

FINDER

Part of Pump Solutions Group

A **DOVER** COMPANY

Expert
Solutions
for Critical
Applications

ENGINEERED PRODUCTS
Brand Portfolio



Where Innovation Flows

www.finderpumps.com

API 610 CENTRIFUGAL PUMPS
API 674 MULTIPLEX PLUNGER PUMPS
API 676 TWIN SCREW PUMPS
API 685 CENTRIFUGAL SEAL LESS PUMPS
ISO CENTRIFUGAL PUMPS
VACUUM UNITS

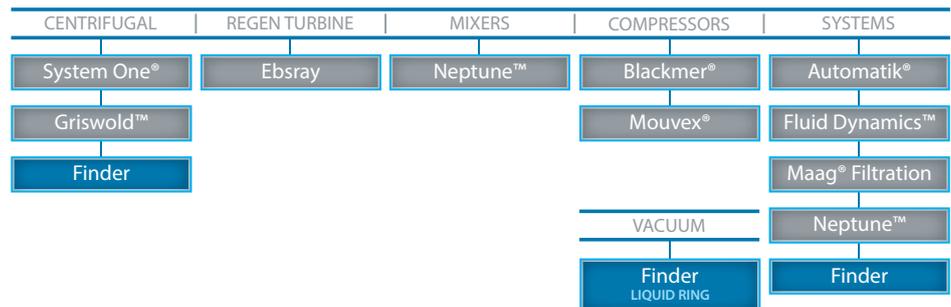
Dover's **Pump Solutions Group (PSG®)**, a global leader in flow-control solutions and supporting technologies, delivers value-added integrated flow-control solutions that serve customers requiring the safe and efficient transfer of critical and valuable materials. PSG features world-class pump brands and has multiple facilities on three continents (North America, Europe and Asia) that are ISO-certified. We are passionately committed to innovative flow-control technologies that will positively impact the world. Our priority is providing the market expertise you need by delivering tomorrow's innovative fluid and material-transfer solutions today.

Where Innovation Flows

POSITIVE DISPLACEMENT PUMPS



PUMPS & SYSTEMS TECHNOLOGIES



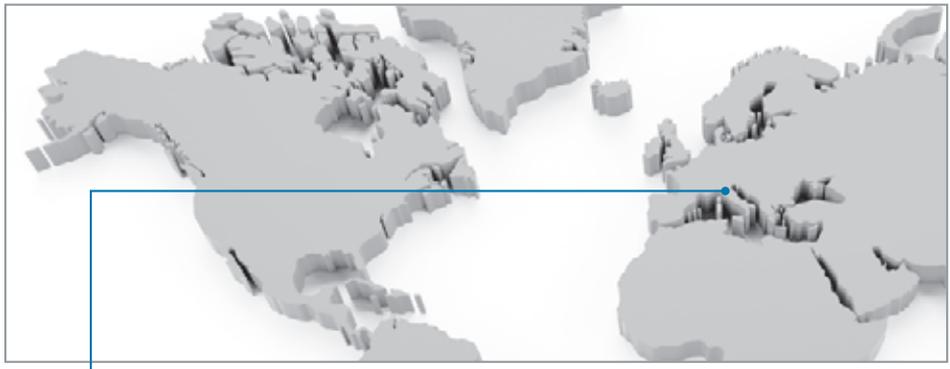


Who We Are



PSG features a broad array of leading pump and flow control technologies as well as world-class facilities in the U.S., Germany, Italy, France, China, India and Australia. PSG's leading infrastructure, knowledge base and intellectual capital truly make it the power behind fluid transfer.

- API 610 CENTRIFUGAL PUMPS
- API 674 MULTIPLEX PLUNGER PUMPS
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- VACUUM UNITS



FINDER – is a European leader in the design and manufacturing of engineered pumps and systems for a multitude of heavy-duty process and industrial applications requiring advanced technical flow solutions. With a worldwide customer base of major engineering companies and end-users, FINDER's centrifugal pumps, twin screw pumps, plunger pumps and vacuum package units are used round the clock in the oil & gas, nuclear energy, desalination, chemical, pharmaceutical and food industries.

FINDER has over 50 years of combined manufacturing and technical expertise for an extensive understanding of pump engineering technology and the pumping challenges faced by industries of all types.

