RHEINHÜTTE PUMPEN

An ITT Brand

Fertiliser Production

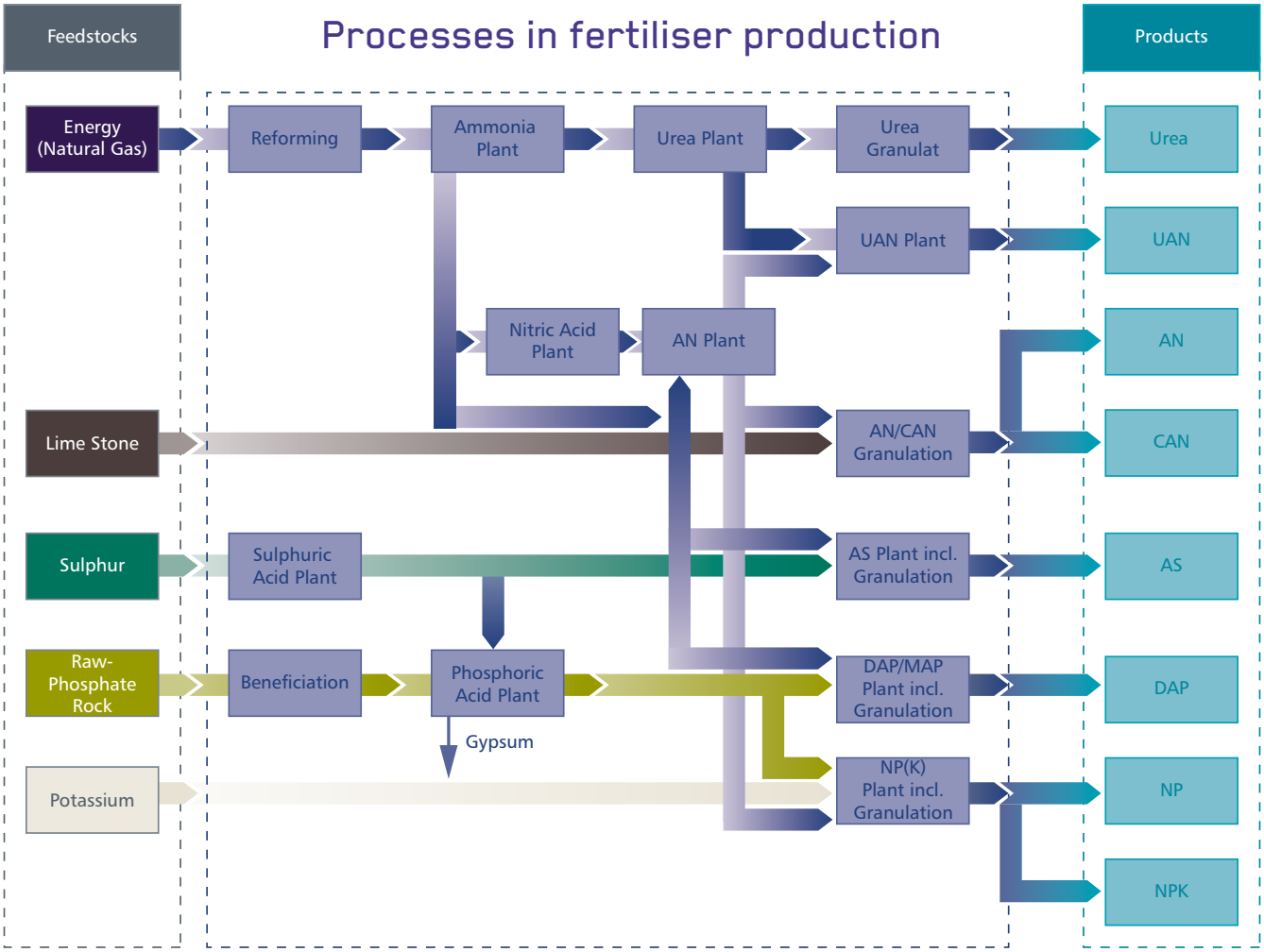
Horizontal and vertical pumps

Special pumps for fertiliser production

Flexibility, reliability, long lifetimes, simple maintenance and low operating costs are the requirements placed on modern fertiliser production plants. Rheinhütte Pumpen offers plant constructors and operators one of the most extensive ranges of pumps to meet these exacting standards.

