

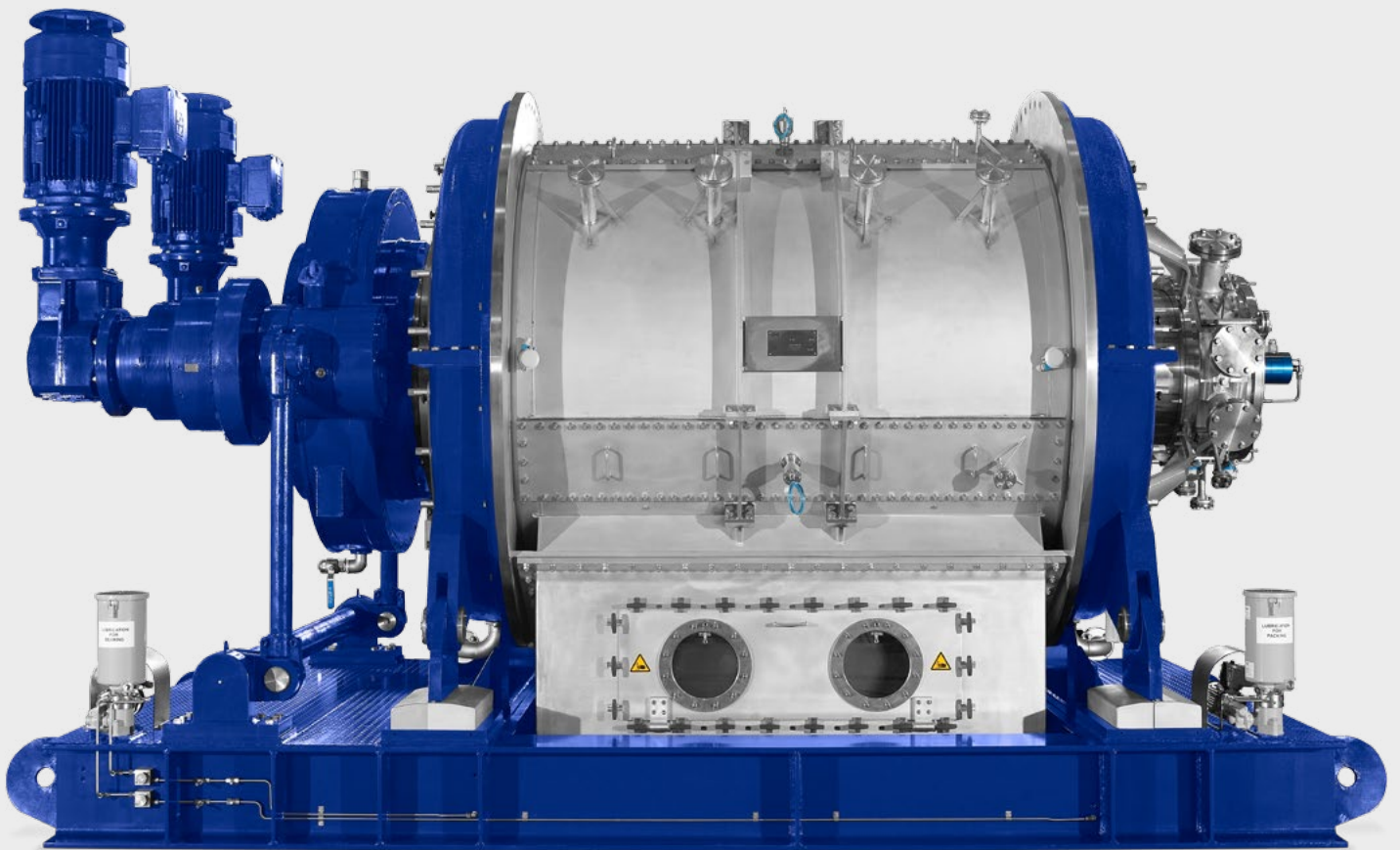
RPF

Rotary Pressure Filter

High process versatility in filtration technology

BHS
SONTHOFEN

TRANSFORMING
MATERIALS
INTO VALUE



Headquarters of BHS-Sonthofen



TRANSFORMING MATERIALS INTO VALUE

BHS
SONTHOFEN



The company

BHS-Sonthofen, headquartered in Sonthofen, Germany, is an owner-operated group of companies in the field of machine and plant engineering. We offer technical solutions in the field of mechanical process engineering, with a focus on mixing, crushing, recycling and filtration. With over 300 employees and a number of subsidiaries, BHS-Sonthofen has a global presence.

