

# FLOWAY® PUMPS OIL & GAS INDUSTRY



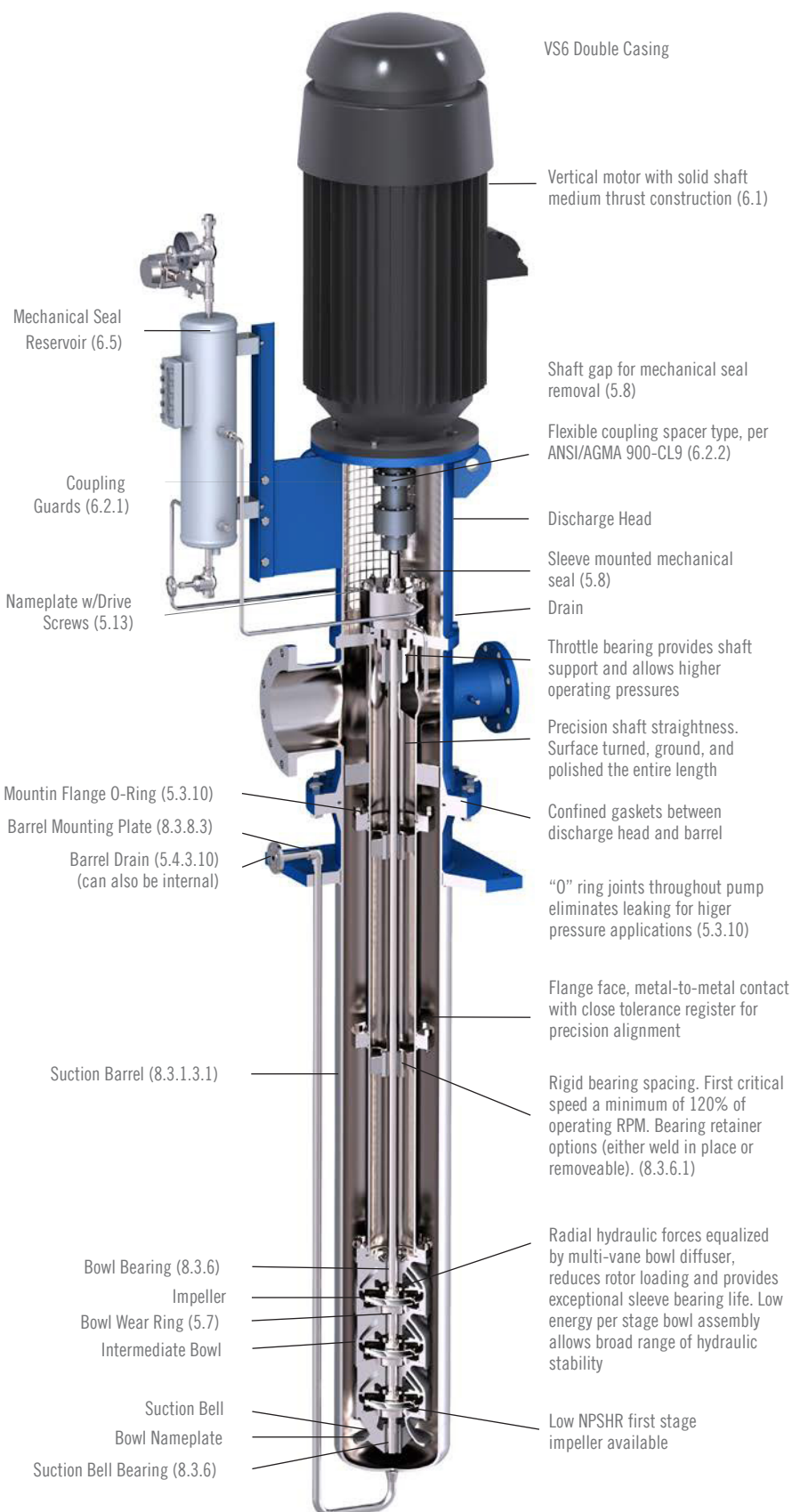
## MEETING THE NEEDS OF THE OIL & GAS INDUSTRY WORLDWIDE

### FLOWAY® VERTICAL HYDROCARBON PUMPS ARE BUILT TO WITHSTAND THE CRUCIAL REQUIREMENTS AND CONDITIONS OF THE OIL & GAS MARKET

The Floway Vertical Hydrocarbon Pump (VHP) is ideal for Oil & Gas applications due to superior quality, low vibration, less maintenance cost and specialized design. We take pride in our product that is controlled in our state of the art facility in Fresno, California, USA at every step from designing to manufacturing and assembly of the finished product.

