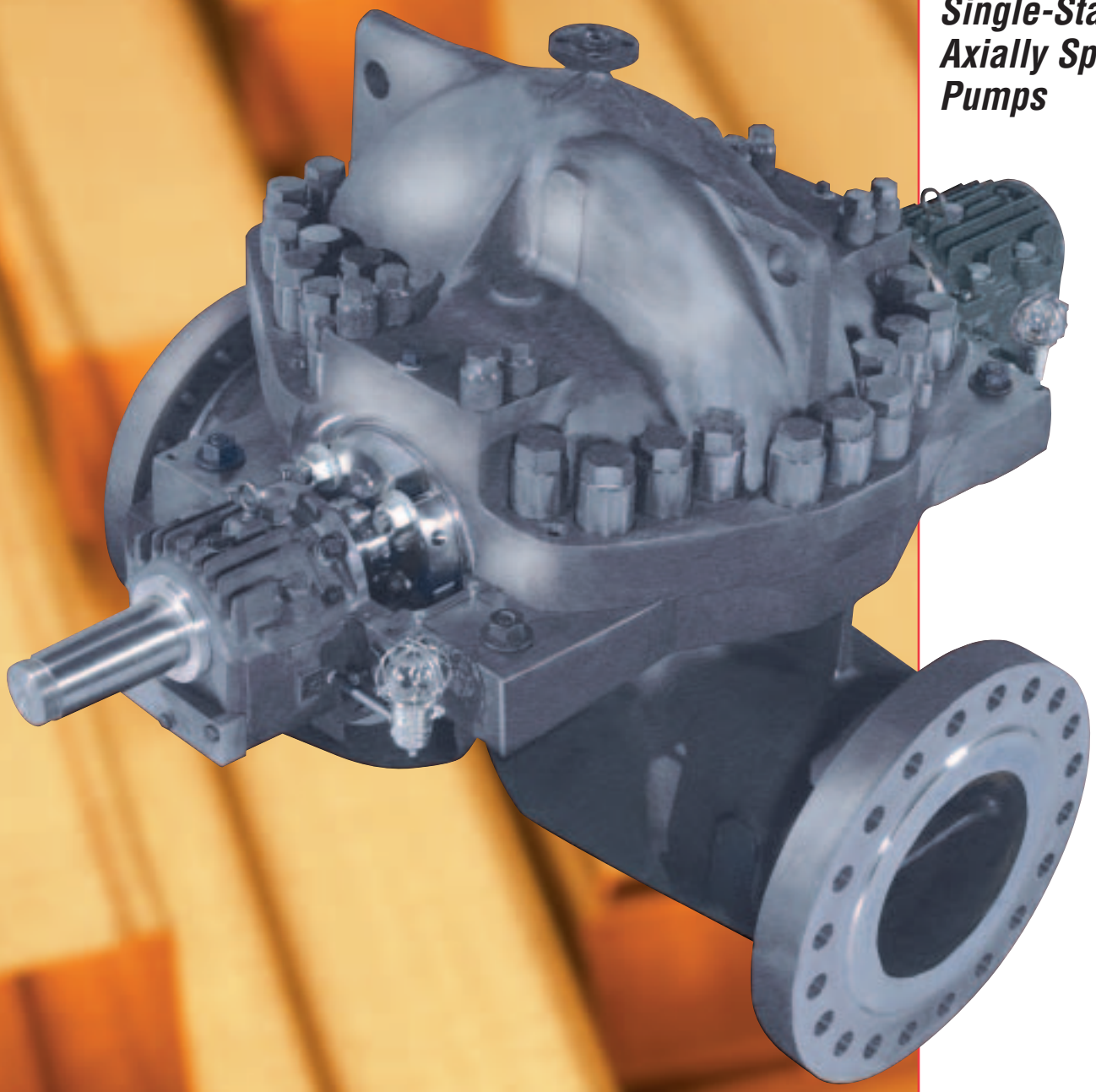
FLOWSERVE

Pump Division

DVSH

Heavy-Duty Between Bearings Single-Stage Axially Split Pumps



Bulletin PS-20-2 (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.

