



Pump Division



VTP
Vertical Turbine
Pump



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Bulletin PS-40-7c (E)

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.

Pumping Solutions

Flowserve is providing pumping solutions which permit customers to continuously 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.



Dynamic Technologies

Flowserve is without peer in the development and application of pump technology, including:

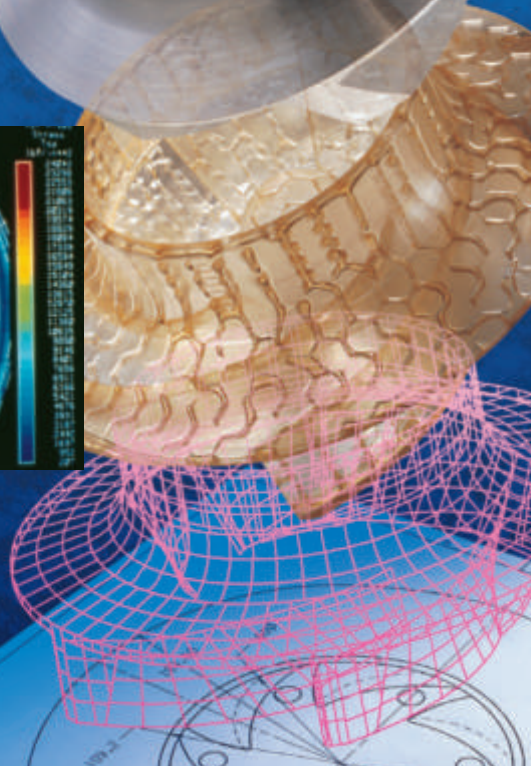
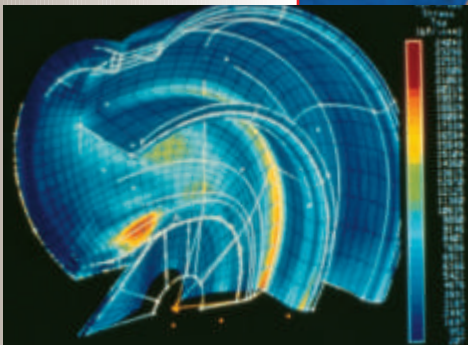
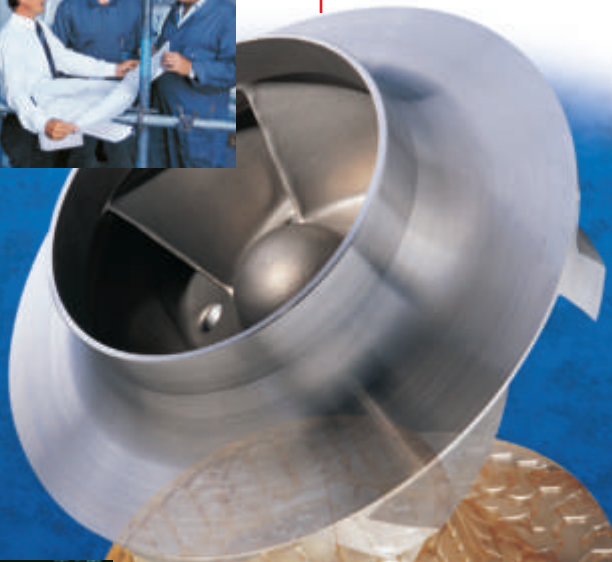
- Hydraulic engineering
- Mechanical design
- Materials science
- Intelligent pumping
- Manufacturing technology

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



VTP
Vertical Turbine Pump

Comprehensive Product Line

Flowserve manufactures one of the world's most comprehensive lines of vertical turbine, mixed and axial flow pumps. With more than 300 bowl and impeller medium and high capacity designs, Flowserve provides unsurpassed hydraulic coverage, with specific speeds from 1500 to 5500, to ensure the best pump selection for a wide variety of services.

Offered in a wide range of configurations, construction and materials, Flowserve VTP pumps are typically installed in a wet pit or deep well where NPSH available is usually not a problem. When a wet well is not available or there is insufficient NPSH available, the VTP pump with low NPSH impellers can be mounted in a suction barrel or can, which serves as the holding vessel for the liquid.

