumps

Scienco™ Pumps

Sier-Bath® Rotary Pumps

TKL™ Pumps

United Centrifugal® Pumps

Western Land Roller™ Irrigation Pumps

Wilson-Snyder® Pumps

Worthington® Pumps

Worthington Simpson™ Pumps

WXH

Utility Grade Multistage, Ring Section Pump

High Performance in Rapid-Cycling Applications

The WXH multistage ring section pump is specifically designed for utility power generation. This heavy-duty, between bearing pump is highly reliable and very well suited for combined cycle plants where severe cycling, cold start-up and thermal transient conditions are commonplace. It is frequently used in boiler feed and start-up boiler feed in conventional power stations as well. Its hydraulic coverage also gives it broad application in alternative power generation, including concentrated solar power and biomass plants.

In addition to power generation, the WXH can be effectively configured for high-pressure descaling service in steel mills as well as applications in the broader chemical processing industries.

Typical Applications

- Power generation
  - Combined cycle heat recovery steam generator (HRSG) feedwater
  - Conventional boiler feed and start-up boiler feedwater
  - Alternative power generation boiler feedwater
- Steel mill descaling
- Chemical processing

Engineered to Perform

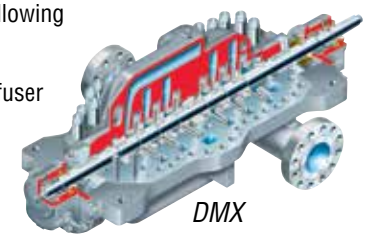
The segmental ring design of the WXH offers many practical application advantages:

- Its modular design, wide range of sizes plus hydraulics and materials options provide the user with broad pump configuration flexibility.
- The inherent balance of radial forces in this diffuser-type pump results in significant performance, reliability and efficiency benefits.
- A self-compensating, one-piece flanged balance drum minimizes residual axial thrust.
- Hydraulic coverage is excellent, providing a wide range of overall efficiency within each pump size.
- A choice of first-stage impeller designs to address NPSH requirements along with the ability to mix hydraulics enables the user to precisely match pump performance to operating conditions.
- Precision investment cast diffusers and channel rings ensure high efficiency.

Complementary Pumps Designs

WXH pumps may be used with or as alternatives to the following Flowserve models:

- CSB multistage diffuser barrel pump
- DMX axially split multistage pumps

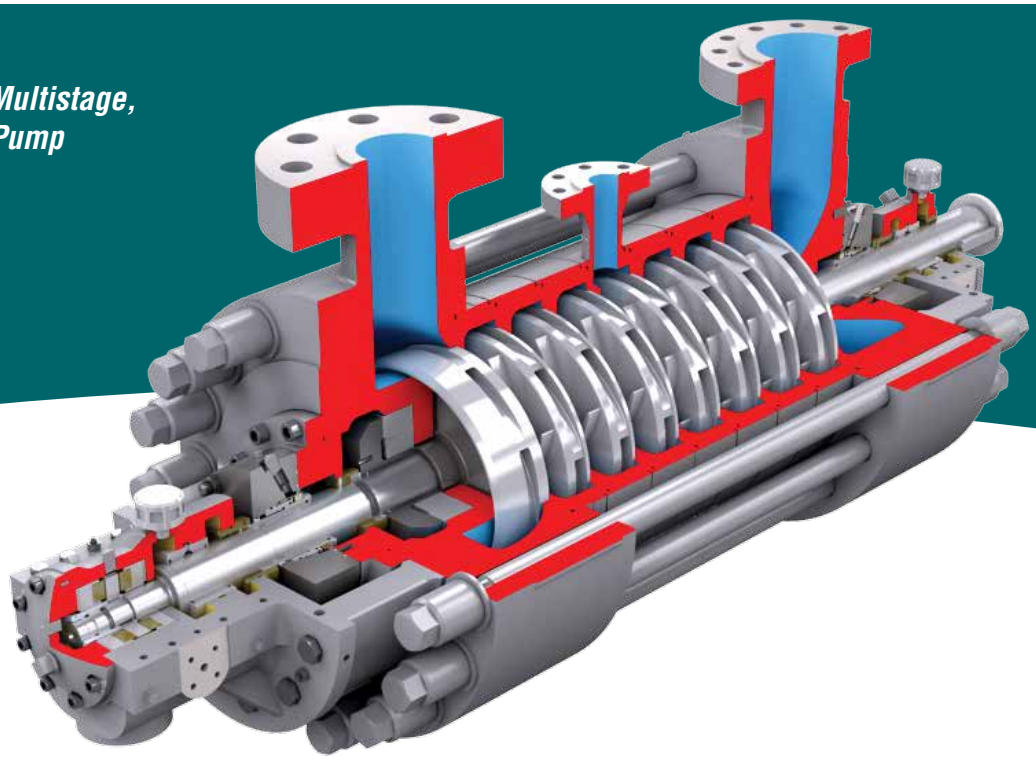


DMX

FLOWSERVE

WXH

Utility Grade Multistage, Ring Section Pump



The WXH is a radially split, centerline mounted, ring section pump expressly designed for reliable performance in high cycle services. Available in eight sizes with up to 14 stages, the modularity of the segmental ring diffuser design means its hydraulics can be mixed to precisely match pump performance to process conditions. A full complement of options is available, including interstage take-off, to ensure extensive pump configuration flexibility.

Operating Parameters

- Flows to 900 m^3/h (4000 gpm)
- Heads to 2650 m (8700 ft)
- Pressures to 310 bar (4500 psi)
- Temperatures to 250°C (480°F)
- Speeds to 5000 rpm

Features and Benefits

Radially Split Pressure Casings are positively located by interstage rabbet fits, ensuring overall pump concentricity and rotor alignment. Non-shear, compression-type O-rings positively seal channel rings. Centerline support ensures alignment is maintained at elevated operating temperatures.

Precision-cast Diffusers create symmetrical passageways around the impellers to equalize radial loads, resulting in increased bearing, wear ring and seal life plus tolerance to transient conditions.

Heavy-duty Rotor with short bearing spans minimizes deflection and prolongs bearing and seal life. Tight tolerances and precision fit impellers ensure proper clearance, concentricity and runout. Shrink-fit impellers are available for high-speed or high-horsepower service.

First-stage Impellers may be single- or double-suction design, depending upon NPSH available. All impellers are precision cast, individually balanced, and mounted with keys in a staggered orientation to prevent vibration amplification due to vane pass frequency excitation.

Self-adjusting Flanged Balance Drum eliminates residual axial thrust across the operating range. Running clearances are serrated to reduce drum leakage and optimize efficiency. A straight balance drum is available for solids-containing service.

Laser-hardened Wear Rings protect casings and impellers from abrasion, minimize interstage leakage and reduce the pump's sensitivity to thermal transients.

Optimized A and B Gap Control minimizes pressure pulsation and vane pass vibration while reducing interstage leakage and efficiency losses.

Raised Face Flanges are integrally cast into suction and discharge heads. Ratings range from ASME 16.5 Class 600 to Class 2500. Other types are available.

Seal Chambers are amply sized to fit cartridge seals.

Split-flanged Bearing Housing Extensions enable quick access to bearing assemblies and mechanical seals without disturbing piping connections.

Available Interstage Take-off

The WXH may be furnished with an interstage take-off connection to provide a portion of the pump flow at a pressure lower than the pump discharge. This is most commonly applied to boiler feed (HRSG) pumps in combined cycle plants equipped with low- and high-pressure feedwater drums. In such cases, an interstage take-off enables both drums to be fed by a single pump.

Choice of Bearing Configurations

The WXH is offered with three bearing designs to meet application requirements. For low-horsepower applications, the standard design incorporates a self-aligning, antifriction radial bearing and two single-row, angular contact antifriction thrust bearings.

Standard bearing lubrication is via an oil ring system and incorporates a constant level oiler and a sight glass. This system prolongs bearing life by ensuring oil penetrates the bearings without foaming. Labyrinth-type bearing isolators are standard.