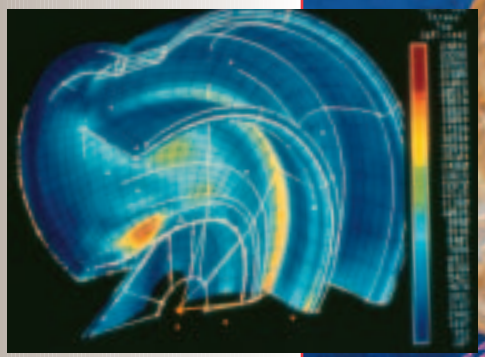
Pumping Solutions
Flowserve is providing pumping solutions which permit customers to continuously improve productivity, profitability and pumping system reliability.

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



DVSH

Heavy-Duty Between Bearings Single-Stage Axially Split Pumps

Unequaled Operating Experience

With tens of thousands of units operating around the world, Flowserve's DVSH model is the undisputed API 610 (BB1) pump of choice. With 94 distinct sizes, the DVSH family provides the most comprehensive range of hydraulic coverage available, thereby permitting precise selection for best hydraulic fit, operating efficiency and stability. Sizes range from 150 mm x 300 mm (6 in x 12 in) to 750 mm x 950 mm (30 in x 38 in), with power ratings to 12 000 kW (16 000 hp).

The basic pump design consists of a double suction impeller operating in a heavy-duty double volute casing, which inherently results in optimum axial thrust and radial thrust balance over the full operating range.

- Stiff shaft design ensures trouble free performance by operating under the first critical speed.
- Double suction impeller design enhances mechanical seal performance by allowing operation under minimum and equal pressure in seal chambers.