Strengths of Rheinhütte Pumpen

- Pumps for all processes of fertiliser production
- Resistant special materials for aggressive media such as Nitric Acid, Ammonium Nitrate, P_2O_5, H_2SO_4 and H_3PO_4
- Plastic pumps for chemical waste waters, scrubbers, H_2SO_4 and H_3PO_4
- All types of pumps for H_2SO_4, H_3PO_4 and Molten Sulphur
- Special seals for Nitric Acid, Ammonium Nitrate, H_2SO_4, Molten Sulphur and Oleum
- Customized design options
- Customized safety instrumentations



As well as sunlight, water and carbon dioxide, plants also need nutrients and certain trace elements in order to grow. Providing agricultural crops with these essential nutrients is of major significance in today's world. A plant can only grow and flourish if it lacks nothing. The use of suitable fertilisers can often increase yields many times over.

The main nutrients are primarily nitrogen, phosphorous, potassium, sulphur or sulphates, calcium and magnesium. What are often called "compound fertilisers" (NPK) combine the primary and most important elements nitrogen (N), phosphorous (P) and Potassium (K). But customised blends and formulations are also common; the composition of these blends vary with differing amounts of primary nutrients and trace elements. A further point is that the elements needed by plants in the fertiliser must be in a bio-available form. There are soluble rapid release fertilisers, slow release fertilisers and delayed release fertilisers, each with a different formulation.

The market is therefore full of fertiliser products. This wide variety is also reflected in the manufacturing processes of the various products and their basic chemicals. When they have to be pumped from place to place, these intermediate products can take the form of suspensions (slurries), liquefied materials or solutions. The conveyance of each of these pumped media can present particular challenges to a centrifugal pump.

Alongside design adjustments, particularly for the different fertiliser applications, the choice of material also plays an important role in many cases. To ensure that our customised pumps operate reliably, we maintain stocks of a wide range of special materials which are optimised for wear and/or corrosion resistance.

Product Range

A wide variety of designs for fertiliser production

The Rheinhütte family of pumps offers specific solutions for all industrial processes used in fertiliser productions and are distinguished by the flexibility and range of designs. With due consideration of the special requirements for the pumped media and the express wishes of individual customers, the "appropriate" Rheinhütte pump is designed, the right material is chosen and the optimum type of seal is selected. This approach has ensured that for more than 55 years we have been a successful partner in fertiliser production.

						
	RCE	**RN**	**RMKN**	**GVRN**	**RCEV**	**GVSO**
Assembly type	Horizontal	Horizontal	Horizontal	Vertical	Vertical	Vertical
Q_{max}	1.200 m³/h 5,280 us. gpm	2.700 m³/h 11,890 us. gpm	500 m³/h 2,200 us. gpm	4.000 m³/h 17,610 us. gpm	900 m³/h 3,960 us. gpm	4.000 m³/h 17,610 us. gpm
H_{max}	180 m 590 ft	150 m 490 ft	150 m 490 ft	85 m 279 ft	85 m 279 ft	180 m 591 ft
Medium temperature max.	+450 °C +842 °F	+300 °C +572 °F	+250 °C + 482 °F	+250 °C + 482 °F	+200 °C +392 °F	+600 °C +1112 °F
Submersible depth max.	–	–	–	3,4 m 11,2 ft	2 m 6,5 ft	17,5 m 57 ft
Solid content max. %	~ 35 %	~ 5 %	~ 2 %	~ 4 %	~ 35 %	~ 2 %
Impeller design	closed, open	closed, open	closed, open	closed	closed, open	closed
Shaft seal type	hydrodynamic shaft seals with and without stuffing box packing, mechanical seal	hydrodynamic shaft seals with and without stuffing box packing, mechanical seal	magnetic coupling	mechanical seal, stuffing box packing	lip ring seal, stuffing box packing	mechanical seal, stuffing box packing, magnetic coupling (GVSOM)
Materials	wear-resistant alloys, cast steel, various stainless steels, nickel-based alloys	cast steel, various stainless steels, nickel-based alloys	wear-resistant alloys, cast steel, various stainless steels, nickel-based alloys	high-alloy cast steel	alloys, cast steel, various stainless steels, nickel-based alloys	cast steel, various stainless steels

