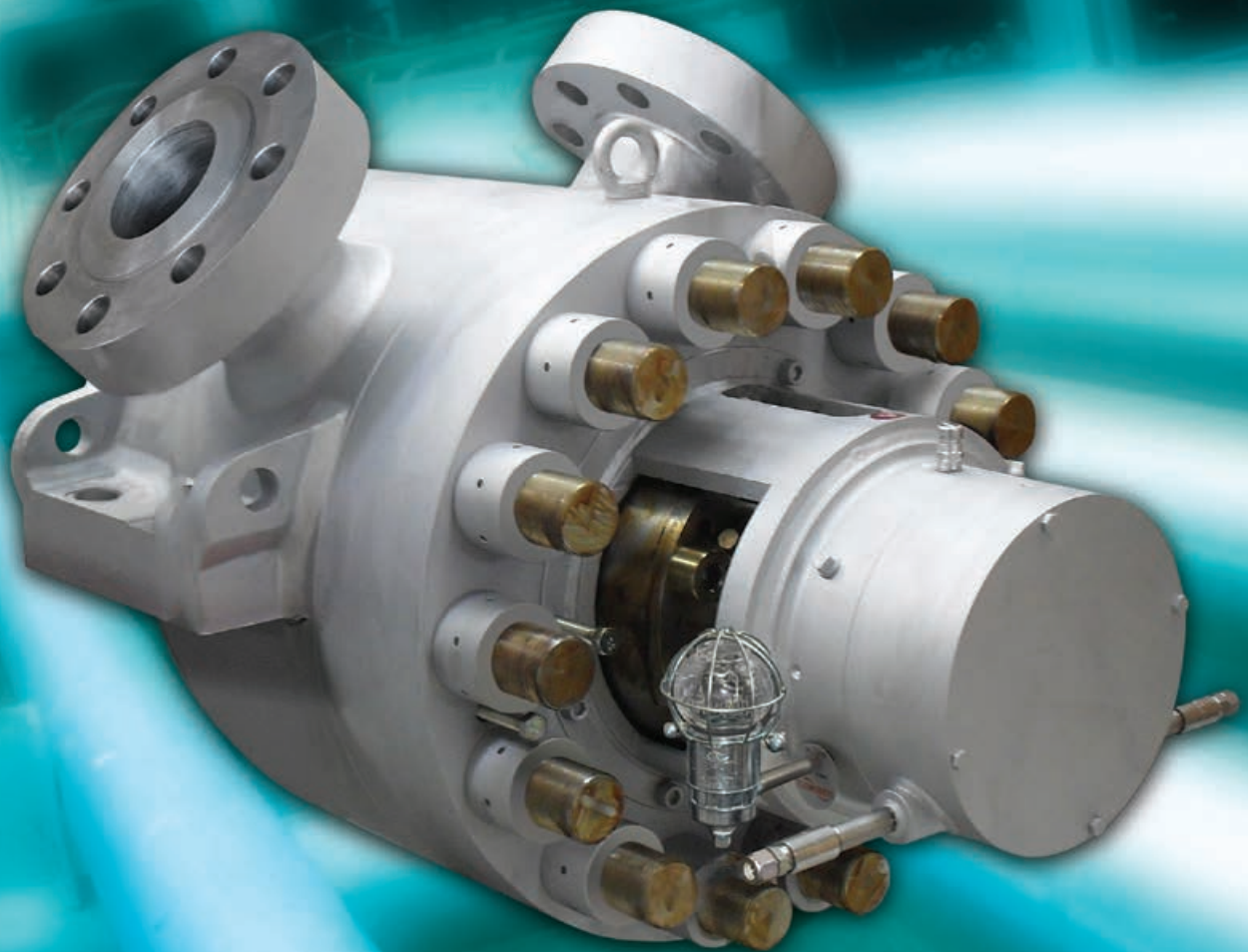


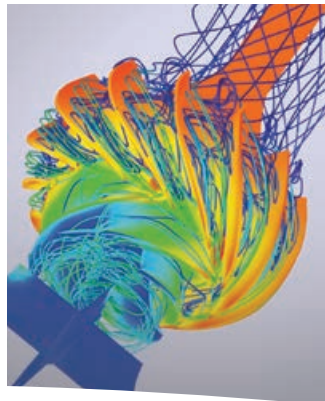


WCH Between Bearings, Radially Split Pump

ISO 13709/API 610 (BB2 or BB5)