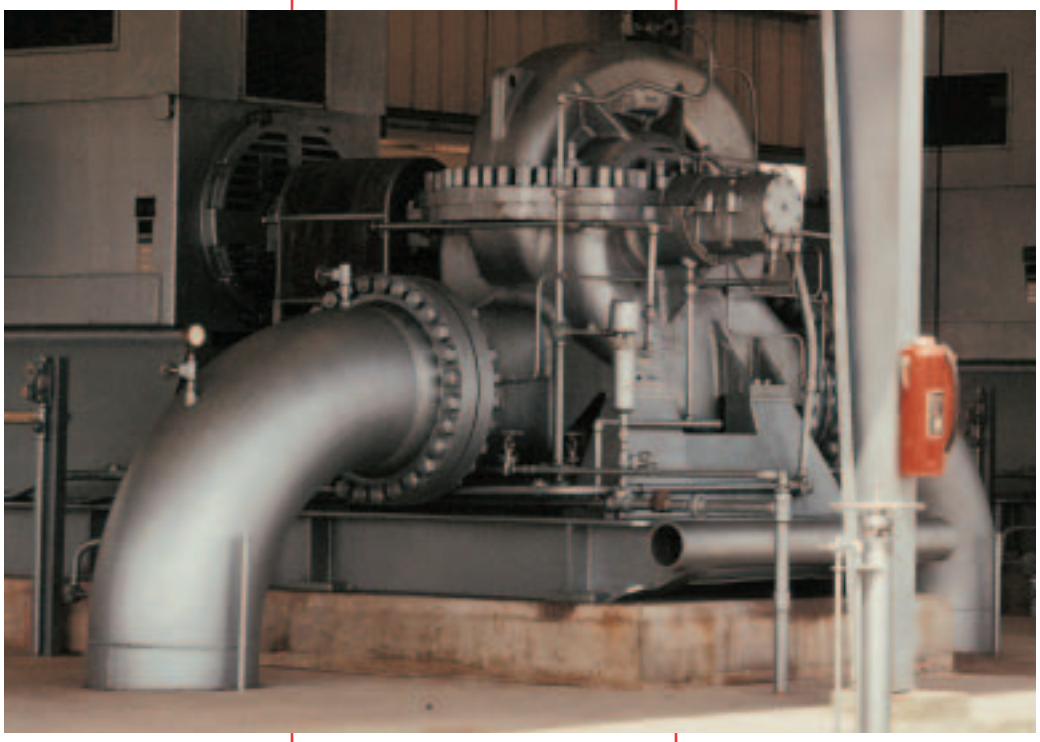
Broad Application

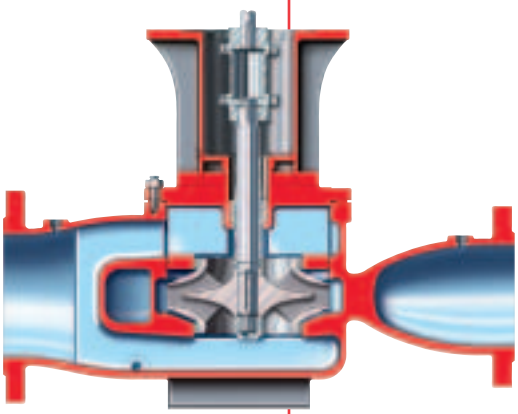
- Pipeline, booster and mainline
- Process charge
- Liquified gas industry service
- Power recovery
- Heavy-duty water and general industrial

Complementary Pump Designs

Type DVSH pumps may be used with other Flowserve models of the following designs:

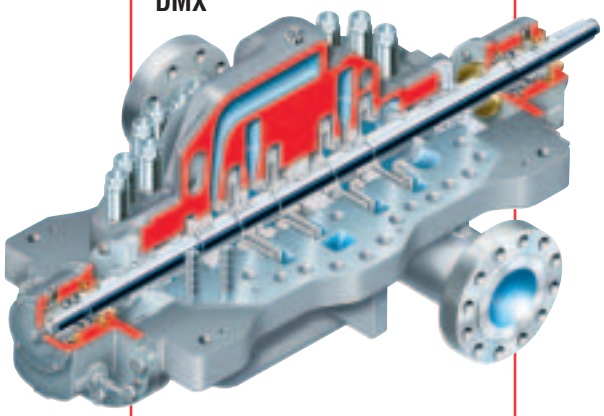
- Radially split, single and two stage between bearing pumps
- Multistage between bearing pumps
- Vertical wet pit or double casing pumps
- Single and double suction, vertical in-line pump