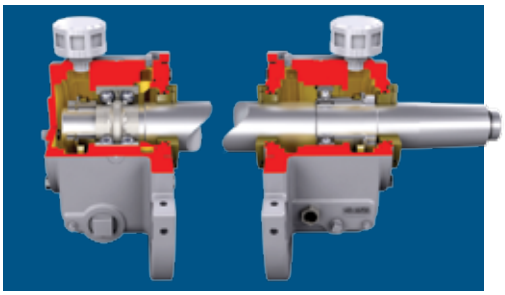
Other available bearing designs include:

- Split sleeve radial and ball thrust
- Split sleeve radial and tilting pad thrust

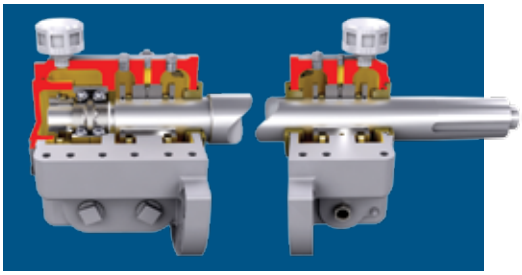
Bearing System Options

Flowserve offers several bearing system options to ensure long-lasting and reliable performance. These include:

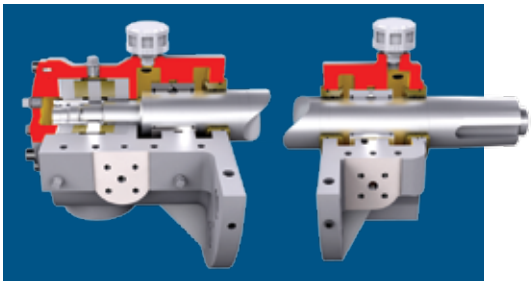
- Bearing Cooling — air, fan or water cooling systems
- Bearing Lubrication — ring oil and force feed systems
- Bearing Isolation — Inpro/Seal® VBX bearing isolators
- Bearing Monitoring Instrumentation



Ball Radial and Ball Thrust



Split Sleeve Radial and Ball Thrust



Split Sleeve Radial and Tilting Pad Thrust

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Mechanical Seal Flush Systems

The WXH may be supplied with ISO 13709/API 610 seal flush piping plan 11 and the heavier duty seal flush piping plan 23 with cooled recirculation from seal chambers.

Drivers

Direct or variable speed drives are available. Variable speed control can be achieved with gear-drive, fluid couplings or variable frequency drive equipment.

Baseplates

Engineered to contract requirements, options include conventional welded steel construction to non-grouted skid types.

Optional high-strength, sub-base rigidly supports the pump to maintain alignment with the driver. Facilitates easy pump removal for maintenance while minimizing impact on supporting equipment.

Instrumentation and Control

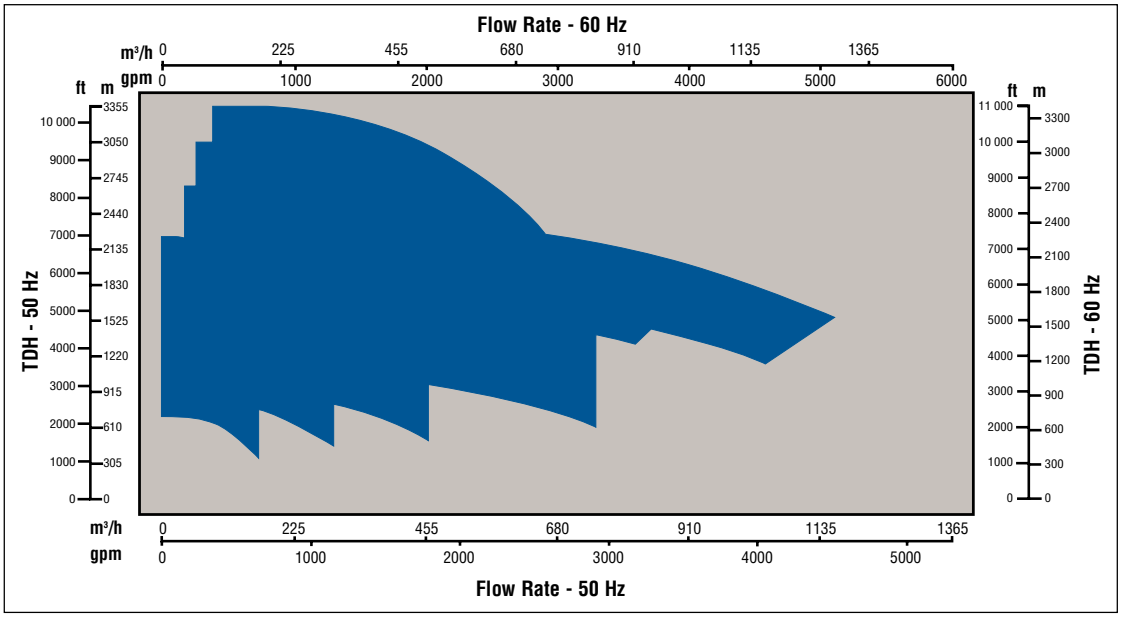
Flowserve Intelligent Process Solutions (IPS) offers a wide range of monitoring and diagnostic equipment for the WXH. Wired or wireless data acquisition systems capture key operating parameters affecting bearings, mechanical seals and casings. Advanced diagnostic systems use intelligent algorithms to protect against high-risk conditions.