Our expertise lies solely in the vertical pump product line and Floway has become a dominant force in today's highly diversified market.

- Through continuous improvements to materials, product design, engineering and manufacturing, we minimize downtime for our customers' operations by providing a reliable product
- Our global capacity has allowed us to service our customers around the world, quicker and more efficient
- Working in close partnership with our customers allows us to develop end-to-end engineering solutions to the technical challenges they face, delivering a genuinely competitive advantage
- Excellence through innovative design and adapt ability to each customer's process is why the Floway VHP is heavily depended upon in the oil and gas industry



## AREAS OF EXPERTISE

### WE UNDERSTAND THE IMPORTANCE OF EACH SECTOR AND FLOWAY® PUMPS ARE ADAPTABLE FOR YOUR SPECIFIC PROCESSES

#### Upstream Exploration

Upstream exploration is a critical sector with a variety of services ranging from offshore systems such as platforms and FPSO's to onshore drilling rigs. Floway pump products are designed for the diverse critical applications in this sector.

- Offshore Exploration: offshore production platform fire-water, seawater lift and auxiliary
- Floating production, storage / offloading (FPSO): fire-fighting, seawater lift, process and auxiliary and offloading
- Onshore exploration: water injection, main oil line, fire-fighting and process and auxiliary

#### Midstream Transport

The midstream sector includes various hydrocarbon duties ranging from transportation over long distances between pump stations to terminal unloading/loading and tank farm storage. Floway has engineered reliable pump products for the wide range of applications included in these crucial duties.

- Pipeline transportation: booster and main line
- Import/export terminal: loading/unloading, firewater and booster
- Tank farm: transfer, storage and unloading

#### Downstream Refining / Petrochemical

The downstream sector including systems such as oil refining and gas processing requires the handling of fluids with extreme temperatures and pressures. Based on these extreme conditions, Floway has designed and engineered a wide range of dependable pump products and offers a variety of services to meet the demands of this sector.



## ENGINEERED TO ORDER

### FLOWAY VHP ARE BUILT TO CUSTOMER SPECIFICATIONS USING SUPERIOR QUALITY COMPONENTS TO MEET VIRTUALLY ANY HYDROCARBON APPLICATION.

#### Industry Leading Low-Vibration Levels

Floway is dedicated to manufacturing pumps with industry leading low vibration levels.

Optional features:

- Premium machined and balanced motor
- Specially toleranced motor coupling
- Jacking posts for precise motor/pump shaft alignment
- Reduced run-out on motor base

#### Excellent Engineering Solutions

Floway utilizes an in-house staff of licensed professional engineers to ensure maximum control over design specifications. Engineering capabilities include:

- 3D solid modeling
- In-house hydraulic design
- Products engineered to customer specifications
- Computational Fluid Dynamics (CFD) analysis
- Stress and deflection analysis using Finite Element Analysis (FEA)
- Lateral and torsional rotor dynamic analysis
- Structural natural frequency analysis (using FEA) and design for Variable Frequency Drive operation
- Design for low-vibration