With an extensive focus on research and development, FINDER knows that new products and innovative state-of-the-art solutions will continue to be the key to success in the years to come. In addition, each FINDER product is thoroughly tested to meet stringent quality standards before it ever leaves the factory to assure top performance and long life.

FINDER's global sales network covers all continents and over 75 countries through direct sales offices, local agents and distributors. This allows FINDER to quickly meet customers' needs and maintain direct, constant contact. All customers are supported by a customer service department dedicated to unheard of support for customer care and spare parts.

MARKETS SERVED

OIL & GAS

Finder offers a wide range of pumping solutions to the oil & gas market for upstream, midstream and downstream applications. The wide variety of available configurations are all fully compliant with API 610 (centrifugal), API 685 (centrifugal seal-less), API 676 (P.D. Twin Screw) and API 674 (P.D. Multiplex Plunger) norms and allow to find a proper solution for practically every customer's requirements. In addition, Finder's technical expertise, industry leadership and intellectual resources are the engine that drives its continual design and development of innovative solutions for the most challenging customer requirements.

Typical Applications Handled:

- Raw crude oil
- Crude oil
- Fuel/Biodiesel
- Refined petroleum products
- Ethanol
- Solvents
- Hydrocarbons
- Sulphur

NUCLEAR

Finder's wide range of PMH Multiplex Plunger Pumps are ideal for critical high-pressure installations requiring crucial reliability and service life.

All PMH Multiplex Plunger Pumps are in full compliance with API 674 – ISO13710 standards and can be customized to meet specific needs and requirements.

Typical Applications Handled:

- Reactor Boron Injection Systems
- Safety injection Pumps
- Reactor Coolant Hydrotest
- Reactor Coolant Pump Seal Water Injection

PETROCHEMICAL & CHEMICAL

Finder's large selection of pumping solutions, ranging from API pumps to ISO pumps to liquid ring vacuum pumps and systems, are perfect for a wide variety of applications in the petrochemical, chemical, pharmaceutical and food industries.

Typical Applications Handled:

- Acids
- Solvents
- General chemicals
- Caustics
- Plastic
- Ammonia

POWER GENERATION

When it comes to power generation, whether conventional or geothermal plants, Finder offers sophisticated vacuum systems based on the liquid ring technology as well as centrifugal and twin screw pumps.

Typical Applications Handled:

- Condenser air extraction
- Boiler Feedwater Deaeration Systems
- Flue gas desulphurisation systems
- Water Box Priming Systems
- Stainless Steel Pumps for Geothermal Plants

HYGIENIC

Finder can also offer a wide range of products for food, pharmaceutical and cosmetic applications.

Typical Applications Handled:

- Tomato sauce & ketchup
- Fruit purees
- Meat packaging
- Pharmaceutical

WATER & HVAC

Finder has been a major player since its founding in handling and transferring water for industrial general services, HVAC, agriculture.

Typical Applications Handled:

- HVAC
- Distribution
- Collection and disposal
- Irrigation
- Industrial water recirculation
- Metal fabrication





API610 OH2 Pumps

HPP | PEP | DUAL PEP

HPPMD | PEPMD

TECHNOLOGY: CENTRIFUGAL

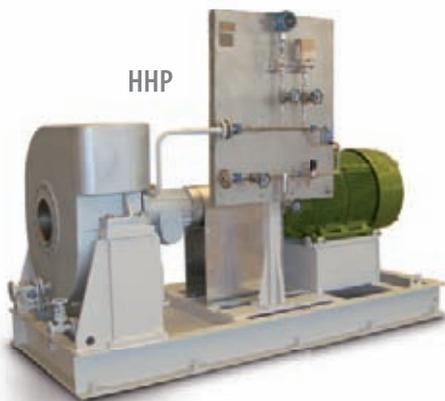
The HPP series meets API 610 standards, latest edition (ISO 13709). The pump casings are radially split, single or double volute. Stuffing boxes are designed to accommodate single or dual mechanical seals, according to the API 682 standard. Special designs, such as jacketed casings, reinforced bearings, etc., are available to meet specific process requirements.

PEP centrifugal process pumps integrate the HPP range in the low flow/high head field, ranging from 1 up to 35 m³/h capacity and up to 300 mt total head using a single impeller and without requiring a device to increase speed. Impeller and concentric volute design substantially reduce radial and axial thrusts on the shaft and bearings and prevent back-flow at low capacity for smooth operation and long service life even in extreme conditions. Simplicity in design also makes maintenance of PEP pumps easy and cost effective.