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

INNOMAG® Sealless 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

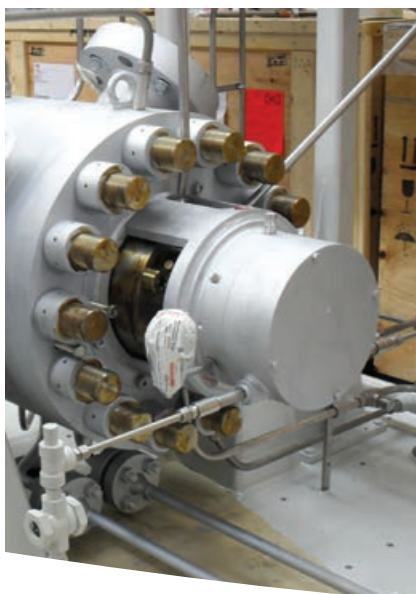
Worthington® Pumps

Worthington Simpson™ Pumps

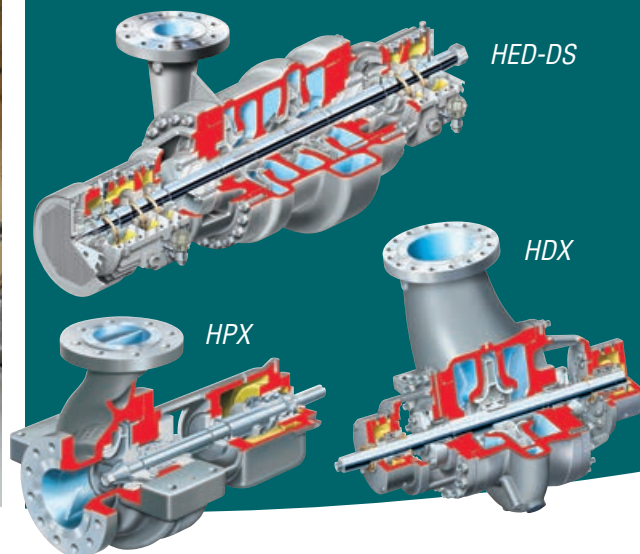
WCH

**Between Bearings,
Radially Split Pumps**

ISO 13709/API 610
(BB2 or BB5)



Complementary Pumps



**Serving High-Pressure
Process Needs**

The WCH family of one-, two- or three-stage radially split pumps is particularly well suited for high-pressure applications, such as those found in hydrocarbon processing, power and specialty services. This family of pumps extends the HPX (OH2), HED (BB2) and HDX (BB2) performance range for extremely high suction pressure.

Available with either a single or double-suction, first-stage impeller, the pumps feature heavy-duty, single or dual volute casings with a staggered arrangement for extended pump reliability and life.

Meeting Industry Needs

The WCH pumps are fully compliant with API 610 (BB2 or BB5) standards. They incorporate all of the design requirements specified by the demanding hydrocarbon processing and power industries. These include:

- API 610 specified nozzle loads and shaft run-out requirements
- API 682 mechanical seal chambers
- Centerline-mounted casing
- Bearing options
- Materials options
- Control and monitoring systems

Broad Applications

- Petroleum refining, production and distribution
- Heavy-duty chemical and petrochemical processing
- Liquefied gas industry service
- Boiler feed
- Heavy-duty utility service
- Reactor feed
- Reactor circulation
- Thermosolar tower