					
R PROP	**RVKu**	**RKuV**	**FNPM**	**CPRF**	**RCNKu⁺**
Horizontal	Vertical	Vertikal	Horizontal	Horizontal	Horizontal
8.500 m³/h 37,420 us. gpm	1.000 m³/h 4,400 us. gpm	120 m³/h 528 us. gpm	350 m³/h 1540 us. gpm	200 m³/h 880 us. gpm	400 m³/h 1,760 us. gpm
6,5 m 21 ft	70 m 230 ft	60 m 197 ft	100 m 328 ft	100 m 328 ft	110 m 361 ft
+150 °C +302 °F	+190 °C +374 °F	+100 °C +212 °F	+190 °C +374 °F	+190 °C +374 °F	+130 °C +266 °F
–	+3 m 9,8 ft	+1,8 m 5,9 ft	–	–	–
~ 30 %	~ 30 %	~ 30 %	~ 3 %	~ 5 %	~ 5 %
Propeller	closed	open	closed	free flow impeller	closed, free flow impeller
mechanical seal	mechanical seal	mechanical seal	magnetic coupling	mechanical seal	mechanical seal
various stainless steels in cast or semi-finished design, nickel-based alloys	polyolefins and fluoropolymers	polyolefins and fluoropolymers	fluoropolymers	polyolefins and fluoropolymers	Polyolefins and fluoropolymers

Metallic Materials

The range of metallic materials encom-passes a wide variety of very different types of material which are distinguished mainly by their alloy composition, their structure and their manufacturing process. This gives each material its characteristic properties and allows an optimal material to be selected to suit the application.

1.4136S / RHRS

Corrosion and erosion resistant high alloy ferritic cast steel. Typical applications are highly concentrated sulphuric acid up to 225 °C (437 °F), oleum, fertilizer RHRS production, crude phosphoric acid containing solids.

1.4306 S

High-quality, molybdenum-free material suitable for applications such as pumping of ammonium nitrate melt, hot nitric acid at medium concentrations and also the vaporization of waste nitric acid.

1.4361

Low carbon silicon alloy material for pumping strongly oxidizing media. Particularly suitable for hot highly concentrated nitric acid, e.g. 98 % HNO_3

1.4408

Austenitic chromium nickel molybdenum steels with good general corrosion resistance. These materials are suitable for pumping almost all organic liquids, pure phosphoric acid, dry chlorine, liquid sulphur, PTA and many other media.

1.4463

Semi-austenitic, easily welded material with an increased strength and a good general resistance to corrosion. Due to good welding properties and wear resistance it is frequently used for jacketed pumps for handling melts containing solids, such as Urea melting.

1.4517

Duplex (Semi-austenitic), molybdenum and copper alloyed material with a high resistance to pitting and stress corrosion. This material is one of the super duplex steels. It can be used with crude phosphoric acid, containing solids at up to 100 °C (212 °F), hot sea water, many solutions containing chloride and sulphuric acid at all concentrations at low temperatures.

R 3020

Fully austenitic special stainless steel with a high of chrome and nickel content. High resistance to pitting, stress corrosion and intercrystalline corrosion. Suitable for 70 % caustic soda up to 200 °C (392 °F), sulphuric acid at all concentrations at low and medium temperatures, in certain areas of the manufacture of phosphoric acid and for pumping solutions with a high chloride content.

