

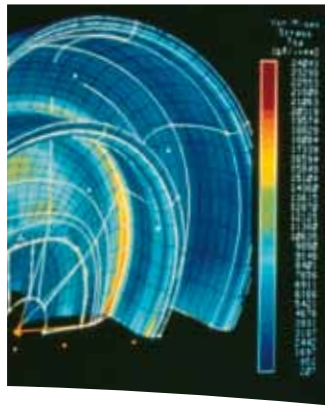


***WIK and WIKO
Severe Service Barrel Pumps
for the Oil and Gas Industry***

ISO 13709/API 610 (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 is providing pumping solutions which 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 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 bearing single stage
- Between bearing multistage
- Vertical
- Submersible motor
- Rotary
- Reciprocating
- 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

**WIK and WIKO
Severe Service Barrel
Pumps for the Oil and
Gas Industry**

ISO 13709/API 610 (BB5)



The Preferred Supplier for Oil and Gas Barrel Pumps

For over 150 years, Flowserve has pioneered virtually every significant advancement in petroleum-related pumping technology. Its ability to understand the industry's high-pressure pumping needs is evidenced by its numerous innovative barrel pump designs and the WIK and WIKO pumps are no exceptions.

WIK and WIKO pumps are manufactured to customer specifications, often exceeding those in ISO 13709/API 610 (BB5). Rated for discharge pressures up to 650 bar (9500 psi), they are ideal for unspared, high-speed/high-pressure services in which the loss of the pump will jeopardize production.

A Foundation of Innovation and Leadership

Since 1926 when it developed the first double-case pump for hot oil, Flowserve has been in the vanguard of pump development for the oil and gas industry. This leadership position was reinforced in 1934 with the introduction of high-pressure water and CO₂ injection pumps and cemented in 1982 when it built the world's largest water injection pump – a 17 900 kW (24 000 hp) behemoth.

Reflecting its leadership position, Flowserve was heavily involved in establishing the API 610 (BB5) standard governing the construction of double-case pumps. From water injection and pipeline to charge and hydraulic decoking, Flowserve is the preferred provider of double-case pump technology worldwide.

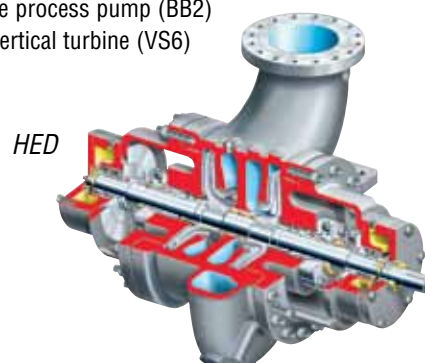
Typical Applications

- Water injection
- Pipeline
- Amine feed
- Hydrocarbon charge
- Hydraulic decoking jet water
- Ethylene feed
- Refinery boiler feed
- Hydraulic power recovery turbine
- CO₂ injection
- Acid gas re-injection