#### Performance Testing

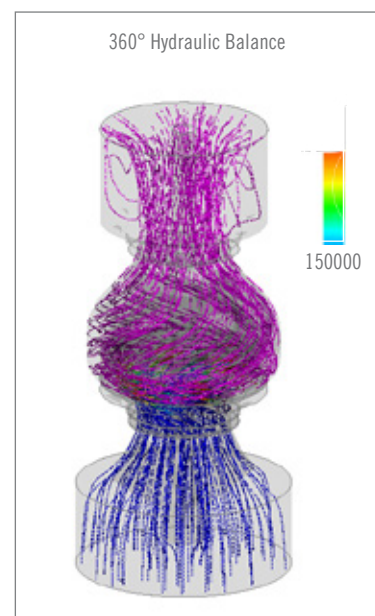
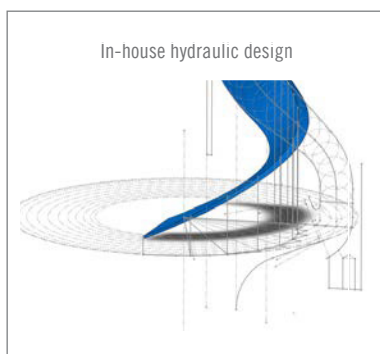
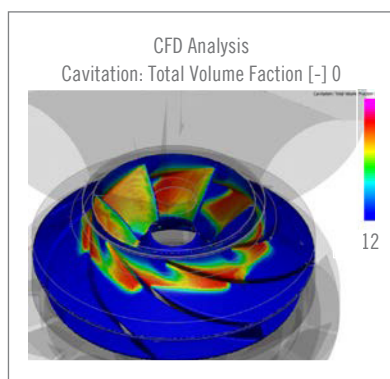
A major engineering function of any pump manufacturer is hydraulic performance testing under a variety of operational conditions. Testing ensures that pump performance matches specifications and that all components are operating properly.

Testing and analysis capabilities include:

- Three test pits for flows ranging from 50 GPM to 45,000 GPM (10,220 m<sup>3</sup>/hr)
- Hydrostatic testing equipment for pressures to 5,000 PSI (345 bars)
- NPSH testing equipment available for flows to 30,000 GPM (6,814 m<sup>3</sup>/hr)
- Pressures to 2,500 PSI (172 bars)
- Electrical power through 3,400 HP (2,535 KW)
- Equipment calibration to National Institute of Standards and Technology (NIST)
- Vibration testing available including spectrum analysis (FFT) with multiple simultaneous channels
- Impact testing available to determine the structural natural frequencies (Reed Critical Frequency) of the pump/motor structure
- Engine driven string testing capability
- Both 50 Hz and 60 Hz power available
- Pump testing using a Variable Frequency Drive (VFD) available upon request
- Coating spark test (low voltage/high voltage)
- Pump thrust testing
- Noise testing

#### Non-Destructive Testing (NDT)

- Dye Penetrant (LP)
- Magnetic Particle Inspection (MP)
- Radiography Exam (RT)
- Ultrasonic Testing (UT)
- Positive Material Identification (PMI)
- Hardness Testing (Rockwell and Brinell)
- CMTR upon request
- AWS Certified Welding Inspection (CWI) Coating
- NSF certified coating available when requested
- Two-part epoxy
- Fusion bonded epoxy
- Wide range of coatings available for potable or non-potable services



### Global Certification Standards

- NEMA
- IEEE
- IEC

### Construction Standards

- Hydraulic Institute
- NSF/ANSI 61 and 372
- ANSI B16.5 Class 150 through 1500 flange ratings
- Welding to ASME Section IX on all listed materials
- ASTM standards met for all materials supplied castings, forgings, and wrought materials
- Stress relief carbon steel to ASME Section VIII
- DIN
- BS
- CE Marking
- API 610

### Quality Assurance

Quality control never ends at Floway. It begins with the quotation phase and continues throughout the order process, manufacturing phase, warranty period, customer follow-up and servicing. This dedication to quality has given us the reputation for having one of the finest products in the vertical turbine pump industry. Certifications include

- ISO 9001:2008 Quality Management Systems
- ISO 14001:2004 Environmental Management Systems
- OHSAS: 18001:2007 Occupational Health and Safety Management Systems



### In-House Manufacturing Capabilities

Fabrication — Floway fabrication facility is staffed by ASME Boiler Code Section IX certified welders.