1.4529 S

A fully austenitic cast material highly resistant to acidic media containing solids and rich in chlorides. Used in phophoric acid production, in vaporization and crystallization processes and for hot sea water.

1.4652 S

Higher austentic cast material with extremely high corrosion resistance. This material is particularly suitable for raw phosphoric acid under high corrosion load.

Plastic Materials

Rheinhütte Pumpen chemical centrifugal pumps are available in a wide range of plastics. Our material experts help you to choose the right material. Plastics are in particular demand in applications with high corrosion resistance requirements, in order to ensure a long pump life cycle.

PP – Polypropylene

In many applications PP represents an economical alternative to high grade metallic materials. This material is suitable for pumping salt solutions, almost all dilute alkalis and acids and is also frequently used in hydrochloric acid pickling solutions. It can be used for working temperatures between 0 °C and 100 °C (32 and 212 °F).

PE 1000 (UHMW-PE) – Polyethylene

The outstanding property of this high molecular weight polymer is its wear resistance to solids in the pumped medium. Added to this is a broad spectrum of corrosion resistance. Its usable temperature range is between -50 to 80 °C (-58 to 176 °F). Its general corrosion resistance exceeds that of PP in some cases. Due to its very high wear resistance, centrifugal pumps made of PE are often used for media such as H_2SiF_6 with corrosive and abrasive properties, as they occur in the production of phosphoric acid.

PE 1000R – Polyethylene

PE 1000R is a further development of the standard polyethylene PE 1000 with wear-reducing additives for up to 20 % higher resistance – for use in highly abrasive suspensions with process-critical solids content. The material can be used at temperatures from -50 °C to +80 °C (-58 to 176 °F).

PVDF – Polyvinylidene-Flouride

PVDF is distinguished by its excellent general corrosion resistance. Its high resistance to stress cracks and its ability to resist UV. For temperature ranges between -20 °C and 130 °C (-4 and 266 °F). This material is particularly suitable for the pumping of hydrofluoric acid at all concentrations up to boiling point, liquids containing halogens, nitric / hydrofluoric acid pickling solutions, and for the evaporation of waste hydrochloric acid.

PFA – Perfluoralkoxi

PFA is a perfluorinated alkyl vinyl ether ether. Centrifugal pumps lined with PFA can be used up to 180 °C (392 °F). With a few exceptions this material has a universal resistance to chemicals.

PTFE – Polytetrafluoroethylene

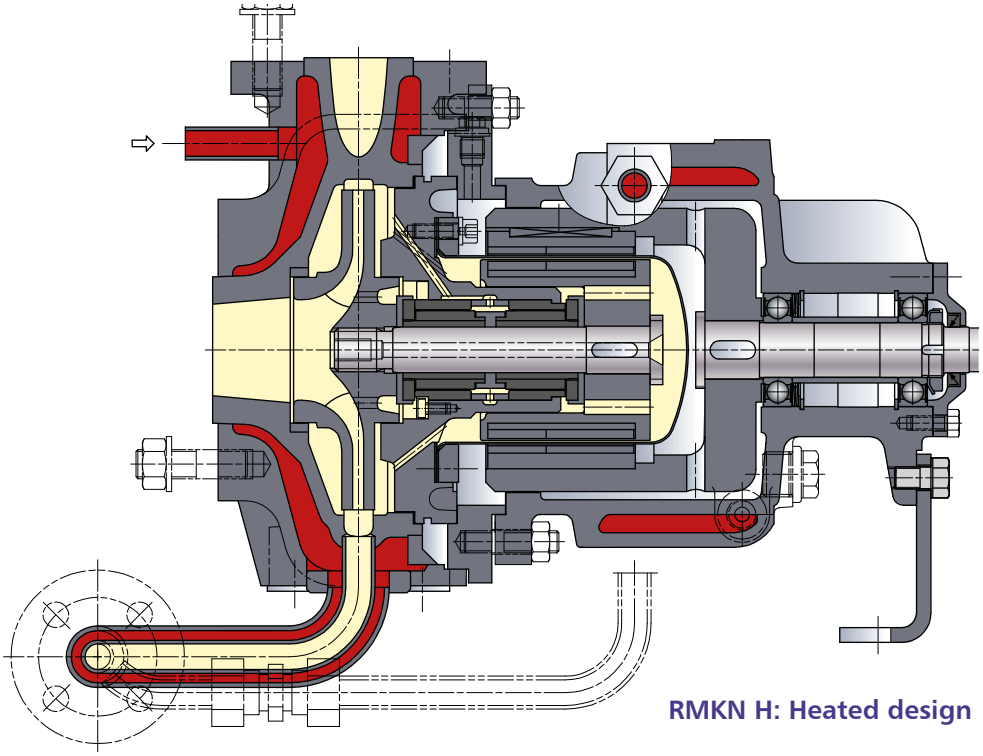
PTFE shows an outstanding resistance against nearly all organic and inorganic media over a wide temperature range. Centrifugal pumps made of PTFE can be used between -50 °C and 180 °C (-58 and 392 °F).