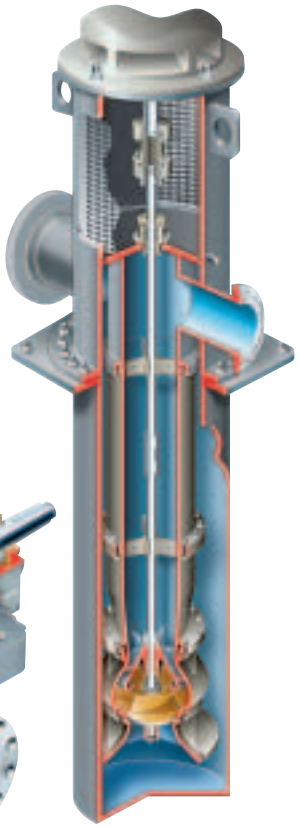




DSVP

DMX





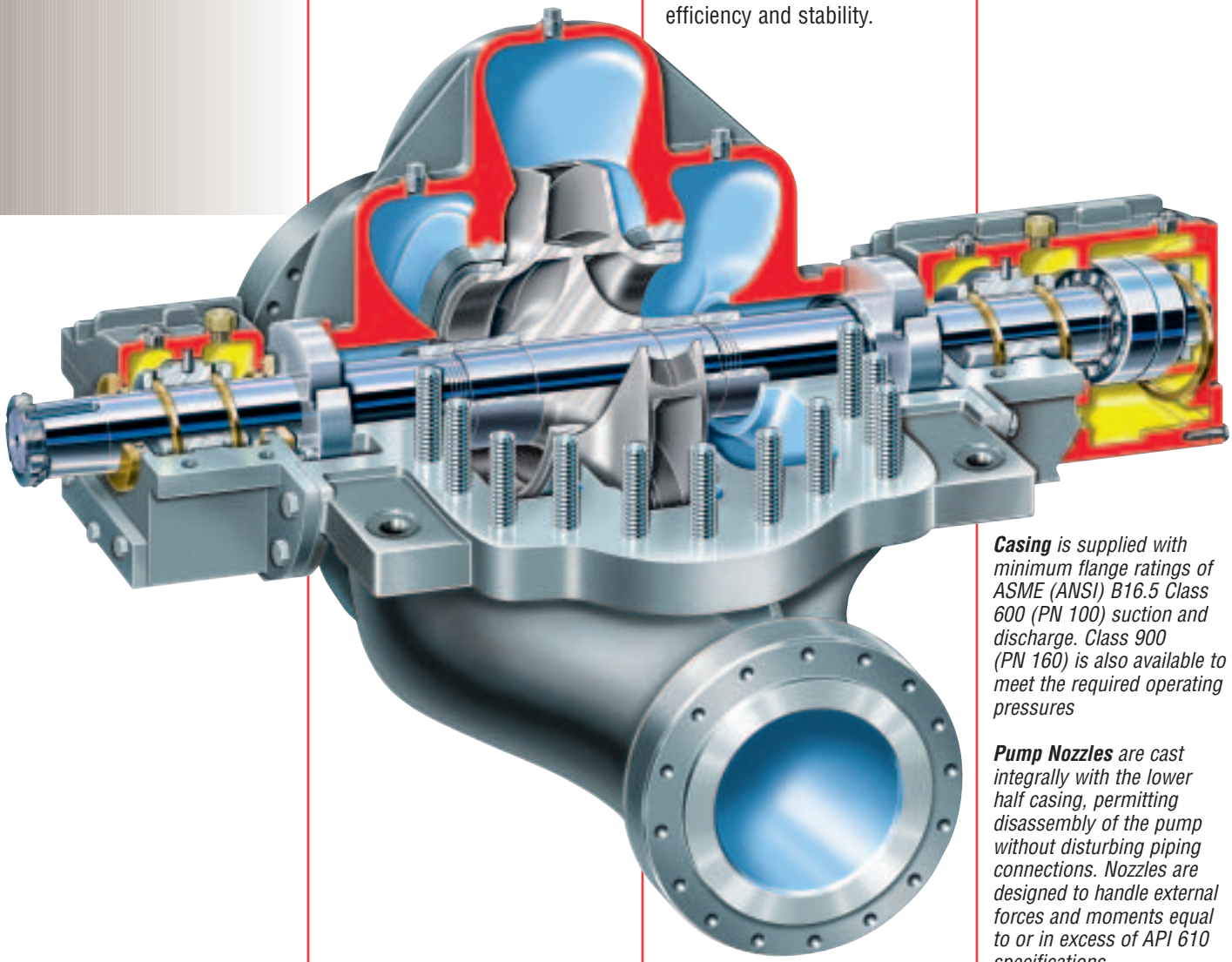
VPC

DVSH

Heavy-Duty Between Bearings Single-Stage Axially Split Pumps

Flowserve's DVSH pump is fully compliant with API 610, latest edition. The DVSH is particularly well suited for use in process charge, transfer and pipeline services where uncompromising reliability over wide flow ranges is of utmost importance.

Further, the DVSH represents the most comprehensive range of coverage available to industry for high design pressure and high flow operation in a single-stage, double suction configuration. This permits precise selection for best hydraulic fit, operating efficiency and stability.



Operating Parameters
- Flows to 22 700 m³/h (100 000 gpm)
- Heads to 510 m (1500 ft)
- Temperatures to 205°C (400°F)
- Pressures to 150 bar (2175 psi)
- Speeds to 6600 rpm

Hydraulically Balanced *double suction impeller reduces NPSH requirements and ensures smooth, efficient operation over a wide range of conditions*