- Machining — computer controlled lathes, large boring mills, and individual production equipment ensure an efficient and flexible manufacturing process
- Balancing — dynamic and static balancing of rotating elements ensure low vibration performance
- Inspection — products are inspected at multiple stages throughout the manufacturing process to ensure quality. Capabilities include a Coordinate Measuring Machine (CMM) that can measure complex curvatures for comparison to 3D solid models. The CMM is also used to measure large parts where conventional measurement techniques are limited
- Final Assembly — all pump components are assembled to customer specifications, ensuring top efficiency, long service life and a high quality product

## OUR COMMITMENT TO OUR CUSTOMERS

The Floway team is committed to delivering market leading products and services which meet the technical and commercial challenges across the Oil & Gas industry. Through our highly skilled service facilities, we are dedicated to repairing and improving performance both in shop and on-site. We offer our customers a range of services to ensure equipment performance, safety and efficiency in the demanding industry

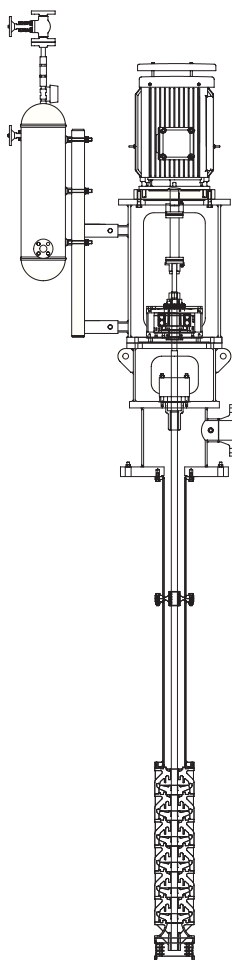


## API COMPLIANT

### FLOWAY VHP'S ARE DESIGNED TO API STANDARDS TO FIT YOUR SPECIFIC PROCESS

Our Floway VHP API 610 standards include the following features:

- Compliant with API 610 current edition
- Multi-staging in the medium specific speed range from 1,300 Ns through 5,000 Ns
- High pressures with premium efficiencies and low operating costs
- Low NPSH first stage construction with Nss below 11,000 is available which allows for a reduction in can length for double casing pumps (VS6) and minimum submergence for wet-pit single casing pumps (VS1)
- Pressure and flow variations are achieved by changing number of stages or impeller type
- Pump bowl assembly is characterized as low energy per stage resulting in a broad flow range with excellent hydraulic stability
- Thrust balanced impellers are available for pump axial thrust reduction and assist in obtaining the desired thrust bearing rating/life
- Thrust pot assembly is available in applications where non-thrust carrying motors are required



PUMP TYPE	VHP VS1	VHP VS6
Pump configuration	Vertical close coupled single or multi-stage turbine for a wet pit	Vertical close coupled single or multi-stage turbine with closed suction
API-610 class type	Vertical suspended, double casing wet pit type	Vertical suspended, double casing can type
Capacity	To 35,000 USGPM (8,000 m <sup>3</sup> /hr)	To 35,000 USGPM (8,000 m <sup>3</sup> /hr)
Pressure	To 1,500 PSI (100 bars)	To 3,000 PSI (200 bars)
Liquid	Water, chemical solutions, (acidic or alkaline), and hydrocarbons	Water, chemical solutions, petroleum, condensates, L.P.G., and hydrocarbons
Temperature	450° F (200° C)	-130°F (-90°C) to 450°F (220°C)
HP	To 3,000 HP (2,250 KW)	To 3,000 HP (2,250 KW)
Drivers	Electric motors, steam turbines, engine/gear drives, and variable speed drives	Electric motors, steam turbines, engine/gear drives, and variable speed drives
Materials of construction	Any machinable and weldable alloys or combinations available	Any machinable and weldable alloys or combinations available



**Typical applications include the following:**

- Vertical process
- Light hydrocarbon, high vapor pressure (low NPSHA)
- Pipeline, pipeline booster
- Offshore platform / sea water lift (crude oil transfer)
- Refinery service
- LPG transfer
- Secondary recovery
- Cryogenic liquid
- Cooling water
- Aircraft fueling
- Terminal / transfer
- Fire pumps



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