Models Available

Flowserve offers several models to best suit application needs, including:

- VTP for general industrial service
- VTP double casing with optional API 610, latest edition design
- VTP-WUC double casing to API 610, latest edition, ASME Code Section VIII and IX, German Pressure Vessel Association (AD) and other international standards
- VTP engineered models for capacities through 160 000 m³/h (750 000 gpm)

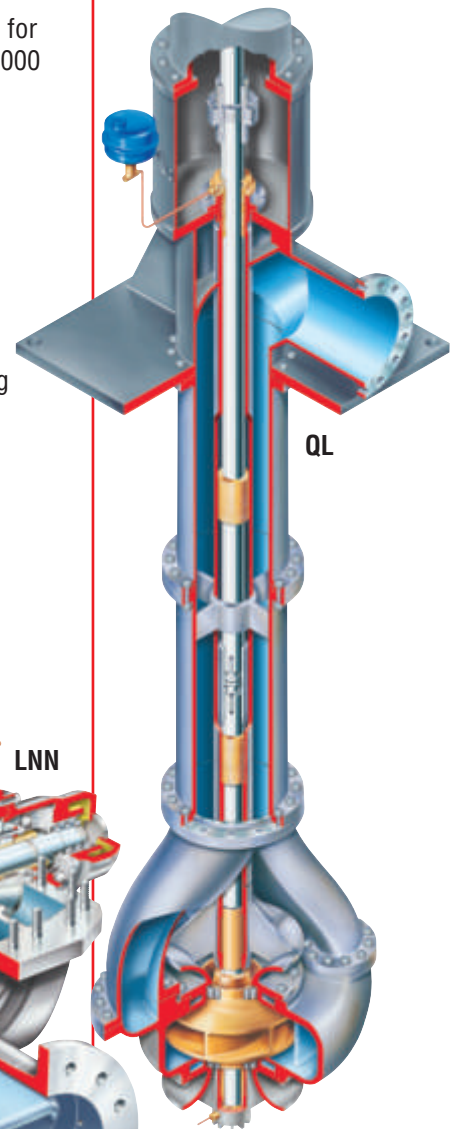
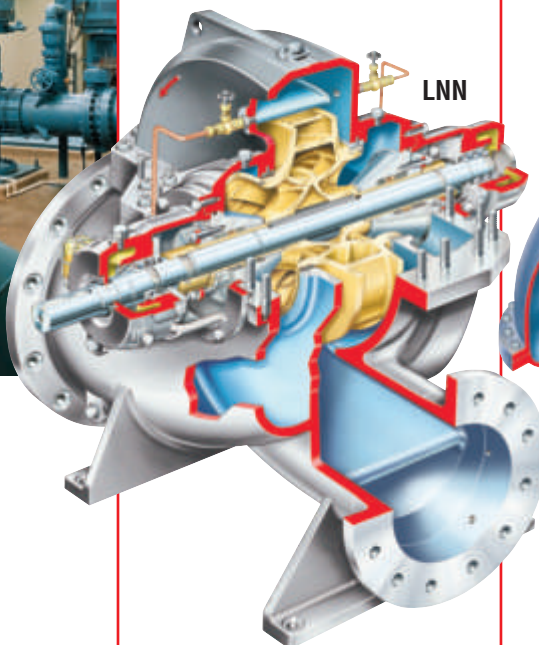
Typical Applications

- Municipal water
- Irrigation
- General industrial
- Snow making
- Power generation
- Oil and gas production
- Hydrocarbon processing
- Mining
- Storm water
- Sump service

Complementary Pump Designs

Depending upon application requirements, Flowserve can also provide these designs:

- Vertical, double casing
- Vertical, mixed and axial flow
- Vertical, double suction
- Horizontal, double suction, single stage



VTP
Vertical Turbine Pump
Product Lubrication

The Flowserve vertical turbine pump is a diffuser type, single or multiple stage, heavy duty pump designed for continuous duty in a variety of wet pit and deep well applications. Its extraordinarily broad hydraulic coverage is well complemented by its versatility.