Suitable sealing systems

Perfection through combination

The safe conveyance of your media requires optimal coordination and combination of pump design, sealing system and pump material. We can supply all components needed to solve your particular conveyance requirements.

If the plant is to work safely and economically the pump design and sealing system must be perfectly matched with each other. The following sealing systems can be used depending on the conveyance conditions.



RMKN H: Heated design

Magnetic coupling

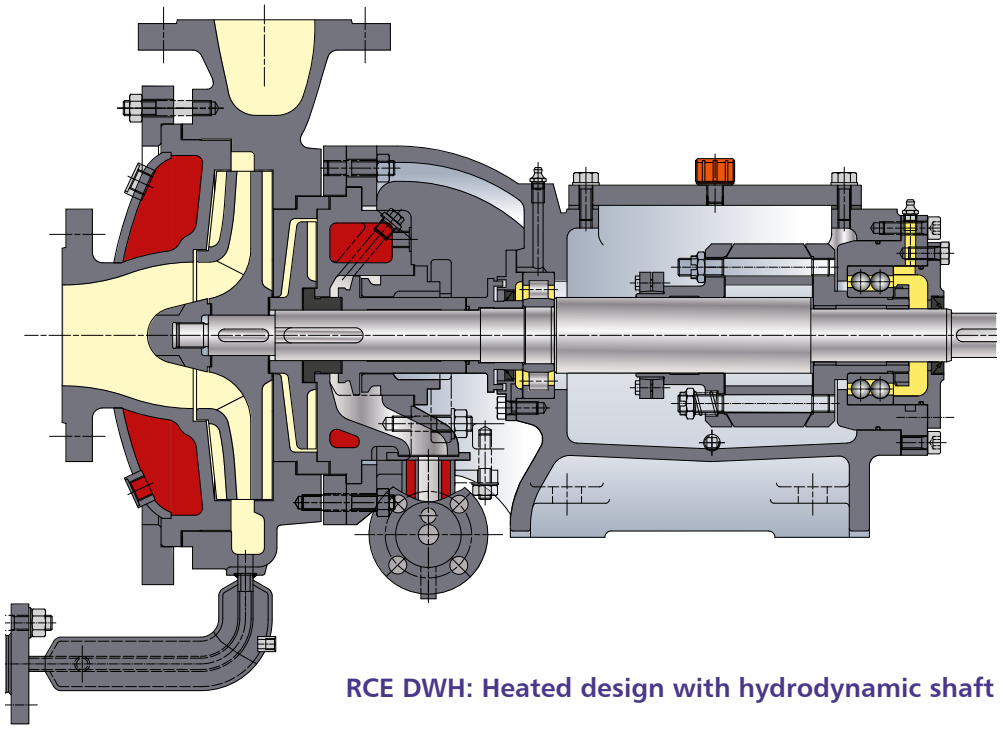
The magnetic coupling is based on a completely different sealing principle. Here the drive for the hydraulic part of the pump takes place through the pairing of permanent magnets whose external unit transmits the torque generated by the motor to an internal unit, which in turn transfers this to the impeller.