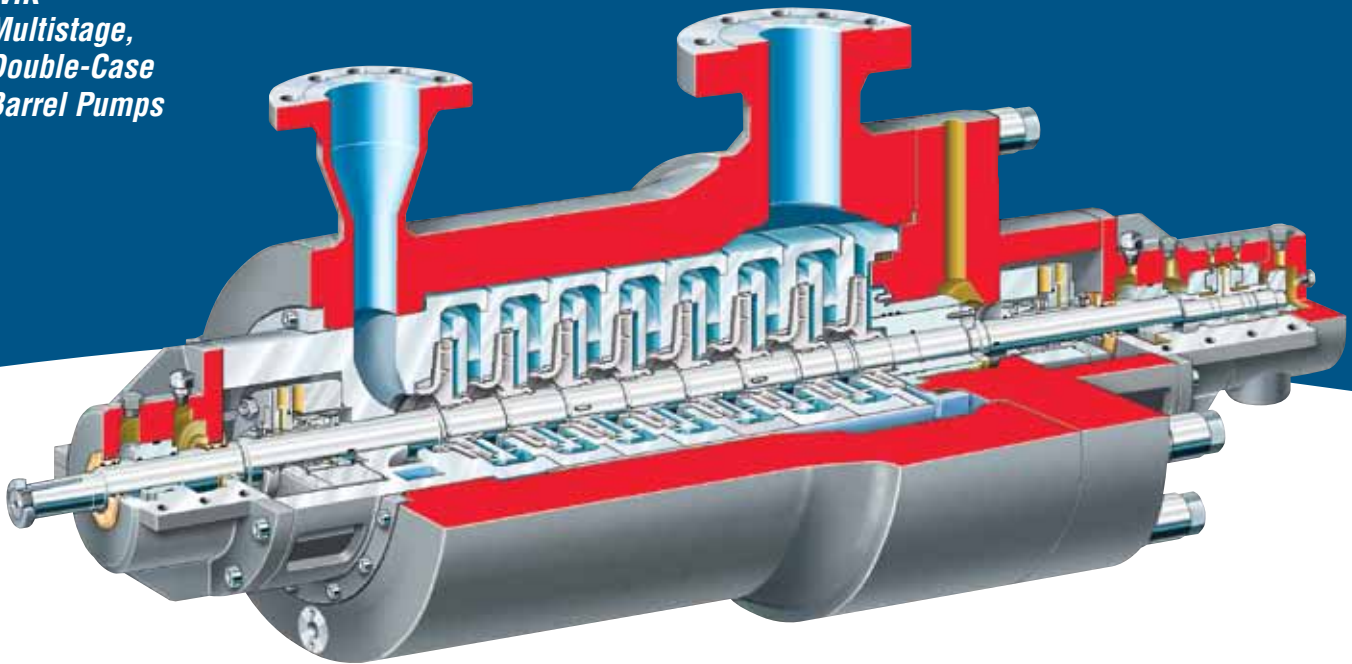
Complementary Pump Designs

Flowserve offers a full range of horizontal and vertical process pumps for the oil and gas industries. These pumps are CE compliant and meet or exceed the criteria of ISO 13709/API 610, latest edition. Examples include:

- HPX overhung process pump (OH2)
- HDX double-suction process pump (BB2)
- HED two-stage process pump (BB2)
- VPC canned vertical turbine (VS6)



WIK
Multistage,
Double-Case
Barrel Pumps



The WIK is a multistage, double-case barrel pump with a tandem (in-line) impeller rotor, diffuser collectors and a single-diameter balance drum to compensate for residual axial thrust. It is an extra heavy-duty design intended for special purpose, unspared, high-power density and extremely arduous applications. The WIK is designed and built to meet or exceed ISO 13709/ API 610 (BB5), latest edition, requirements and custom engineered to stringent customer requirements.

The WIK's high stiffness rotor with low static deflection is the result of a large diameter shaft, short bearing spans, unique low specific speed hydraulics and high design speeds. This minimizes angularity through the shaft seals and reduces the risk of accidental contact within the running clearances. High mechanical stiffness also improves the pump's ability to tolerate inadvertent vapor-bound operation.

Typical Operating Parameters

- Flows to 2730 m³/h (12 000 gpm)
- Differential pressure to 650 bar (9500 psi)
- Temperatures to 450°C (840°F)

Features and Benefits

Large Diameter Shafts are incrementally stepped at all impeller, seal and thrust collar fits for ease of assembly. Shafts are thermally stabilized to eliminate potential distortion from residual stresses

Precision Cast, Low Specific Speed Impellers are statically and dynamically balanced. Impellers are double keyed and positively secured against axial movement by split rings and a shrink fit. Large eye single-suction and double-suction, first-stage impellers are available depending on NPSH conditions. Impeller hubs have integral hardened wear surfaces

Optional Grooved Impeller Running Fits increase the pump's tolerance to foreign materials and desensitize it during start-up, stopping and system transients

Multi-Vane, Radial Split Diffuser and Channel Ring Collectors are cast components eliminating radial imbalance across the entire operating range. Collectors provide continuous metal-to-metal sealing between stages and between inner and outer casings. Collectors are milled to create smooth passageways, match operating conditions and ensure repeatability of performance

Single-Diameter Balance Drum compensates for the residual axial thrust produced by the tandem impeller arrangement. The drum is grooved against the flow to improve rotor stability, lower balancing leak-off flow and reduce the risk of galling in the running clearance. It is mounted with a shrink-fit, key driven and located with a split ring

Element and Cartridge are assembled vertically to maintain alignment and ensure repeatability of performance



Forged Barrel Casing and Discharge Head

The barrel casing and discharge head houses the pump cartridge and is a split pressure level design with an optional full discharge pressure suction design also available. Forged pressure containment parts are normally provided in the following materials:

- Carbon steel overlaid with stainless steel at all critical metal-to-metal seating fits and high-velocity areas
- Stainless steels
- Duplex and super duplex stainless steels
- Carbon steel overlaid with Inconel® in all wetted areas

Alternative materials are available as required to suit individual service requirements.