Cake filtration

BHS has specialized in cake filtration for more than 50 years. We supply a broad range of pressure and vacuum filters for both batch and continuous operation. We have accumulated a great wealth of experience. The number of applications that have been implemented is in the thousands. All BHS filters are characterized by the fact that they work with a thin cake.

Filtration tests

BHS has a range of pilot and lab filters available for customer-specific filtration tests. These are available for rent; BHS advises on all application-related matters.

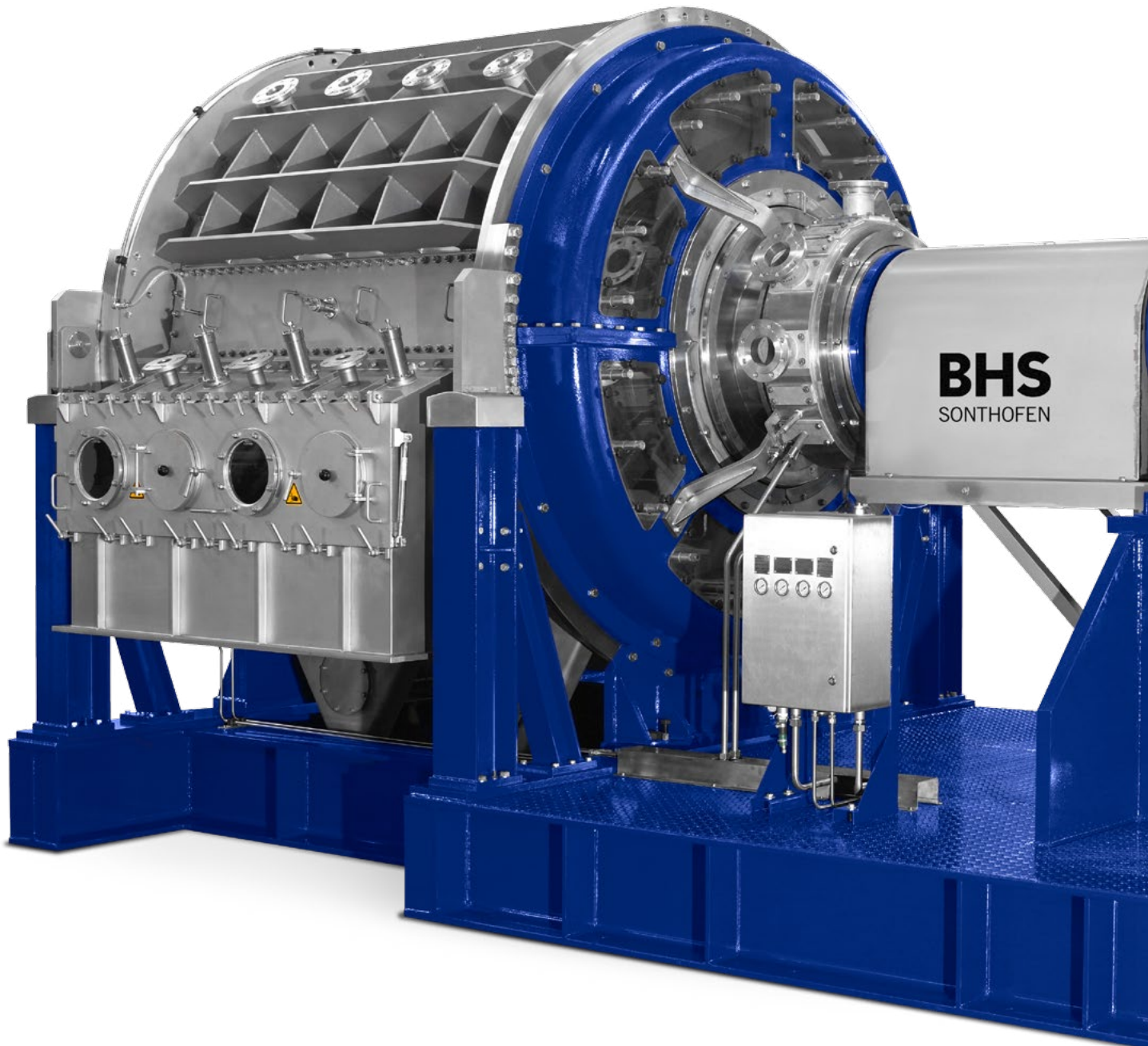
Worldwide service

BHS offers quick and reliable service worldwide with its technical customer support and a large stock of spare parts for all standard machine types and also for older machines.