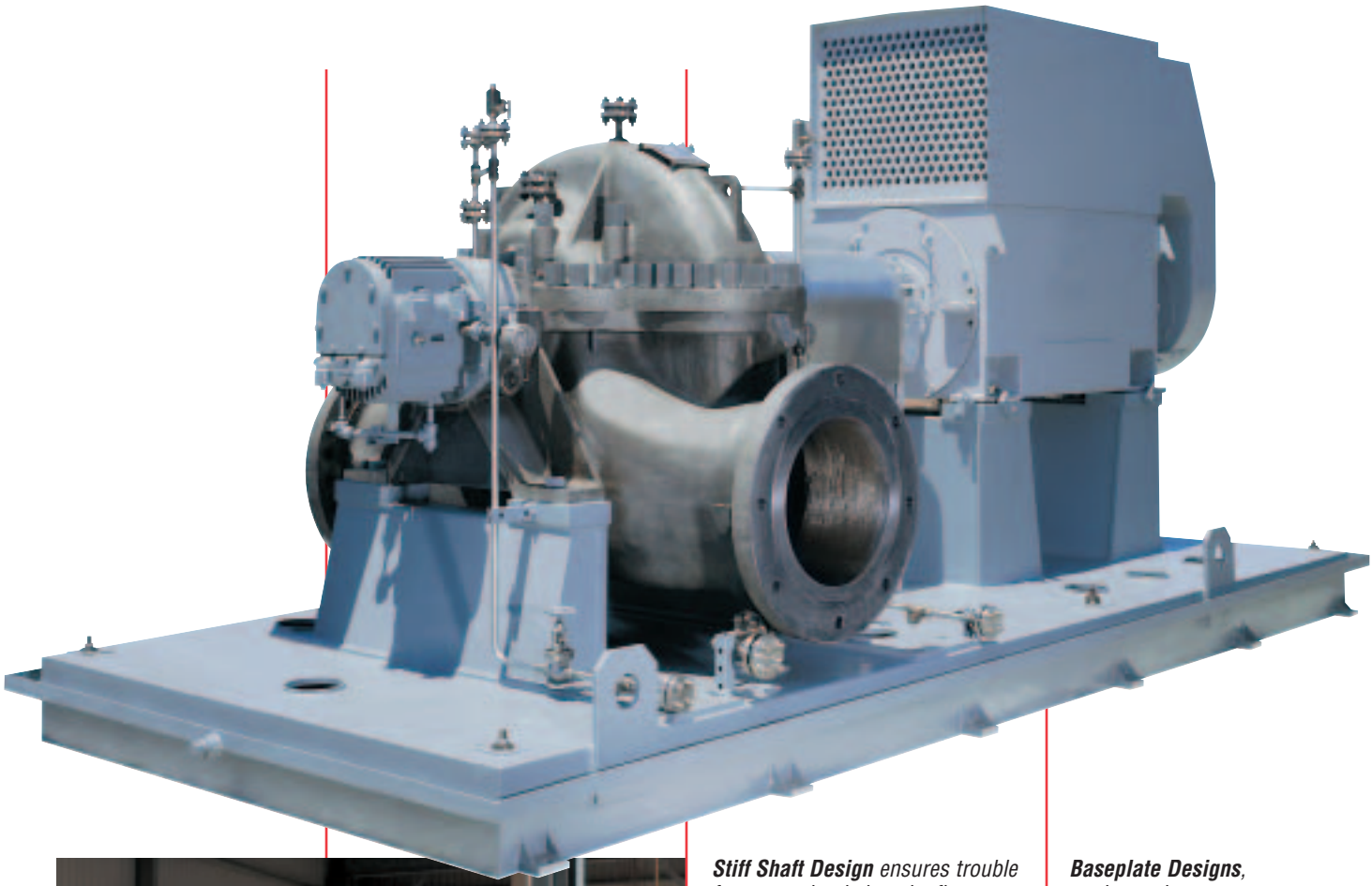
Pump Casing *is near center-line mounted to maintain alignment during operation at elevated temperatures. Raised face flanges meet ASME (ANSI) B16.5 dimensional requirements*

Casing *is supplied with minimum flange ratings of ASME (ANSI) B16.5 Class 600 (PN 100) suction and discharge. Class 900 (PN 160) is also available to meet the required operating pressures*

Pump Nozzles *are cast integrally with the lower half casing, permitting disassembly of the pump without disturbing piping connections. Nozzles are designed to handle external forces and moments equal to or in excess of API 610 specifications*

Case Nuts *are arranged in the top half casing parting flange, allowing easy casing removal for rotor inspection and maintenance*

Seal Chambers *to API 682 dimensional criteria allow for installation of cartridge design single, dual unpressurized and dual pressurized mechanical seals to meet safety and environmental requirements*



Radially Split DVSH

Replaceable Wear Rings *reduce maintenance and operating costs by protecting the casing and impeller from wear. Internal clearances can be inexpensively renewed, permitting continued high operating efficiency. Optional laser hardened or non-metallic wear rings in Graphalloy®, PEEK® and other materials are available*

Stiff Shaft Design *ensures trouble free operation below the first critical speed. Short bearing span and heavy shaft minimize deflection under all operating conditions, including off peak flows. Final two plane dynamic balancing and TIR verifications are conducted on assembled rotors to assure optimum mechanical performance throughout the operating range*