Operating Parameters

- Flows to 13 600 m³/h (60 000 gpm)
- Heads to 700 m (2300 ft)
- Pressures to 150 bar (2175 psi)
- Temperatures from - 200°C (-328°F) to 300°C (570°F)
- Sizes 150 mm (6 in) to 1375 mm (55 in)
- Settings to 365 m (1200 ft)

Discharge Head with ASME Class 125 or 250 flat face flange provides a smooth transition of the pumped liquid into the discharge piping. It also functions as a mounting base for the driver

Prelubrication Connection allows connection to an external lubrication source for deep set pumps

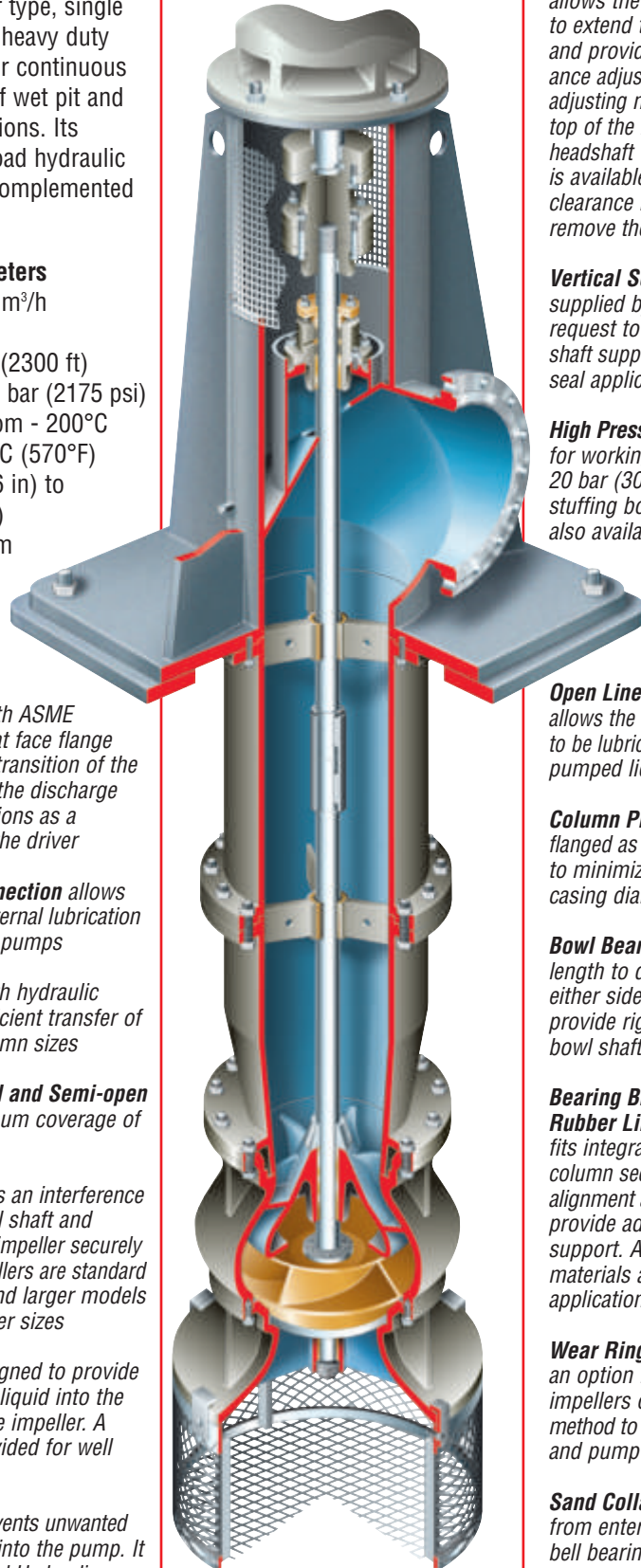
Discharge Case with hydraulic adapter ensures efficient transfer of flow to various column sizes

Impellers, Enclosed and Semi-open designed for maximum coverage of all applications

Lock Collet provides an interference fit between the bowl shaft and impeller to hold the impeller securely in place. Keyed impellers are standard for 500 m (20 in) and larger models and optional on other sizes

Suction Bell is designed to provide efficient flow of the liquid into the eye of the first stage impeller. A suction case is provided for well pump applications

Basket Strainer prevents unwanted debris from getting into the pump. It is designed to exceed Hydraulics Institute parameters. Cone strainers are provided for deepwell installations



Vertical Hollow Shaft Motor allows the pump headshaft to extend through the motor and provides impeller clearance adjustment with an adjusting nut located at the top of the motor. A two-piece headshaft with a motor stand is available when overhead clearance is inadequate to remove the motor