The Dual PEP overhung pump has two stages in a back-to-back configuration using the same PEP hydraulic concept. This provides all PEP advantages such as no backflow and high stability at low flow conditions, low NPSHr without the use of inducers, use of API 682 standard mechanical seals, high reliability and maintainability. The Dual PEP can be used on a capacity range up to 19 m³/h against a total dynamic head up to 550 m.l.c. without the use of speed increasing devices.

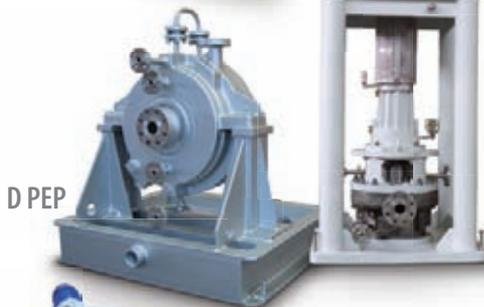
OH2 pumps (except D-PEP) are also available with magnetic coupling with hydraulics directly derived from HPP and PEP series in full compliance with the API 685 norms.

All material combinations listed in the API 610 material tables, plus erosion/corrosion resistant alloys, are available.



LOW FLOW HIGH HEAD Pumps

PEP | PEPMD | D PEP | L PEP
B PEP | L BPEP | V PEP



TECHNOLOGY: CENTRIFUGAL

The PEP pump range has been specifically designed to meet low flow, high head, low NPSHa API 610 requirements without requiring increased speed solutions.

Hydraulic working principles are the same described in the literature for "Partial Emission" or "Barske type" pumps i.e. open impeller with full radial vanes and 90° exit angle, concentric volute, the energy being transferred to the liquid in a forced vortex regime and converted into pressure in a diverging diffuser. The peculiarity of PEP range is that the required output velocity is obtained by increased impeller diameter instead of increased rotating speed. Low rotating speed grants low NPSHr values all over the operating range: in all PEP pumps, NPSHr remains less than 1m @ 3000 rpm without the use of inducers which are often restricting the pump operating region.

The result is a robust, maintenance-friendly pump for extreme service conditions: from less than 1 to 25 m³/hr, up to 300 mt head, with casing pressures 50 Bar and over, at temperatures up to 400°C and with any type of hazardous and flammable fluids.

Open impeller design and generous clearances allow moderate solid contents in the process fluid and surface coating if required.

The low-flow, high-head pumps are available in the following configurations:

- OH2 – PEP Series
- OH2 - Magnetic Driven – PEPMD
- OH2 – Dual stage – D-PEP Series
- OH3 – L-PEP Series
- BB2 – B-PEP Series
- VS4 – V-PEP
- Special version: BB2 in vertical execution

Advantages vs. conventional volute pumps

- Eliminates impeller backflow, which normally causes erosion, noise, vibrations
- Reduces radial load to prevent shaft deflection and high vibrations
- Provides low and stable NPSHr properties throughout the pump curve

Advantages vs. increased speed pumps

- Low and stable NPSHr, no inducer needed
- Less sensitive to off-design conditions
- Maintenance friendly: no gearbox; simple to disassemble and reassemble; easy to change cartridge mechanical seals
- Lower investment cost
- Lower maintenance costs

API610 OH3 Pumps

LHVN | L-PEP

TECHNOLOGY: CENTRIFUGAL

LHVN and L-PEP process pumps are single-stage, vertical in-line overhung type (OH3 configuration) and fully comply with API 610 Std. (ISO 13709), latest edition.

The pump casings are radially split with an in-line nozzle arrangement. Larger sizes are designed with twin volutes to minimize radial loads.

The shaft has a stiff design to assure the first lateral critical speed remains well above the operating speed of the pump.

The axial thrust to the rotor is supported by oil-lubricated ball bearings. The bearing housing and motor baseframe are mounted on the casing that is directly bolted on a foundation plate. Its vertical configuration provides a smaller footprint in limited space environments.

LHVN pumps can be used for a capacity range up to 3.000 m³/h with total dynamic head of 140 m.l.c. The L-PEP pumps cover the low flow-high head range from 1 to 35 cu.m./hr at 300 m head.