Casing and Internal Material Combinations *available to meet service requirements include carbon steel, 12% chrome, austenitic stainless steels, Monel® and duplex stainless steel*

Standard Ring Oil-Lubricated Bearings *assure complete oil penetration into the bearings without foaming for increased bearing life. Optional bearing arrangements and lubrication systems are available to meet the requirements of any speed or application*

Shaft Options *include double extension for connection to auxiliary pumps or hydraulic turbines, and special shaft end machining for hydraulic fitted couplings*

Baseplate Designs*, engineered to contract requirements, include conventional welded steel with drain rim, sub base under pump only, 3-point design, pre-grouted and skid type non-grouted*

Pump Packages *are provided to specifications, and include lube oil piping, seal systems, monitoring instruments and drive train mounting*

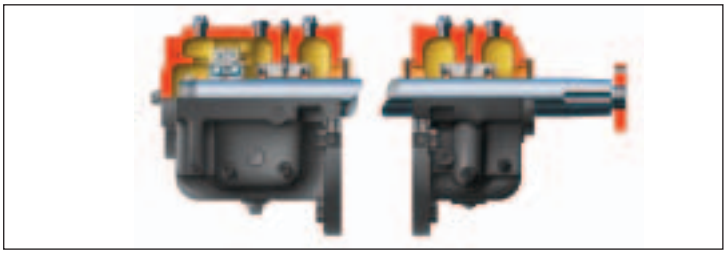
Certified Testing *is performed on each pump prior to shipment*

® Graphalloy is a registered trademark of the Graphite Metallizing Corporation
® PEEK is a registered trademark of Victrex plc Corp.
® Monel is a registered trademark of International Nickel Co.

