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.

Supplier of Choice to the Hydrocarbon Processing Industry

Flowserve offers the world’s most complete line of API 610 pumps with the widest range of hydraulic coverage, pressure and temperature capabilities. Its engineering expertise, applications know-how and installation experience are peerless. From 19th century lamp oil to the advent of the gasoline engine and the development of petrochemicals, Flowserve has proven itself to be the world leader in meeting the changing and demanding needs of hydrocarbon processing.

Heritage Names of Distinction

ACEC™ Centrifugal Pumps
Aldrich® Pumps
Byron Jackson® Pumps
Cameron® Pumps
Durco® Pumps
Flowserve® Pumps
IDP® Pumps
Jeumont-Schneider™ Pumps
Pacific® Pumps
Pleuger® Pumps
Scienco® Pumps
Sier-Bath® Rotary Pumps
United® Centrifugal Pumps
Western Land Roller® Irrigation Pumps
Wilson-Snyder® Pumps
Worthington® Pumps
Worthington Simpson® Pumps
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. This provides the following benefits:

- Advanced technology solutions
  - Order engineering
  - Hydraulic engineering
- Broad product reliability
- Worldwide service and support
- Competitive price and delivery
- Technology innovation
- Applications expertise

Pump Designs

Flowserve offers a wide range of complementary pump types, built to recognized global standards and customer specification. These include:

- Single Stage Process
- Between Bearing Single Stage
- Between Bearing Multistage
- Vertical
- Submersible Motor
- Rotary
- Reciprocating
- Nuclear
- Specialty

Optional Configurations

- Sealed and Sealless
- Axially and Radially Split
- Volute and Diffuser
- Close Coupled and Long Coupled
- Single and Double Casing

Dynamic Technologies

Few if any pump companies can match Flowserve’s capabilities in hydraulic and mechanical design or in materials engineering. Among these capabilities are:

- Computational fluid dynamics
- Flow visualization
- Cavitation studies
- Efficiency optimization
- Finite element analysis
- Rapid prototyping
- Captive alloy foundries
- Non-metallic materials processing and manufacturing
Sophisticated process technology along with advanced equipment and materials engineering make possible the conversion of feedstocks into fuel for transportation, fertilizers for agriculture and products for everyday life. And to no small extent, it is the resourcefulness of Flowserve that turns the technologically possible into practical solutions.

Throughout the years, Flowserve has pioneered off-the-shelf and purpose-engineered designs in a wide array of materials to safely and reliably handle any kind of process liquid at all encountered pressures and temperatures.
Playing A Key Role
A contributing member on the API 610 Committee, Flowserve is in the forefront of meeting the hydrocarbon processing industry’s ever increasing need for improved safety, reliability and emissions containment. Equally important, Flowserve provides the flexibility to readily handle different crude types and intermediate stream qualities in virtually all charge, process, transfer and storage applications as well as address service and utility needs.

With over a hundred different API 610 pump models, each available with multiple hydraulic and mechanical configurations, Flowserve can efficiently and cost effectively address the widely diverse pumping applications in a refinery. These include all aspects of production for reformulated gasoline (RFG), alternative transportation fuels (ATFs), gas-to-liquid conversion (GTL) and synfuels from tar sands as well as pumps for the more routine yet equally difficult processes and liquids.

Leading The Pump Industry
As the global leader in pump design and engineering for the hydrocarbon processing industry, Flowserve plays a major role in the practical implementation of new and improved process technologies. Flowserve accomplishes this through a continuous commitment to research and technology and by its leadership in these important industry organizations and committees:

- API
- ASME
- ASTM
- Europump
- HI
- ISO
- NACE
- NFPA
Safety, reliability and emission containment are top priorities for hydrocarbon processing operations. Improved equipment mean time between failure and lower total life cycle cost, likewise, are issues of continuing urgency.

Compared to refining, petrochemical processing involves lower operating pressures and temperatures but often with significantly more corrosive liquids. Flowserve leads the hydrocarbon pumping industry in large part due to its alloy expertise and applications know-how. This has a significant and positive impact on pump safety and reliability.
Pumps for the hydrocarbon processing industry handle liquids that are volatile, flammable and sometimes toxic. Containment of these liquids is a central aspect of pump and seal selection. The combination of pump types available from Flowserve ensures compliance with global emission laws and regulations.