The discharge head is either bolted or available with optional Supernuts™.

Robust Bearing Design

The radial and thrust bearings of the WIK pump are conservatively sized to maximize service life. Heavy-duty journal-type radial bearings are thick-walled and pressure lubricated. Heavy-duty, tilting pad thrust bearings feature leading edge groove (LEG) lubrication and are self-equalizing. Bearings and forced-feed lubricating systems are conservatively sized for each application.

ISO 21049/API 682 Seal Chamber

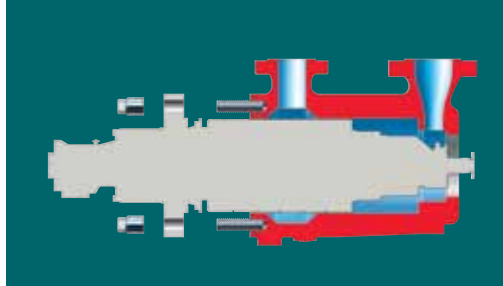
The WIK's seal chamber is fully compliant with ISO 21049/API 682. It readily accommodates numerous types of mechanical seals, including: normal single, dual pressurized and unpressurized seals in addition to wet and dry gas seals, where appropriate.

Performance Tested

Every WIK pump is performance tested in accordance with API and Hydraulic Institute testing standards to ensure the unit meets the specified design conditions. Each pump can be tested at full flow, pressure and speed, up to 18 650 kW (25 000 hp).

Back Pull-Out, Cartridge-Style Construction

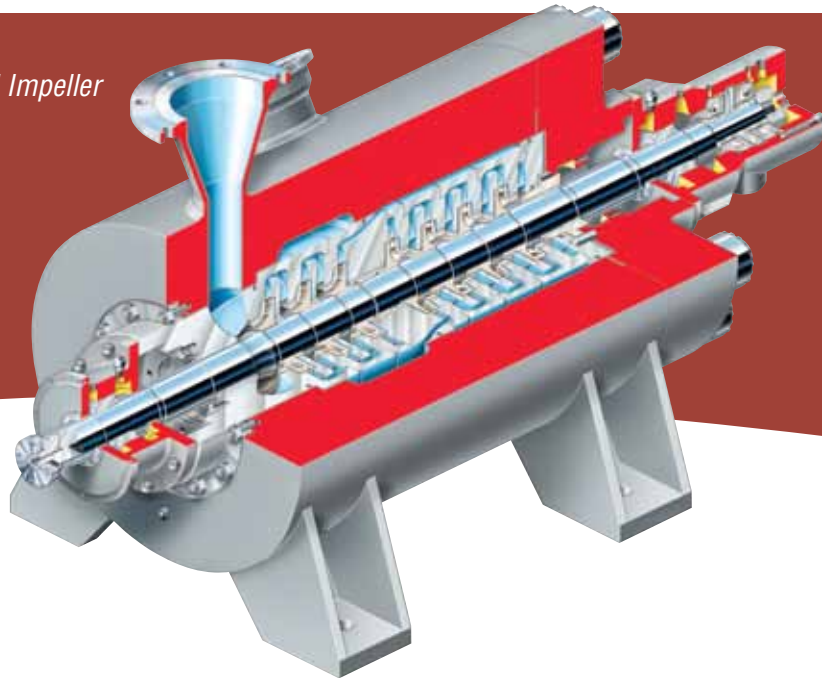
The standard construction cartridge-style inner case sub-assembly includes the rotor, diffusers, discharge head, suction head, seals and bearing assemblies. This cartridge-style construction eases maintenance by allowing quick replacement of the entire sub-assembly. Major assembly, disassembly and mechanical seal and rotor setting can then be performed in the shop rather than in the field. A conventional construction version is also available.