Pumps are available in any material listed in the API 610 tables.



LHVN

API610 BB1 Pumps

C2PO

TECHNOLOGY: CENTRIFUGAL

C2PO heavy duty process pumps are horizontal, between bearings, with axially split casing, double suction, one stage impeller (BB1 configuration), in full compliance with API 610 std., latest edition (ISO 13709).

The C2PO design achieves very high efficiency with low NPSHr values. Robust casing, stiff shaft design and different bearing arrangements for specific applications make the C2PO an extremely reliable pump with long service life and reduced maintenance costs.

With its specific design, inner parts are easily accessible without disconnecting the casing from the piping and the electric motor for labor savings in maintenance.

Pumps are available in any material listed in the API 610 tables. Other material combinations, such as erosion/corrosion resistant alloys, are also available upon request.



API610 BB2 Pumps

HPD | HPE | HPEDS

TECHNOLOGY: CENTRIFUGAL

Single and two stage between bearings process pumps, BB2 configuration, designed and manufactured according to API 610, latest edition. Their compact configuration and generously-sized components make these pumps suitable for the most critical applications. To minimize shaft and bearing loads, the axial thrust is intrinsically balanced. The HPD series is a double-suction design, while the HPE line can be configured in either a single- or double-suction version.

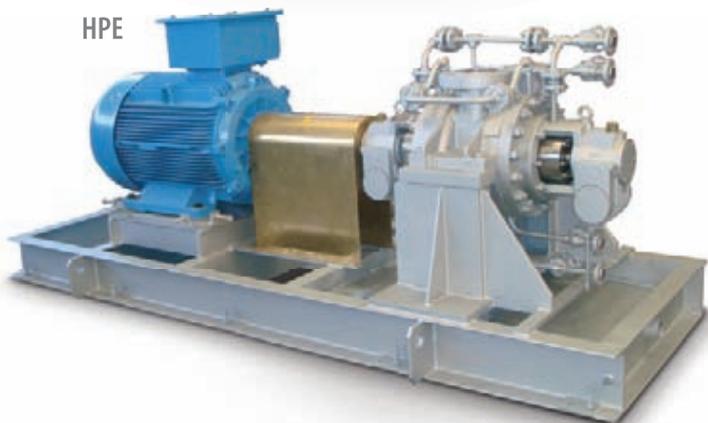
The pumps' advanced designs and precision manufacturing, including dynamic balancing of rotating parts, assure long-term equipment reliability and smooth operation with low residual vibrations. For high temperature duties, specifically designed stainless steel integral coolers can easily be installed for bearing cooling and can be quickly removed for maintenance without dismounting the bearing housing. Alternatively, high-efficiency, integrally-cast air fans can be installed on the drive and non-drive ends of the pump.

HPD and HPE pumps are available in any material listed in the API 610 tables. Other material combinations, such as special alloys for chemically aggressive services, are also available upon request.

HPD



HPE



API610 BB3 Pumps

HPM

TECHNOLOGY: CENTRIFUGAL

The HPM process pumps are multistage, axially split, volute type pumps with single or double suction first stage impeller that meet all requirements of the latest edition of API 610 standards.