**From The Handling Of Primaries And Intermediaries To The Transfer And Storage Of Feedstocks**

Flowserve provides the petrochemical processing industry with the most complete lines of chemical and process pumps available. Chemical pumps meet ASME (ANSI) B73.1M or ISO 2858 with ISO 5199 design criteria; process pumps, API-610.

**Global Alliances, Support And Service**

A measure of Flowserve's leadership in the hydrocarbon processing industry is its alliances with the world's most prominent energy companies. While typically these relationships are global they may include more limited and localized project partnerships and service agreements.
Without question, Flowserve offers the industry’s most extensive line of API 610 pumps for virtually all applications in separation, conversion and treatment. Further attesting to its capabilities, Flowserve has been a leader in the development of more specialized, even unique pumps for proprietary processes and advanced process technologies. These special purpose pumps include:

- Cryogenic liquid expanders to increase LNG production
- Unspared process double casing pumps for reactor charge
- Hydraulic power recovery turbines
- Reactor circulating systems for ebullated catalyst bed hydrocrackers
- Slurry pumps of special materials for handling abrasive bottoms
- Hydraulic decoking systems used in delayed cokers
- Horizontal and vertical cryogenic pumps
- Zirconium pumps for proprietary processes
**TKW Cryogenic Liquid Expanders**

LNG production is typically a two-stage refrigeration process: vapor compression, then liquid expansion. Expanding the mixed refrigerant and LNG across an expander instead of a valve improves the thermal performance of the process. The result is greater LNG production, up to 4 percent, for the same compression effort.

Flowserve’s type TKW cryogenic expander, introduced in 1989, is a multistage, fixed or variable geometry, fixed speed turbine loaded by a generator. There are now over 15 units in service.

**Reactor Recycle Systems**

Ebullated catalyst bed hydrocrackers offer improved conversion of heavy oils, residues and coal slurries. A reactor recycle system, ebullating pump plus variable frequency drive and oil injection pump, ebullates the catalyst bed. The unspared pump operates at reactor conditions, pressures to 210 bar (3000 psi), temperatures to 480°C (900°F), and must run three years or more between inspections.

Flowserve developed the first PR ebullating pump in 1965 and now has over 60 units in service.

**Hydraulic Decoking Systems**

Delayed coking is a thermal cracking process widely used to reduce heavy bottoms to valuable volatiles and petroleum coke. The coke is formed in drums and removed using a hydraulic decoking system.

Hydraulic decoking employs high velocity water jets, produced by the decoking tool from water at pressures up to 310 bar (4500 psi). A special purpose double casing pump, rated up to 3500 kW (4700 hp) supplies the high-pressure water. Safe and effective decoking is assured by a custom control system.

Since hydraulic decoking was developed in 1938, Flowserve has furnished over 180 decoking systems.
Flowserve hydrocarbon processing pumps comply with the latest applicable industry standards.

- Charge-feed – Horizontal multistage, single or double casing
- Process – API, ANSI or ISO overhung process; two stage process; horizontal multistage
- Transfer and storage – Horizontal and vertical, single or multistage
- Service and utility – Horizontal single or multistage; vertical turbine; vertical circulator; vertical sump

Single Stage, Overhung, API Process Pumps (API-OH2, API-OH3, API-OH4, API-OH5)
Horizontal and vertical in-line configurations. Fully compliant with API 610, latest edition for refinery and petrochemical plant services. Available with inducers for low NPSH requirements. Available with coke crusher design

Operating Parameters
- Flows to 2050 m³/h (9000 gpm)
- Heads to 335 m (1100 ft)
- Temperatures to 450°C (850°F)
- Pressures to 80 bar (1160 psi)
Single Stage, Between Bearing, Radially Split Pumps (API-BB2)
Horizontal, double suction pumps for use in critical services and low NPSHA applications. Available with coke crusher design

**Operating Parameters**
- Flows to 4100 m³/h (18 000 gpm)
- Heads to 450 m (1500 ft)
- Temperatures to 450°C (850°F)
- Pressures to 100 bar (1500 psi)

Two Stage, Between Bearing, Radially Split Pumps (API-BB2)
Horizontal, two stage, single suction opposed impellers for medium head, high temperature services. Double suction first stage impeller available for low NPSHA - high flow services. Available with coke crusher design

**Operating Parameters**
- Flows to 1360 m³/h (6000 gpm)
- Heads to 690 m (2250 ft)
- Temperatures to 450°C (850°F)
- Pressures to 100 bar (1500 psi)