Vertical Solid Shaft Motor supplied by customer request to provide superior shaft support for mechanical seal applications

High Pressure Stuffing Box for working pressures up to 20 bar (300 psi). Other stuffing box options are also available

Open Lineshaft Construction allows the lineshaft bearings to be lubricated by the pumped liquid

Column Pipe available flanged as shown or threaded to minimize well pump casing diameter

Bowl Bearings with high length to diameter ratio on either side of the impeller provide rigid support for the bowl shaft

Bearing Bracket with Rubber Lineshaft Bearing fits integrally between the column sections to maintain alignment and is spaced to provide adequate shaft support. Alternate bearing materials available to suit application

Wear Rings, available as an option for enclosed impellers only, provide a method to renew clearances and pump efficiency

Sand Collar prevents grit from entering the suction bell bearing

Bell Bearing with permanent grease lubrication for maximum shaft support and reliability

Closed – Low Capacity



Closed – Medium Capacity



Closed – High Capacity



Semi Enclosed – Medium Capacity



Semi Enclosed – High Capacity



VTP
Vertical Turbine Pump

Oil Lubrication

Tension Bearing



Long length ensures sufficient tension to maintain shaft integrity

Lineshaft Bearing



Spiral grooved for positive lubrication

Bottom Case Bearing



Permanently grease packed for long seal life

Oil Lubrication

Enclosed Oil Lubrication isolates the lineshaft and bearings from the pumped liquid minimizing maintenance in abrasive services. Alternative lubricants such as clean water or grease can also be used with enclosed lineshaft construction

Heavy Duty Discharge Head with ASME Class 150, 300, or 600 raised face flange provides a rigid and stable support for high horsepower drivers. The mitred elbow reduces the internal friction loss and reduces turbulence in the discharge head. Cast iron discharge heads are available up to 500 mm (20 in) discharge

Rigid Adjustable Coupling provides accurate impeller clearance adjustment and overall shafting stability

Tension Bearing holds the enclosing tube and lineshaft bearings in alignment. It also provides a chamber for the lubricant as it enters the enclosing tube

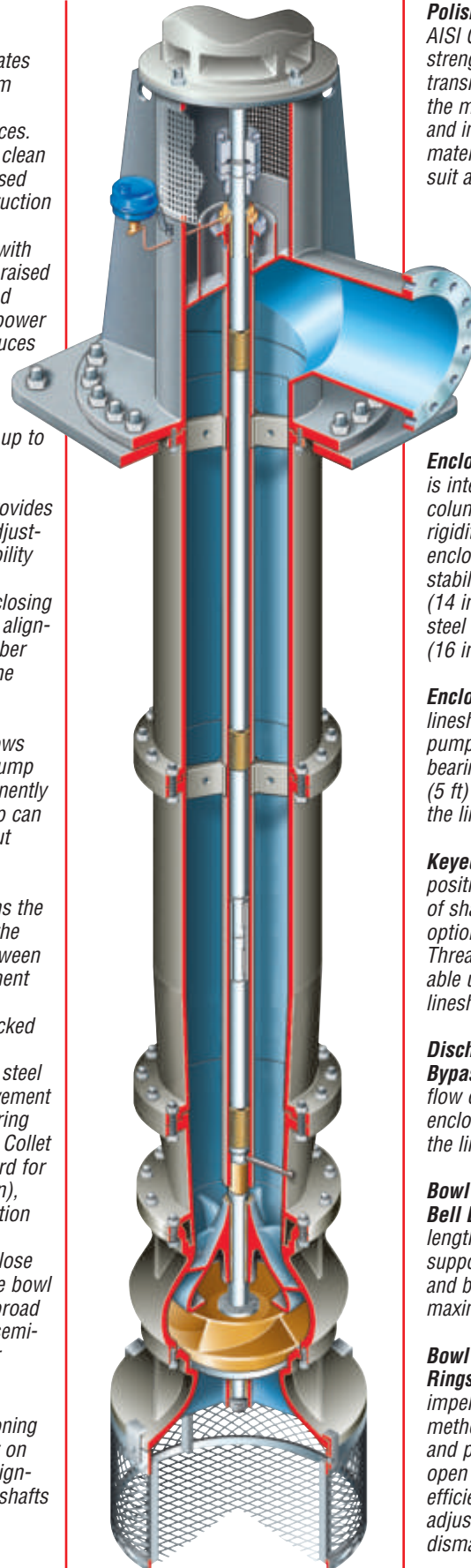
Separate Steel Soleplate allows grouting and leveling of the pump discharge head without permanently anchoring the head. The pump can be removed for service without disturbing the grout