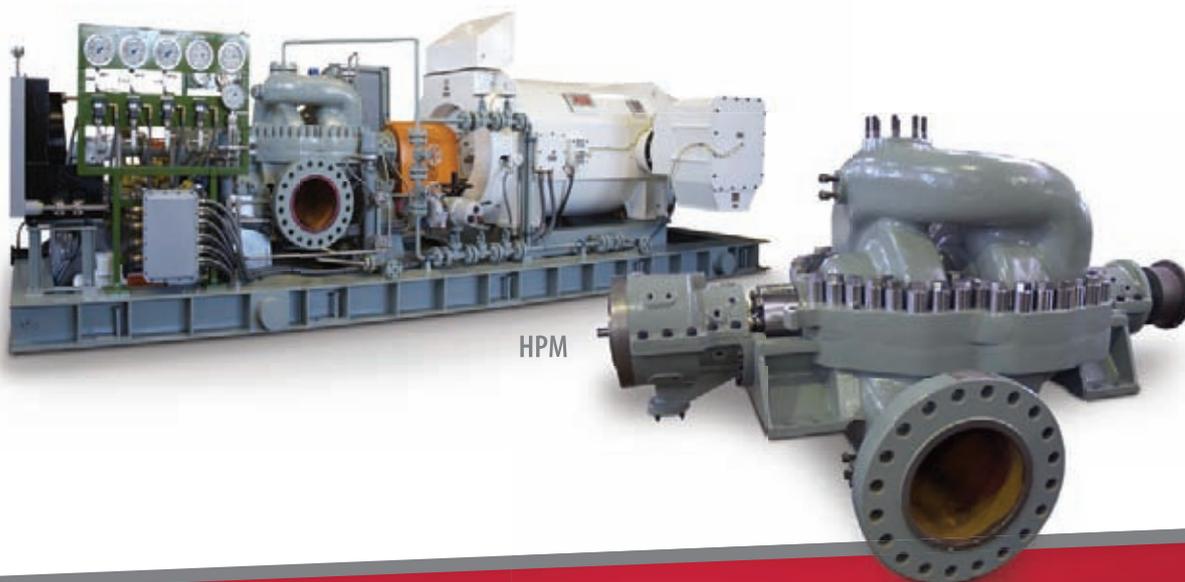
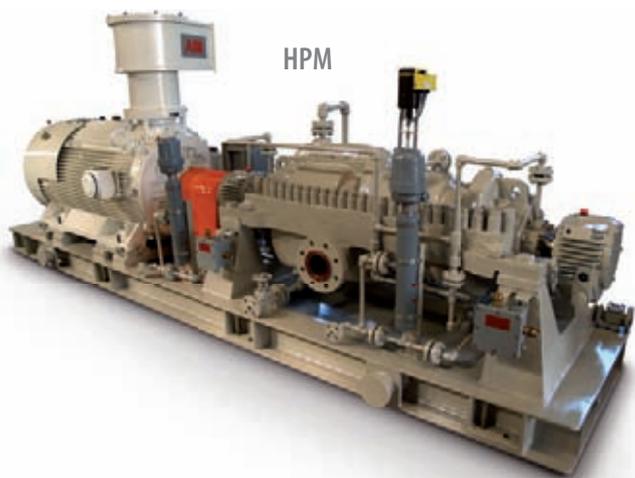
Casing is axially split; suction and discharge nozzles are integrally cast with the lower half casing. A crossover is integrally cast into the upper half casing to deliver pumped fluid from the first set of stages to the other stages.

Axial thrust is eliminated by back-to-back configuration of the impellers within the rotor.

The double volute design minimizes the hydraulic radial forces, thus reducing shaft deflection.

Single impellers and the complete rotor are dynamically balanced to reduce vibrations.

Shaft dynamic characteristics were precisely engineered to reduce deflection under the most severe operating conditions. Anti-friction bearings are standard. Hydrodynamic bearings (Journal bearing and tilting pad) are provided when requested by service or standard requirements.



API610 BB5 Pumps

HPMB



TECHNOLOGY: CENTRIFUGAL

The HPMB line of barrel pumps is multi-stage and suitable for heavy-duty applications such as oil and gas, refining and petrochemical, power plant boiler feedwater, water injection and reverse osmosis. The HPMB pump was designed and manufactured according to API 610, latest edition.

The pump casing is radially split, and the centerline is supported to eliminate the effects of the thermal expansions in case of high temperature applications. Standard HPMB pumps utilize vaned diffusers, and small capacity HPMB pumps (<80 m³/h) are equipped with double volute diffusers.

The opposed impeller and diffuser configuration allows it to minimize axial and radial thrusts. Full cartridge design allows quick and easy dismantling.

It is available with 4 to 13 stages with the ability to be “de-staged” to increase or decrease the number of stages and meet future requirements. For low NPSHr, the first stage impeller is larger than those of subsequent stages or is double suction.





API685 Pumps

HPPMD | PEPMD

TECHNOLOGY: CENTRIFUGAL

HPPMD and PEPMD pumps are designed and manufactured in full accordance with the API 685 (Seal-less Centrifugal Pumps for Petroleum, Heavy Duty Chemical and Gas Industry, latest edition, 2011) standards.

Hydraulics are directly derived from the API 610 series (HPP and PEP) while magnetic couplings, containment devices and inner bearings have been designed to comply with the most stringent requirements of the guiding norms.