ANSI and ISO Chemical Process Pumps

**Chemical Pumps**
Pumps conform to the ASME B73.1M (ANSI) standard or to ISO 2858 dimensional with ISO 5199 design criteria. Shaft sealed and sealless models available

**Operating Parameters**
- Flows to 1680 m³/h (7400 gpm)
- Heads to 300 m (985 ft)
Single Stage, Axially Split Pumps (API-BB1)
Axially split, double volute case, double suction pumps for transfer service and related heavy-duty requirements

Operating Parameters
• Flows to 22,700 m³/h (100,000 gpm)
• Heads to 550 m (1800 ft)
• Pressures to 83 bar (1200 psi)
• Temperatures to 180°C (385°F)
• Speeds to 4200 rpm

Vertical Turbine, Double Casing Pumps (API-VS6)
High-pressure, heavy-duty, diffuser type, single or multistage pump for continuous duty in hydrocarbon booster and transfer services. Available with single or double suction first stage impeller

Operating Parameters
• Flows to 13,600 m³/h (60,000 gpm)
• Heads to 1100 m (3500 ft)
• Pressures to 100 bar (1500 psi)
• Temperatures from -185°C (-300°F) to 230°C (450°F)

Vertical, In-line Pumps (API-OH4)
Double suction, in-line design for high flow, limited NPSHA. Tank farm, transfer and pipeline booster services

Operating Parameters
• Flows to 6350 m³/h (28,000 gpm)
• Heads to 335 m (1100 ft)
• Pressures to 50 bar (750 psi)
• Temperatures to 425°C (800°F)
Multistage, Axially Split Pumps
(API-BB3)
Between bearing, axially split, double volute case, side suction, side discharge, multistage design. For high-pressure, heavy-duty applications

Operating Parameters
• Flows to 2875 m³/h (10 000 gpm)
• Heads to 2150 m (7000 ft)
• Pressures to 275 bar (4000 psi)
• Temperatures to 205°C (400°F)

Horizontal, Multistage, Double Casing Pumps
(API-BB5)
Diffuser or volute type pumps for high pressure service. First stage single or double suction depending on available NPSH. Designs for both general purpose (spared) and special purpose (unspared) applications

Operating Parameters
• Flows to 2875 m³/h (10 000 gpm)
• Heads to 6700 m (22 000 ft)
• Pressures to 415 bar (6000 psi)
• Temperatures to 450°C (850°F)
Innovation Through Dynamic Technology

Flowserve is without peer in the development, refinement and application of pump technology. This dynamic creativity is reflected in the strength of the company’s commitment to:

• Hydraulic engineering
• Mechanical design
• Materials science
• Intelligent pumping
• Manufacturing technology

All research and technology efforts are directed toward providing customers with greater total value for their investments in Flowserve products and systems. Further, these capabilities enable Flowserve to quickly and accurately provide the best possible solutions to customers’ specific pumping problems.
**Pump Improvement Engineering Services**

The goal of this specialty service is to help plant technical personnel achieve optimal pumping solutions through engineering and technological assistance. Reducing the costs of operation and maintenance while improving overall equipment reliability is achieved through:

- Field performance testing
- Vibration analysis
- Design analysis and root-cause problem solving
- Material improvements
- Pump and system audit
- Advanced technology solutions
- Nuclear Maintenance Rule support
- PumpTrac™ remote pump monitoring and diagnostic services
- Instruction manual updates
- Training courses

**Parts and Service**

Quality OEM parts are readily available from Flowserve’s worldwide network of service and repair centers, fast response centers and regional parts services offices. All are computer networked to provide “as soon as possible” response to customers’ requests for assistance.

Customer service technicians are on call around the clock, seven days a week to respond to customer queries, to evaluate and troubleshoot reported pump problems and to provide reliable solutions.

**Service and Repair Group**

Flowserve’s Service and Repair Group is dedicated to maximizing equipment performance and reliability-centered maintenance programs. Pump related services include:

- Startup and commissioning
- Diagnostics and prognostics
- Contract maintenance programs
- Routine and repair maintenance
- ANSI and ISO power end exchange program
- Mechanical seal exchange program
- Re-rates, upgrades and retrofits
- Spare parts inventory and management programs
- Training
Flowserve... Supporting Our Customers
With The World’s Leading Pump Brands

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Your local Flowserve representative:

To find your local Flowserve representative please use the Sales Support Locator System found at www.flowserve.com

Or call toll free: 1 800 728 PUMP