© Inconel is a registered trademark of International Nickel Company, Inc.
 ™ Supernuts is a trademark of Superbolt, Inc.

**Options and
Technical Data**

*WIKO
Opposed Impeller
Diffuser*



***WIKO: Innovative Opposed Impeller
Design For Extreme Pressures***

The WIKO was developed to meet ever increasing customer requirements for extreme discharge pressures and the need to balance residual axial thrust. By pairing an opposed impeller rotor with diffuser collectors and a single-diameter balance drum, this design can be customized to meet higher pressures.

Every WIKO is custom designed and built to order for specific ultra high-pressure applications.

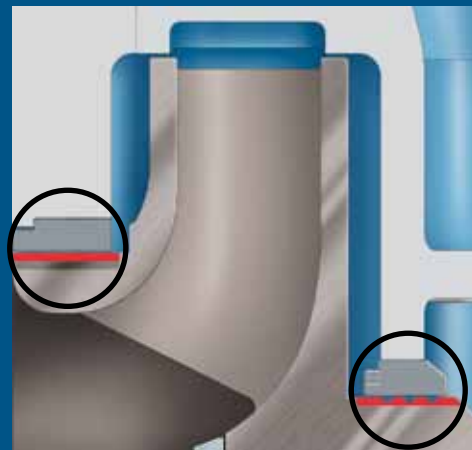


Advanced Close Clearance Technologies

For severe services the WIK is available with state-of-the-art erosion- and abrasion-resistant materials in the running fits. These materials are applied by various processes to ensure the ultimate in reliability for even the harshest environments:

- Through hardening: Metallurgically alters the micro-structure of the metal component, resulting in a solid hard wearing part.
- Super hard overlay: A second material possessing the desired wear characteristics, like tungsten carbide or Stellite® 6, is overlaid onto the base metal via the HVOF or Direct Laser Deposit processes.
- Non-metallic and ceramic materials.

Flowserve will advise which materials and processes are recommended based on the specifics of the actual application.