The magnetic couplings are generously sized for the applied torques and manufactured with Samarium-Cobalt elements. The primary containment shell can be manufactured in Hastelloy C or Titanium alloy for high-pressure applications. The standard containment casing is designed to withstand the pump casing MAWP. The HPPMD series is also equipped with a compensation device to withstand axial and radial thermal expansion for smoother and more reliable operation at higher temperatures and in thermal transient conditions.

HPPMD

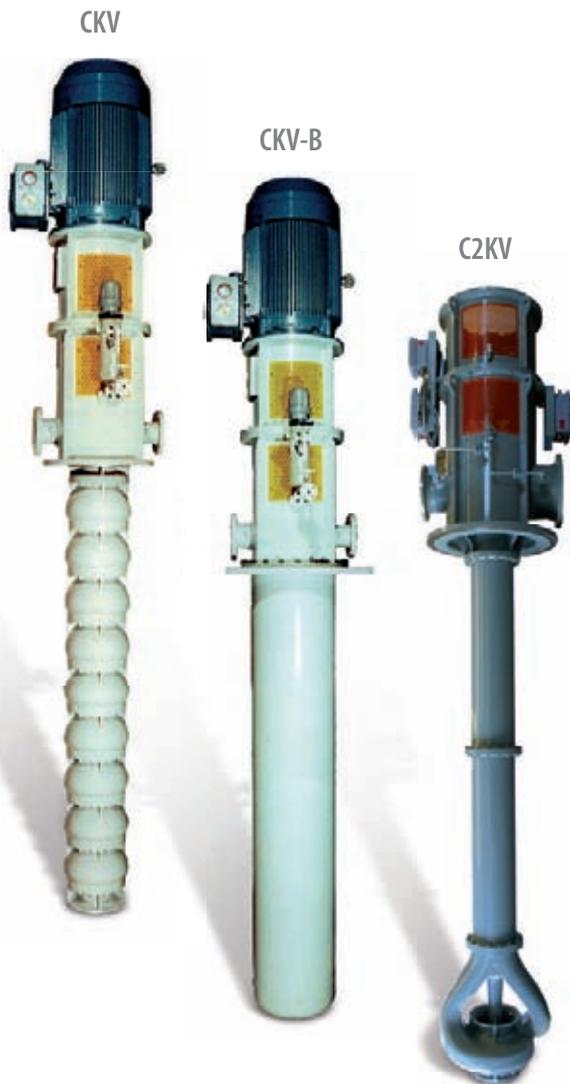


PEPMD



API610 VS1 VS4 VS6 Pumps

HPVT | CKVN | C2KV | HPV | V PEP



TECHNOLOGY: CENTRIFUGAL

HPVT, CKV and CKVN are vertically-suspended, single or multi-stage centrifugal pumps (VS1 or VS6 configuration), designed and built in full accordance with API 610 standards. The integrally-cast diffuser type bowls assure optimum hydraulic efficiency and minimum radial thrust.

A generously-sized, carefully-designed line shaft assures rotor stability and low vibration level. An oil-lubricated double row ball thrust bearing provides rotor axial positioning and support.

A rigid coupling with spacer allows the removal of the cartridge mechanical seal without interfering with motor positioning and alignment.

Line shaft bearings are lubricated by the pumped fluid and can be provided in different material combinations, depending on the fluid to be handled. PED and ASME design and certifications for can, column and discharge head are available as options.

C2KV and C2KV-N pumps are double-suction twin volute vertical wet pit pumps. Because of their specific design, these pumps strongly reduce NPSHr value and the axial thrust value.



CKV-T



TECHNOLOGY: CENTRIFUGAL

HPV and V PEP are API 610 compliant, vertically suspended, single-casing volute, line shaft driven VS4 type centrifugal sump pumps. Each HPV and V PEP pump is engineered to customer specifications, application and requirements. Any pump length from 0.5 down to 10 m below the mounting plate can be achieved.

Standard features include a single-piece shaft, guided by sleeve type line bearings where needed, that is lubricated by the pumped fluid or from an external lubricating source (clear liquid or grease) in abrasive services. Thrust bearings are generously sized and are available in both a grease- and oil-lubricated version.

The mounting plate can be provided in either a square or round shape. A mounting flange having the same pressure rating of the corresponding tank interface is also available as an option.