The external or atmosphere side magnet system is separated from the internal product side magnetic system by a spacer can made of non-magnetic material. The torque needed to drive the impeller is transmitted exclusively by magnetic forces which act through the spacer can. The pump it is thus hermetically sealed.

The axial and radial mountings for the pump shaft are through hydro-dynamic sleeve bearings made of silicon-free silicon carbide. Bearing lubrication and heat removal normally takes place through the pumped medium, in two separate circuits.

Advantages:

- Rheinhütte standard used for clean sulphur
- Perfect for sulfur loading pumps (intermediate operation)
- 100 % leakage-free
- Pump according to DIN 5199



RCE DWH: Heated design with hydrodynamic shaft sealing and ring valve

Hydrodynamic shaft seal

The hydrodynamic shaft seal works without contact and without wearing parts. It requires no maintenance of any sort and is particularly suitable for continuous operation. With the aid of impeller back blades and a downstream auxiliary propeller the shaft gland is completely relieved hydrodynamically from the pump and inlet pressure. The medium is kept away from the shaft gland.

When the pump is operating a liquid ring appears in the auxiliary impeller which isolates the inner pump chamber from the atmosphere without any leakage. The hydrodynamic shaft seal thus only functions fully during operation of the pump. After switching off the pump a stationary seal takes over the task of sealing the shaft gland from the outside. For this a choice can be made between a simple packing gland, a pneumatic system or even a mechanically controlled ring valve of various designs.

The hydrodynamic shaft seal, with few exceptions, is suitable for all pure or solids bearing media which occur in the chemical industry.

Option: grease lock safety seal

In order to prevent the possibility of uncontrolled leakage of medium in the event of an unscheduled stop of a pump with hydrodynamic shaft sealing, Rheinhütte developed the grease lock safety seal.
When the pump stops, the shaft passage (packing chamber) is automatically sealed with a pressurised grease (grease lock) resistant to medium and temperature. An uncontrolled leakage of medium is effectively prevented. The pressure required for sealing is monitored by an automatic control system and, if necessary, readjusted by means of the grease pump. The seal is simply operated via a display and, if necessary, connected to a control centre or monitoring system via an interface. In H_2SO_4 applications, especially at high temperatures and concentrations, this combination of hydrodynamic shaft sealing and grease lock safety seal is a simple and reliable solution.

Mechanical seals

ALLPAC S and RHETA®

Single or double acting mechanical seals are used to seal the shaft gland. Sealing is achieved through axial sliding faces which are pressed against each other by spring force and this prevents them opening when at rest. The stationary part of the mechanical seal usually sits in a housing and the rotating unit on the shaft sleeve. In the sealing gap between the sliding faces a lubricating film is generated by the pumped medium in order to prevent the sliding faces running dry.