Descaling Configuration

The WXH is well suited for descaling service in steel mills, an application requiring high flow rates with entrained solids and rapid cycling. To maximize efficiency and service life, the following changes are recommended:

- 12% chrome steel and suction and discharge heads
- Shrink-fit impeller construction
- Straight balance drum
- Tilting pad thrust bearing assembly
- Hardened hubs and casing wear rings

WXH Range Chart



Global Service and Technical Support

Life Cycle Cost Solutions

Typically, 90% of the total life cycle cost (LCC) of a pumping system is accumulated after the equipment is purchased and installed. Flowserve has developed a comprehensive suite of solutions aimed at providing customers with unprecedented value and cost savings throughout the life span of the pumping system. These solutions account for every facet of life cycle cost, including:

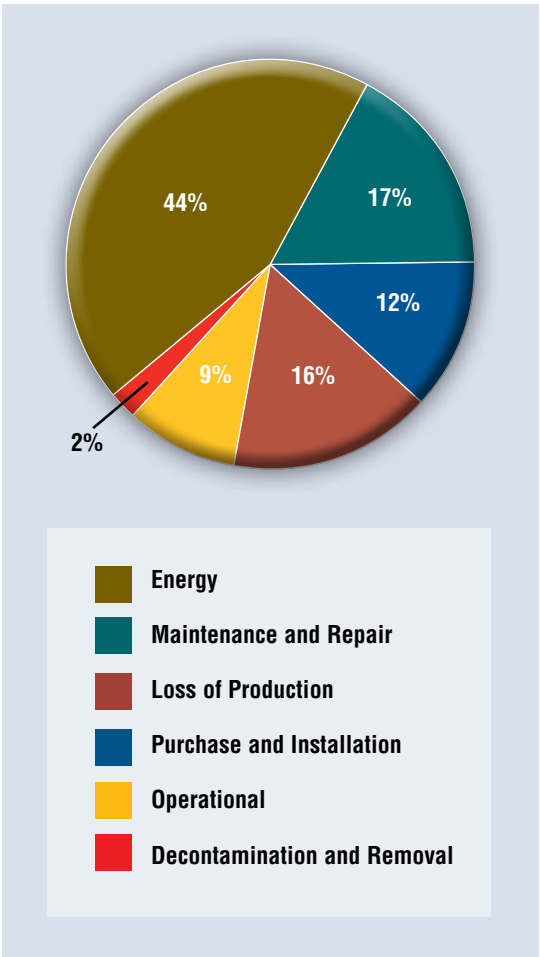
Capital Expenses
- Initial purchase
- Installation

Operating Expenses
- Energy consumption
- Maintenance
- Production losses
- Environmental
- Inventory
- Operating
- Removal

Innovative Life Cycle Cost Solutions

- New Pump Selection
- Turnkey Engineering and Field Service
- Energy Management
- Pump Availability
- Proactive Maintenance
- Inventory Management

Typical Pump Life Cycle Costs[1]



[1] While exact values may differ, these percentages are consistent with those published by leading pump manufacturers and end users, as well as industry associations and government agencies worldwide.

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