All pumps can be manufactured in several materials combinations including Duplex SS and corrosion resistance alloys.

HPV



HPVT



ENGINEERED CHEMICAL Pumps

HC | HCV | VX | VXV



TECHNOLOGY: CENTRIFUGAL

HC pumps are designed and manufactured according to ISO 5199 - ISO 2858 standards for a wide range of process applications in the chemical industry as well as other heavy-duty uses in all industrial sectors.

HC pumps, in back-pull-out execution, can be manufactured in any material combination. It contains a number of constructive features such as a seal gland for single, double and cartridge type mechanical seals; heating/cooling chambers on the pump casing and/or stuffing box; and flanges rated according to DIN and ANSI.

HC pumps are also available with a semi-open impeller (SO version) or an open impeller (VX Vortex design), which is suitable for fluids with suspended solids. HC and VX pumps are also available in vertical configurations: HCV and VXV with a shaft length of up to 10 m.

Vertical pumps can be supplied with a lip-seal, packing ring or mechanical seal.



API676 TWIN SCREW Pumps

RR | RRH

TECHNOLOGY: TWIN SCREW

RR and RRH pumps are P.D. twin-screw pumps, designed and manufactured according to API 676 standards. They represent the result of over one century's experience in the design of this technology.

The two rotors are machined from a single-block piece, and the intermeshing screws provide a synchronous operation thus balancing the axial hydraulic thrusts.

The screw bearing housing can either be internal or external in a wide variety of configurations according to customer requirements.

Screw motion is transferred by a coupled timing gear located inside one of the bearing housings. This configuration prevents metal-to-metal contact and resultant wear between the pump screws and provides a synchronous yet opposite rotation of the screws.

Mechanical seal seats are designed for compliance with API 682 standards.

As specified in API 676, the pump casing overpressure safety valve is supplied separately. However, it can be integrated and fitted onto the pump casing on request.

These pumps are used whenever a steady flow is required and are suitable for pumping both low and high viscosity fluids such as bitumen, mineral oils, hydrocarbons, fuel oils, etc.

Additionally, they are capable of pumping dirty fluids, even with some solid particles, as well as aggressive fluids such as acids and alkaline solutions provided the pump and its components are built with the appropriate materials.

By applying special constructive solutions, the RR and RRH twin-screw pumps are also suitable to convey fluids that include a moderate quantity of dissolved gases. They function well at low suction pressure conditions and with low NPSHr curves.

They can be supplied both in vertical and horizontal configurations for onshore and offshore applications.



MULTIPLEX PLUNGER Pumps

NF50



TECHNOLOGY: RECIPROCATING

Positive displacement reciprocating multiplex plunger pumps with a fixed stroke are specifically designed for extremely high-pressure applications and fully comply with the API 674 standard. They are suitable to transfer a wide range of fluids, including corrosive, aggressive and hazardous media, with viscosity up to 100 cst, solid contents up to 100 μm , but without vapor. They can be driven by electric, diesel or hydraulic motors.

Multiplex plunger pumps are designed for a pressure range from 50 Barg to 2000 Barg. The pump's configuration allows outflow to vary according to pump speed. If the application requires a variable flow rate, a variable speed drive can be used to easily modify the rotating speed of the pump. Alternatively, a regulator to recirculate the excess flow could be utilized.

NH 77



Reciprocating plunger pumps have packing type sealing to provide a seal between the plunger and sleeves. In order to ensure proper lubrication of the seal packing, a very small fluid leak is necessary. This leakage, which consists of few drops, is collected. In some applications, a collection system is available as an option to enable the recirculation of the packing leakage into the pump suction system.

TN 260





VACUUM Units



TECHNOLOGY: VACUUM LIQUID RING

Finder Pompe is a respected industry authority in developing engineered units according to customer requirements. Systems are provided skid mounted, complete with accessories for proper and safe operation, including instrumentation and controls. Finder Pompe units are reliable and easy to operate.

If operating conditions go beyond the potential performance provided by the liquid ring pump alone, Finder Pompe can provide hybrid units such as a combination of mechanical booster pumps or steam ejectors to work in conjunction with our liquid ring pumps. Both boosters and/or ejectors can be combined in series and in parallel to extend the compression ratio when a deeper vacuum is required. Hybrid systems are often a good option when the cooling medium temperature does not match the pump specifications.



Where Innovation Flows



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