Complementary Pump Designs

Type WCH pumps may be used with many other Flowserve pump designs, including:

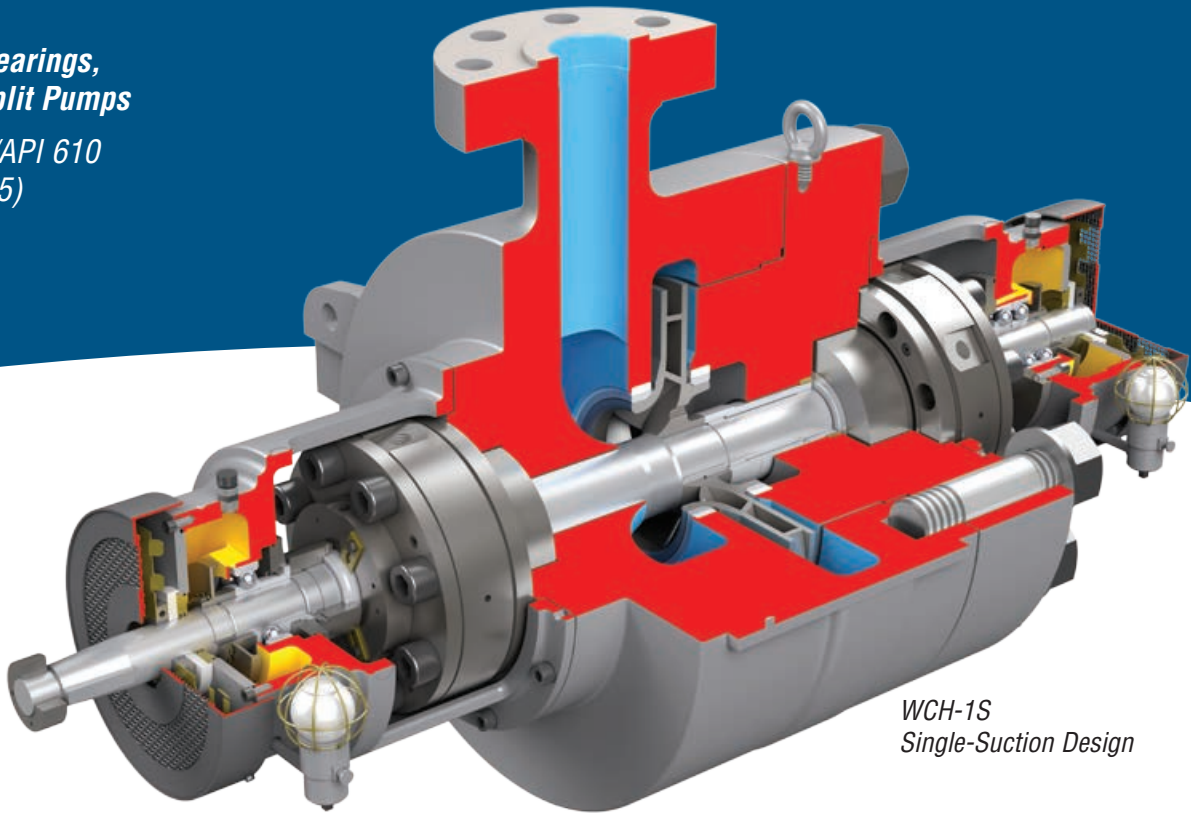
- Radially split, overhung and between bearing process pumps
- Multistage, between bearings pumps
- Vertical, double-case pumps



WCH

Between Bearings, Radially Split Pumps

ISO 13709/API 610
(BB2 or BB5)



WCH-1S
Single-Suction Design

Fully compliant with the latest edition of API 610 (BB2 or BB5), the Flowserve WCH pump is a between bearings, radially split, one-, two- or three-stage pump, specifically designed for high suction pressure applications.

Pumps are CE compliant and engineered to provide safe, reliable operation in the elevated temperature and pressure required for the refining and power applications.