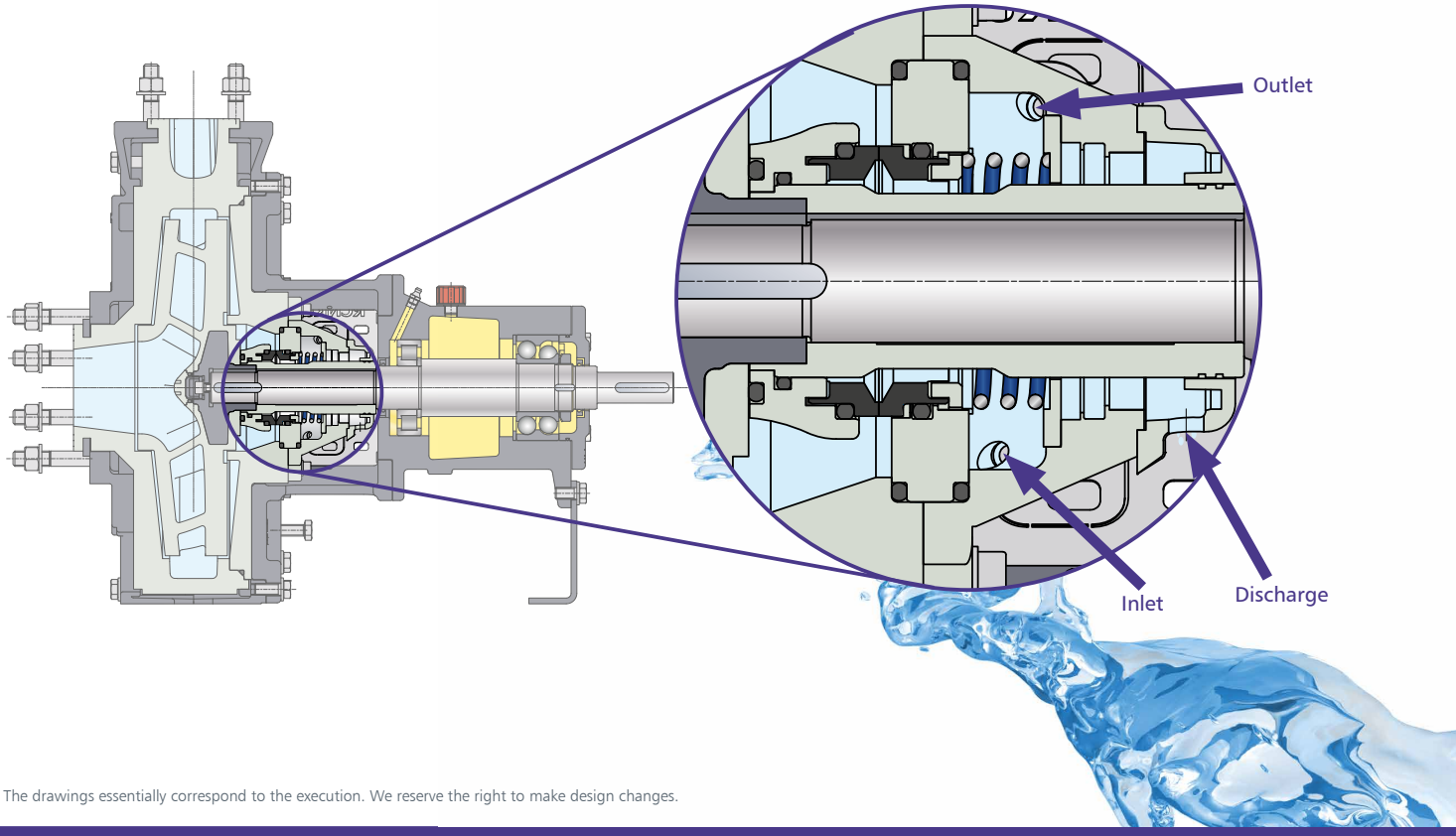
Allpac S

The standard mechanical seal Allpac S can be used universally, even with abrasive media, and is also characterised by its ease of maintenance due to the small number of components. With the double acting mechanical seal two seals are arranged one behind the other so that an additional space occurs between the sliding face of the seals which in turn can be supplied with a pressurised external sealing medium. This ensures that no product can escape into the atmosphere.