***Optional grooved wear surface shown
on impeller hub.***

**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

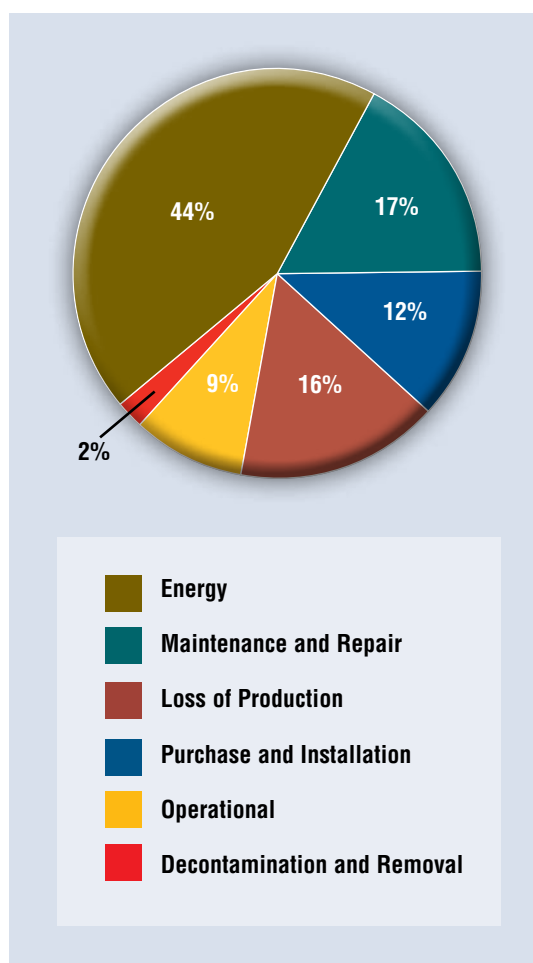
Operating Expenses

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

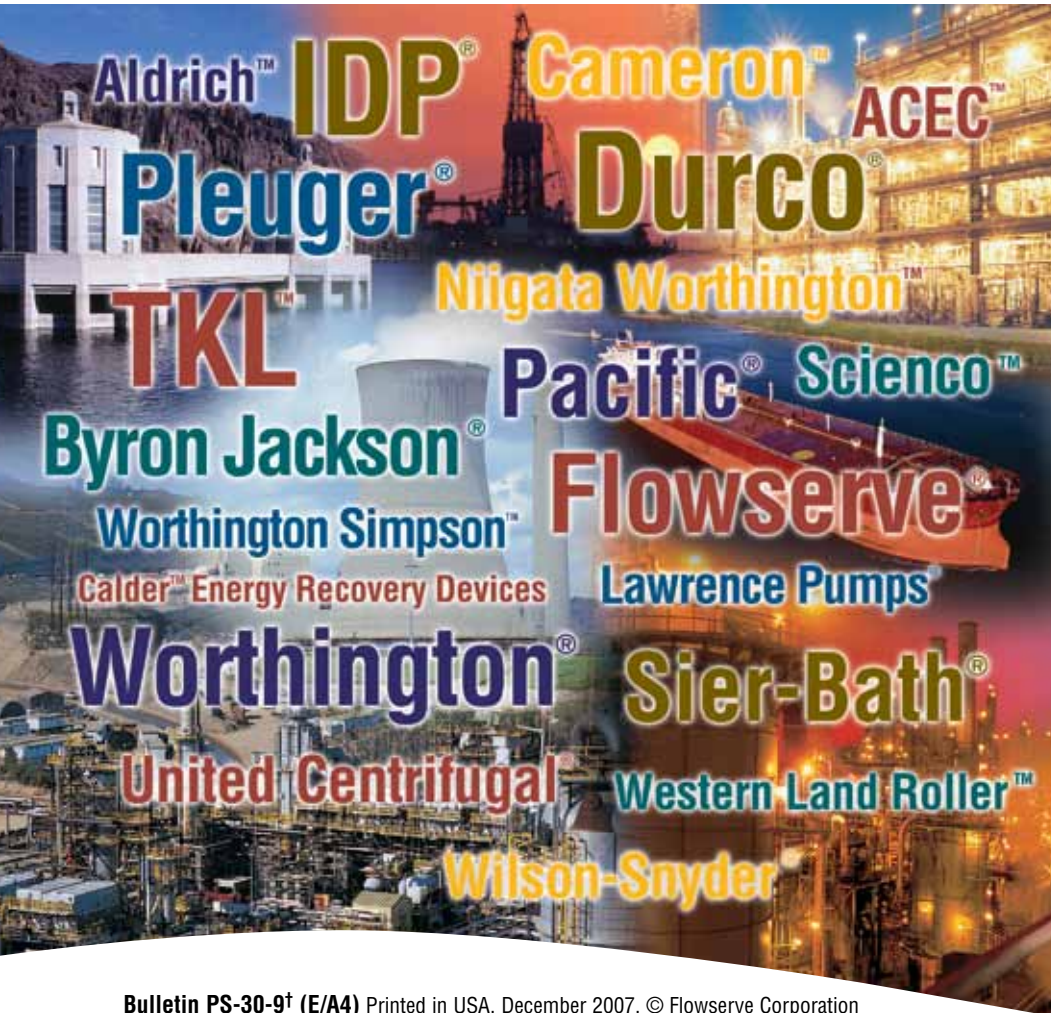
Innovative Life Cycle Cost Solutions

- 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.



Bulletin PS-30-9† (E/A4) Printed in USA. December 2007. © Flowserve Corporation

To find your local Flowserve representative:

For more information about Flowserve Corporation,
visit www.flowserve.com or call USA 1 800 728 PUMP (7867)

USA and Canada

Flowserve Corporation
5215 North O'Connor Blvd.
Suite 2300
Irving, Texas 75039-5421 USA
Telephone: 1 937 890 5839

Europe, Middle East, Africa

Flowserve Corporation
Gebouw Hagepoint
Westbroek 39-51
4822 ZX Breda
Netherlands
Telephone: 31 76 502 8920

Latin America

Flowserve Corporation
Boulevard del Cafetal
Edificio Ninina, Local 7
El Cafetal - Caracas
Venezuela 1061
Telephone: 58 212 985 3092
Telefax: 58 212 985 1007

Asia Pacific

Flowserve Pte. Ltd.
200 Pandan Loop #06-03/04
Pantech 21
Singapore 128388
Telephone: 65 6775 3003
Telefax: 65 6779 4607