Flanged Column Pipe contains the pressure being generated by the pump and has a rabbet fit between the flanges to maintain alignment

Keyed Impellers positively locked to the shaft eliminate shaft to impeller movement. Stainless steel slotted keys prevent radial movement while the stainless steel split-ring keys prevent axial movement. Collet mounted impellers are standard for impellers up to 460 mm (18 in), with keyed impellers as an option

Enclosed Impeller provides close running clearance between the bowl to maintain efficiency over a broad operating range. Full range of semi-open impellers are available for particular applications

Alignment Screws allow positioning of the larger frame size motor on the discharge head for final alignment of the pump and motor shafts



Polished Steel Lineshaft, in AISI C-1045 for maximum strength and reliability, transmits the torque from the motor to the bowl shaft and impeller. Other shaft materials are provided to suit application

Enclosing Tube Stabilizer is integrally welded to the column pipe to maintain the rigidity and alignment of the enclosing tube. Rubber stabilizer for up to 355 mm (14 in) column size and steel stabilizer for 400 mm (16 in) and larger

Enclosing Tube provides lineshaft protection from the pumped liquid. The lineshaft bearings are spaced at 1.5 m (5 ft) intervals to support the lineshaft

Keyed Lineshaft Coupling positively locks the sections of shafting together. This is optional for all pump sizes. Threaded coupling is available up to 65 mm (2.5 in) lineshaft

Discharge Case with Bypass Port allows positive flow of the lubricant into the enclosing tube to lubricate the lineshaft bearings

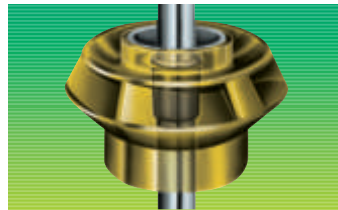
Bowl Bearing and Suction Bell Bearing with high length to diameter ratio support the bowl shaft above and below the impeller for maximum reliability

Bowl and Impeller Wear Rings, optional for enclosed impellers only, provide a method to renew clearances and pump efficiency. Semi-open impellers maintain efficiency by impeller adjustment without dismantling the pump

Options and Technical Data

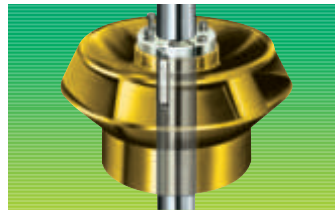
VTP pumps can be supplied with:

- Enclosed, open or semi-open impellers
- Open lineshaft construction, or enclosed for better lubrication of the lineshaft bearings in abrasive services
- Product or oil bearing lubrication
- Flanged or threaded column pipe
- Cast iron or fabricated steel discharge head
- Above or below ground discharge variations
- Dry or submersible electric motors, variable speed drive, engines with right angle gears, steam turbines
- Variety of mechanical seals
- Motor steady bushings for a two-piece headshaft



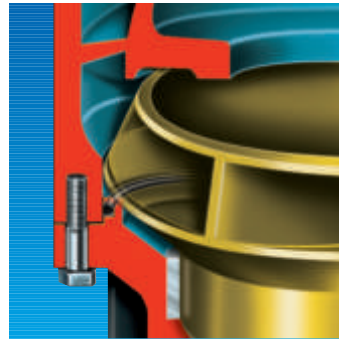
Thrust Balanced Impeller

- For extremely high pressure or deep settings to reduce thrust loads
- Integral or separate wear ring



Key and Thrust Ring Construction for Impellers

- Optional on 450 mm (18 in) bowls and smaller
- Split radial key for thrust load
- Axial key for torque
- For extreme temperature applications



O-Ring Bowl

- For high pressure applications
- Wear rings for bowls and enclosed impeller

Adjustable Flanged Coupling

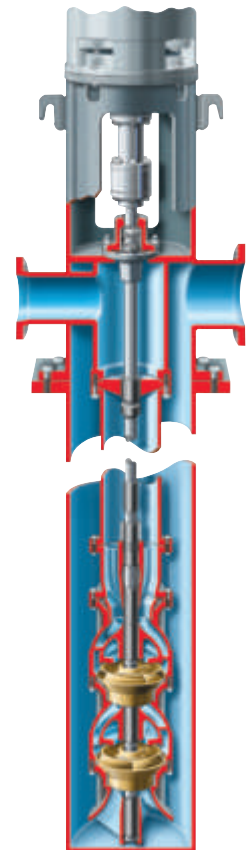
- For easy maintenance of mechanical seal