Operating Parameters

- Flows to 2000 m³/h (8800 gpm)
- Heads to 450 m (1500 ft)
- Pressures to 200 bar (2900 psi)
- Temperatures to 450°C (840°F)
- Speeds to 3600 rpm
- Specific gravities down to 0.35

Features and Benefits

Radial Split Casing, single piece cast or forged, with suction and discharge nozzles oriented to meet customer piping layout.

Casing Covers fully bolted, with gasket and metal-to-metal fit, fully confined and controlled compression, to ensure proper sealing and alignment when handling hot liquids.

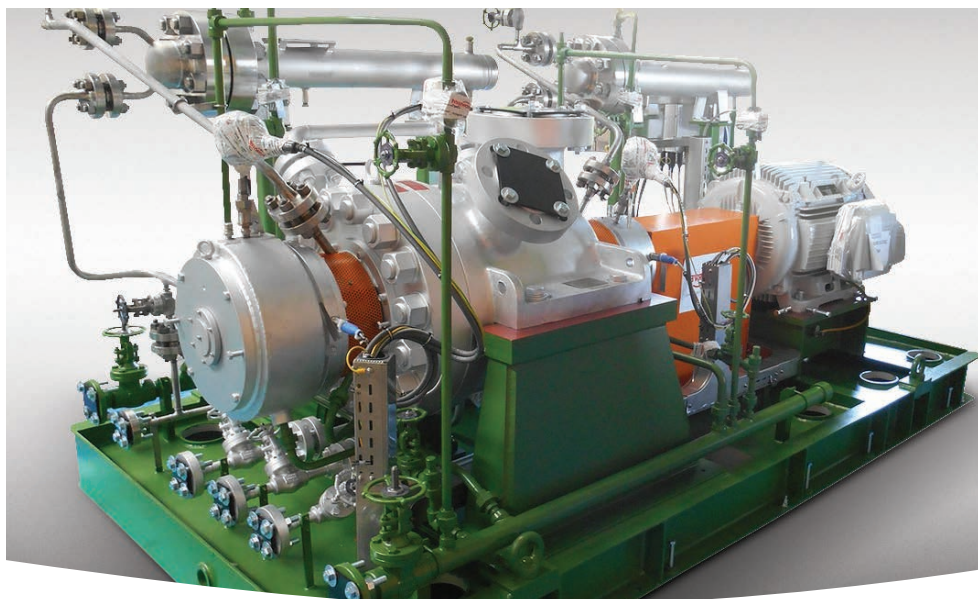
API 682 Seal Chamber accommodates a wide variety of seal configurations, including dual pressurized and unpressurized cartridge types for the most severe services. A full complement of API 610 seal flush plans is available.

Raised Face Flanges meet ASME B16.5 criteria for Class 600, 900 and 1500. Surface finish is in accordance with API 610.

Renewable Casing and Impeller Wear Rings are secured by locking pins or threaded dowels. Wear rings economically restore pump efficiency and maintain operational stability. Optional non-metallic wear rings are available in PEEK and other specialty materials.

Cartridge Seal Mounting ensures precise seal face setting for maximum seal life while easing maintenance.

WCH pumps incorporate all of the design requirements specified by the demanding hydrocarbon processing and power industries.



Casing Construction

The WCH pumps feature heavy-duty casings with either single volute, double volute or diffuser arrangement construction. Both configurations ensure radial balance over the full operating range. Detrimental shaft deflection and vibration are virtually eliminated.

Dynamically Balanced Impellers

Precision cast impellers are dynamically balanced to reduce vibration and ensure hydraulic efficiency.

- Impellers are positively locked to the shaft to eliminate vibration.
- Ceramic core casting technology produces incredibly smooth passages, improving pump efficiency.
- The between bearings design and the axial thrust balance over the entire operating range make this pump the right product for the high-pressure application. In case of suction pressure variation, typical of this application, no axial thrust is created, thus allowing maximum bearing life with standard oil lubrication.