RHETA® - Easy To Assemble

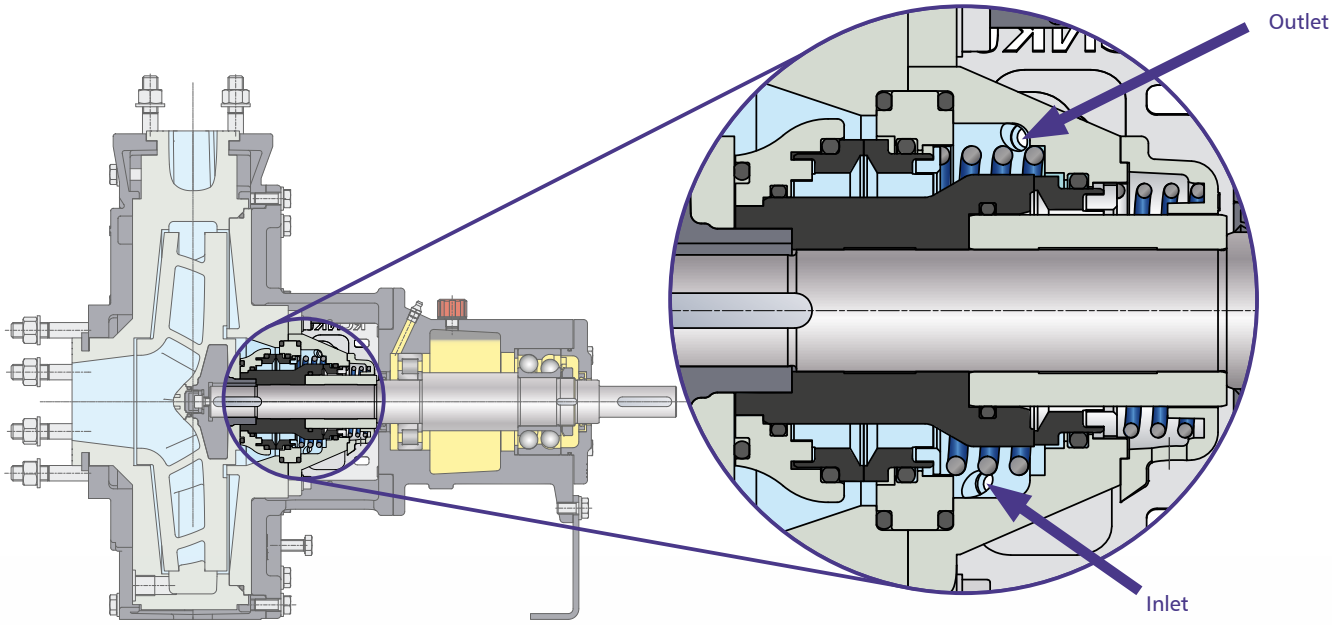
The metal-free mechanical seal designed by RHEINHÜTTE pumps is characterised by its high level of serviceability. Disassembly and assembly can be carried out quickly and smoothly from one side , which is a great advantage for maintenance and servicing.
Due to the ingenious parts concept, it is also possible to change, quickly and easily, from a single to a double-acting mechanical seal. The parts for the second mechanical seal are simply retrofitted.
RHETA® consists of innovative, metal-free materials, which contribute to the long service life of the seal due to their corrosion resistance. The individual parts of the seal are made of chemically stable plastics , which can easily withstand high temperatures of up to 130 °C, and have a high degree of standardisation. Chambers and channels are designed to optimise flow for the respective individual rinsing concepts.

Single-acting mechanical seal RHETA® CS with service flushing



The drawings essentially correspond to the execution. We reserve the right to make design changes.

Double-acting mechanical seal RHETA® CST



Service flushing as standard

RHETA® offers a cost-effective solution for regular rinsing, as service rinsing is integrated into the design of the CS product. Crystallisation residues and deposits can be rinsed out of the seal using different rinsing modes. Simple rinsing is possible in the standard CS design, which can be carried out during operation and standstill. So-called service flushing takes place via the lower rinsing connection with a pressure of approximately 0.3 bar. The rinsing liquid is discharged via the upper rinsing connection (see illustration). Rinsing can be performed as often as required.
The CST seal offers a convenient solution when permanent rinsing is needed.
The end-of-work (CSR) and external (CSX) rinsing connections are provided as standard and so can be used at any time.

RHEINHÜTTE PUMPEN

An ITT Brand

ITT RHEINHÜTTE Pumpen GmbH
Rheingaustraße 96-98
D-65203 Wiesbaden
T +49 611 604-0
info@rheinhuette.de
www.rheinhuette.de