Bearing Materials

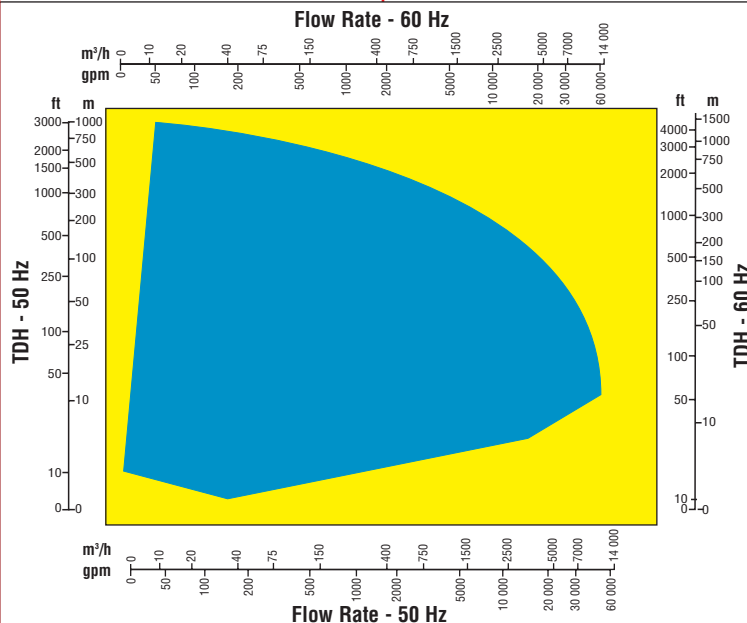
- Metal
- Rubber
- Carbon
- Composite

VPC Double Casing

- General Industrial
- API 610, latest edition
- Diffuser type design
- Services with limited NPSH available
- Single or multiple stage
- Large eye first stage impeller for low NPSH characteristic



VTP Range Chart



**Global
Engineered Services
and Support**

- Total Cost Reduction*
- Asset Management*
- Product Life Cycle*
- Performance Re-rates*
- Site Diagnostics*
- Repair Services*
- Energy Management*
- Spare Parts*
- Maintenance Contracts*
- Materials Upgrades*
- Turnkey Services*
- Field Repairs*
- Installation*
- Project Supervision*
- Commissioning*
- Equipment Upgrades*
- Condition Monitoring*
- Systems Analysis*
- Field Machining*

Service Dedication

Flowserve Engineered Services is focused on providing customers with uncompromising service and support, where and when needed. Dedicated to delivering the highest quality support, Engineered Services integrates its extensive pump and materials engineering knowledge with creative service solutions. Engineered Services fully understands the business challenges facing customers and is prepared to manage solutions to succeed as a team.

A worldwide network of service and repair centers staffed by highly skilled engineers and technicians is available around the clock, seven days a week to respond to customer queries, to evaluate and troubleshoot problems and to provide reliable solutions.



**Strength of Experience,
Commitment to Excellence**

Flowserve has long served industries requiring superior equipment performance and service life.

- Oil and gas production
- Hydrocarbon processing
- Chemical processing
- Water resources
- Power generation
- Nuclear
- Mining and mineral processing
- Pulp and paper
- General industry

Engineered Services is dedicated to maximizing equipment performance and providing reliability-centered maintenance programs for pumps and related equipment, regardless of manufacturer. Using the FlowStar™ asset management software, Engineered Services tracks performance and supports improvement programs using a service life cycle cost business approach. The results are improved reliability and increased profitability.

Business Partner

Flowserve partners with customers to respond to the dynamic business conditions that affect them. Flowserve will work with customers to drive efficiency, maximize throughput and control process quality. Whether user needs involve on-site technical assistance or broader project planning with full turnkey responsibility, Flowserve Engineered Services will deliver professional, reliable results.



**Flowserve... Supporting Our Customers
With The World's Leading
Pump Brands**



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