Oil-Lubricated Bearings

Antifriction bearings are lubricated by means of a slinger or ring oil system. This lubrication system prolongs bearing life by ensuring the oil penetrates the bearings without foaming.

- Standard single row, self-aligning radial bearing
- Standard dual single row, back-to-back thrust bearings
- Optional bearing arrangements and lubrication system are available to meet application requirements

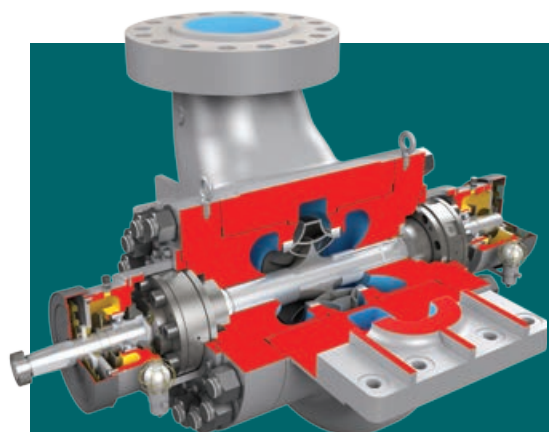
Carbon Steel Bearing Housing

Carbon steel bearing housing is designed with 360° bolting to the mounting bracket.

- Standard labyrinth type oil seals
- Bearing isolators prevent oil loss and contamination
- Optional fan-cooled bearing housing permits use in extreme temperatures without water cooling systems

Stiff Shaft Design

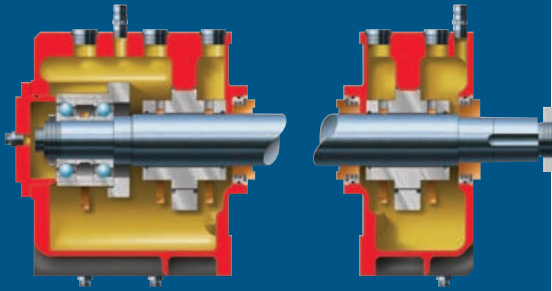
Stiff shafts ensure trouble-free operation below the first critical speed. A short bearing span and a heavy shaft minimize deflection under all operating conditions.



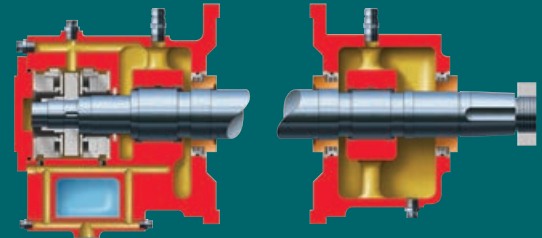
*WCH-1D
Double-Suction Design*

**Options and
Technical Data**

Sleeve Radial and Ball Thrust Bearings



Sleeve Radial and Tilting Pad Thrust Bearings



Bearing Options

- **Sleeve Radial and Ball Thrust Bearings**
 - Applied to maximum energy density (= power x rated speed) ratings of 4.0 million kW-rpm or 5.4 million hp-rpm
 - For applications in which thrust bearing speed and life for rolling element bearings are within API 610 limits
- **Sleeve Radial and Tilting Pad Thrust Bearings**
 - Applied when energy density ratings and bearing speed or life is beyond the limits for rolling element bearings as defined by API 610
 - Tilting pad thrust bearings normally require an external forced lubrication system. Pump shaft driven or separate lube pumps are available.