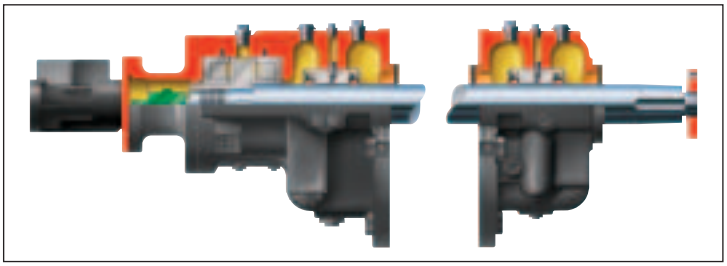
Options and Technical Data

Bearing Design Options

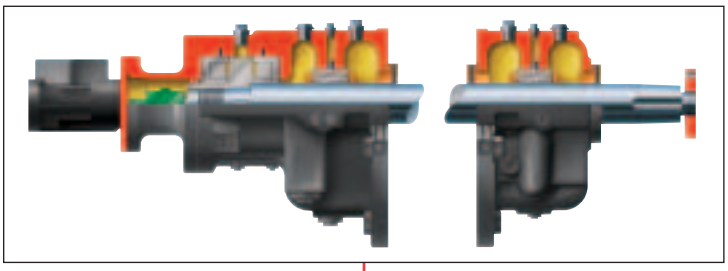
Split Sleeve Radial and Ball Thrust



Split Sleeve Radial and Tilting Pad Thrust



Tilting Pad Radial and Tilting Pad Thrust



Bearing Cooling Options

- Air cooling
- Water cooling
- Product cooling

Bearing Lubrication Options

- Ring oil
- Pressure lubricated

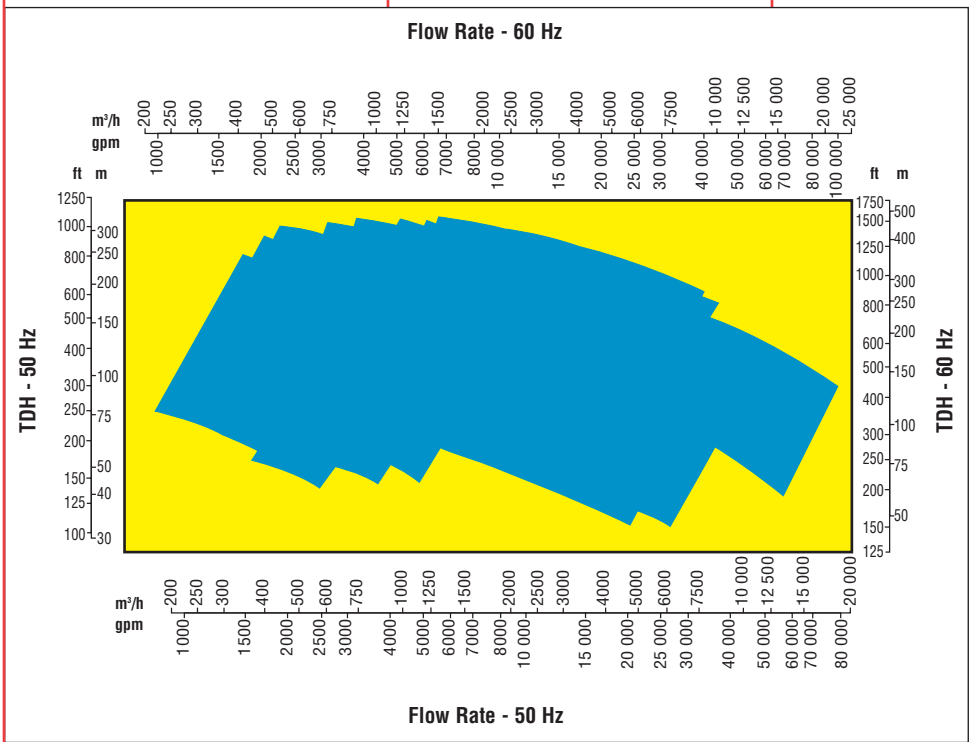
Rotation Options

- CW
- CCW standard

Radially Split Casing

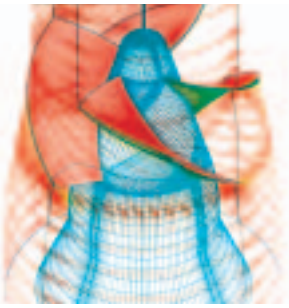
for very low specific gravity applications down to 0.35, including liquid CO_2 pipelining and high pressure applications

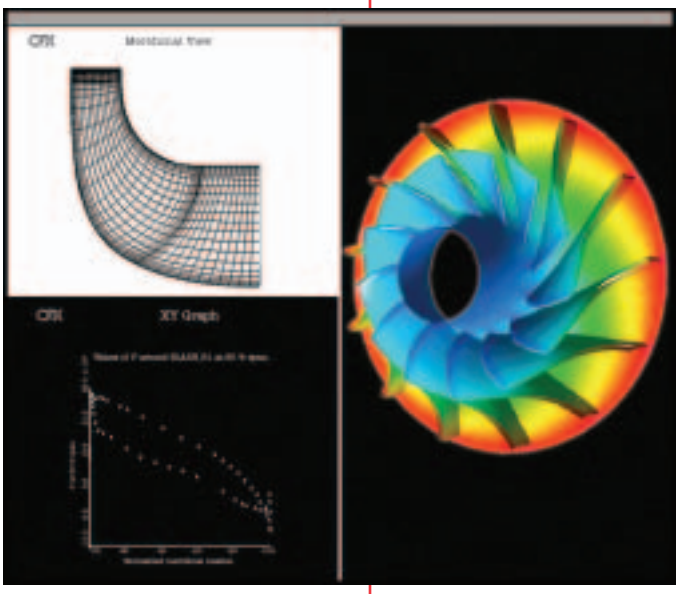
DVSH Range Chart



Global Service and Technical Support

Advanced Technologies
Few if any pump companies can match Flowserve's capabilities in hydraulic and mechanical design or in materials engineering. These capabilities include:
- Computational fluid dynamics
- Flow visualization
- Cavitation studies
- Efficiency optimization
- Finite element analysis
- Rapid prototyping
- Captive high nickel alloy and light reactive alloy foundries
- Non-metallic materials processing and manufacturing





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
- Routine and repair maintenance
- ANSI and ISO power end exchange program
- Re-rates, upgrades and retrofits
- Spare parts inventory and management programs
- Training

Pump Improvement Engineering Services
Flowserve is committed to helping customers obtain the best possible return on their pump equipment investment. Engineering assistance and technological solutions for pumping problems are readily available.

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

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

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FLOWSERVE®
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