Shaft Options

- Hydraulic-fit coupling
- Double extended

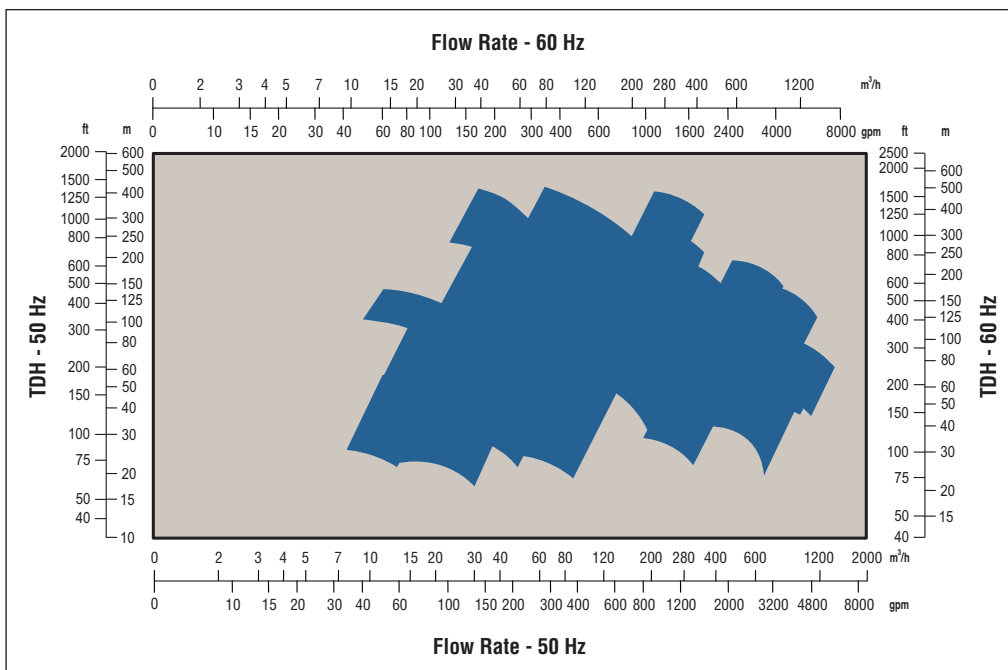
Baseplates

- Welded steel with drain rim or pan
- Sub-base under pump only
- Skid type non-grouted
- Three-point design for off-shore application
- Pregrouted design

Other Options

- Pure or oil mist bearing lubrication
- Water- or fan-cooled bearings

WCH 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

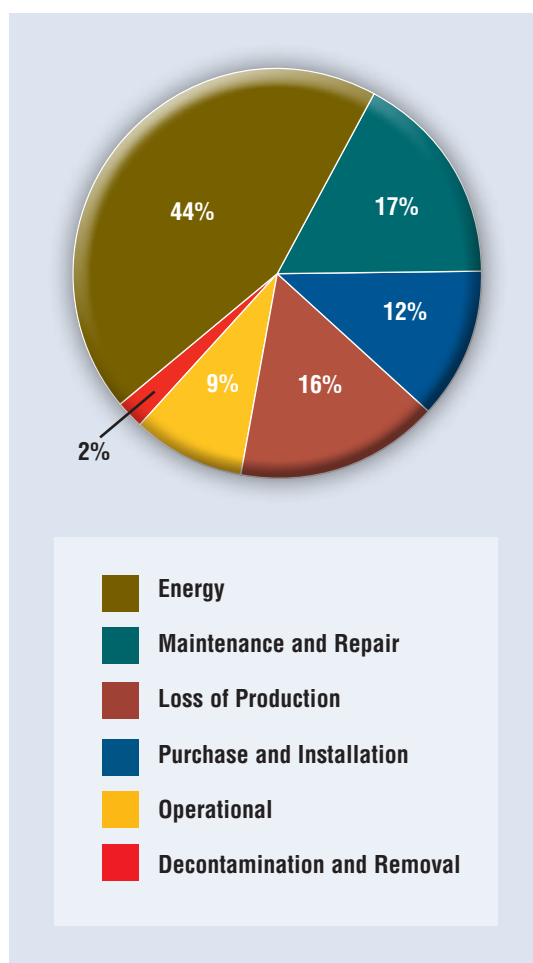
Operating Expenses

- 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 Costs¹



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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