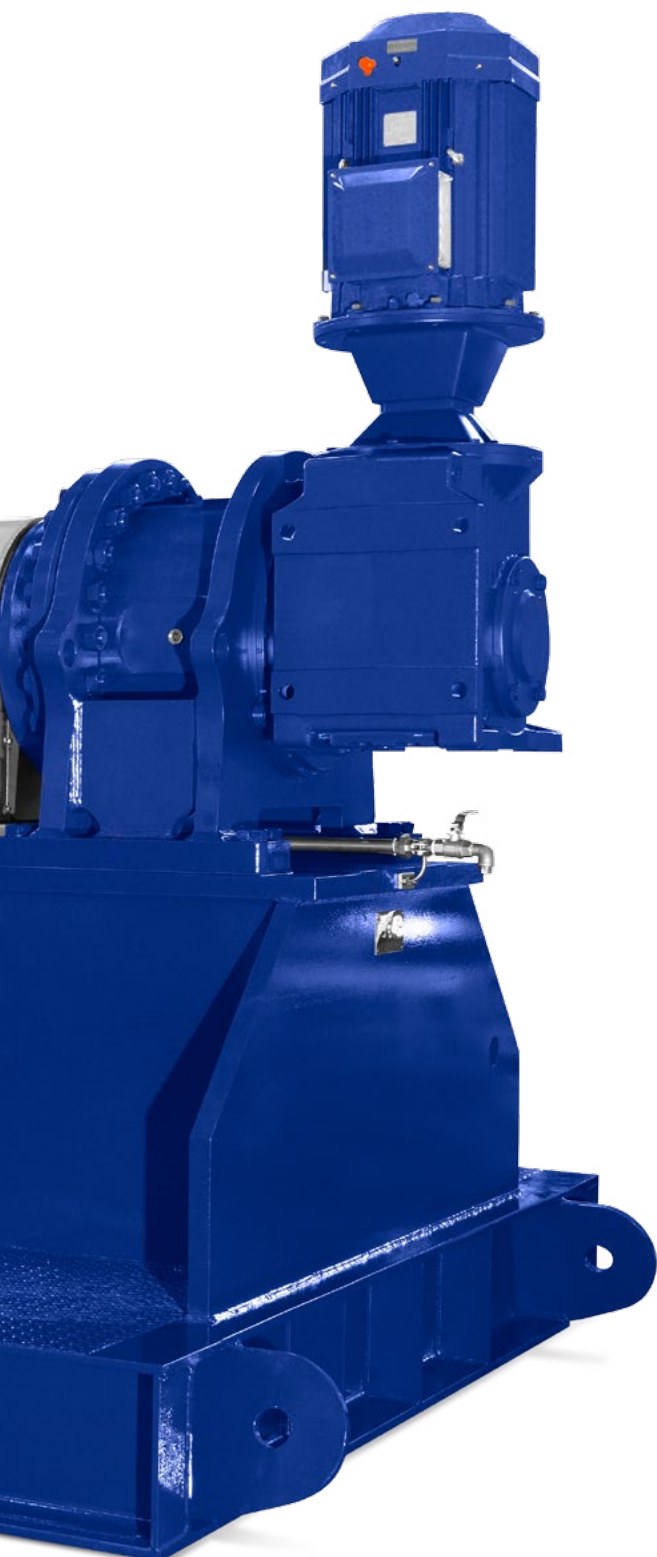
www.bhs-sonthofen.com

BHS rotary pressure filter (RPF)

The BHS rotary pressure filter (type RPF) is a continuously operating filter for pressure filtration, allowing gas-tight cake treatment in several separate process steps. For example the cake treatment can consist of single- or multi-stage cake washing and cake drying. The cake can be discharged under atmospheric conditions. The range of applications is wide and covers, in particular, bulk chemicals, fine chemicals and the pharmaceutical and food processing industries.



RPF X16 rotary pressure filter with CenterDrive



High process versatility

The rotary pressure filter makes a large number of process steps possible during one drum revolution. After the suspension has been separated into filtrate and filter cake, the rotary pressure filter additionally enables the following operations: single- or multi-stage cake washing, displacement washing, counter-current washing, closed-cycle washing, reslurrying, solvent exchange, steaming, extraction and mechanical or thermal cake dewatering. All process steps are performed in separate segment zones inside the filter. This allows filtrates and other fluids to be drained off separately.

Self-contained, gas-tight operation

The rotary pressure filter is a completely self-contained unit allowing gas-tight integration into a production process. This enables the rotary pressure filter to be implemented even in operating environments subject to strict safety or hygiene regulations.

Variable process pressures and temperatures

The rotary pressure filter operates at a pressure of up to 7 bar (g) and operating temperatures from approx. -20° to approx. 160° Celsius. In all process steps, pressure is generated hydraulically by feeding suspension, wash liquids or extraction agents and not pneumatically by gas layers. This allows an individual process optimization of each step.

Atmospheric cake discharge

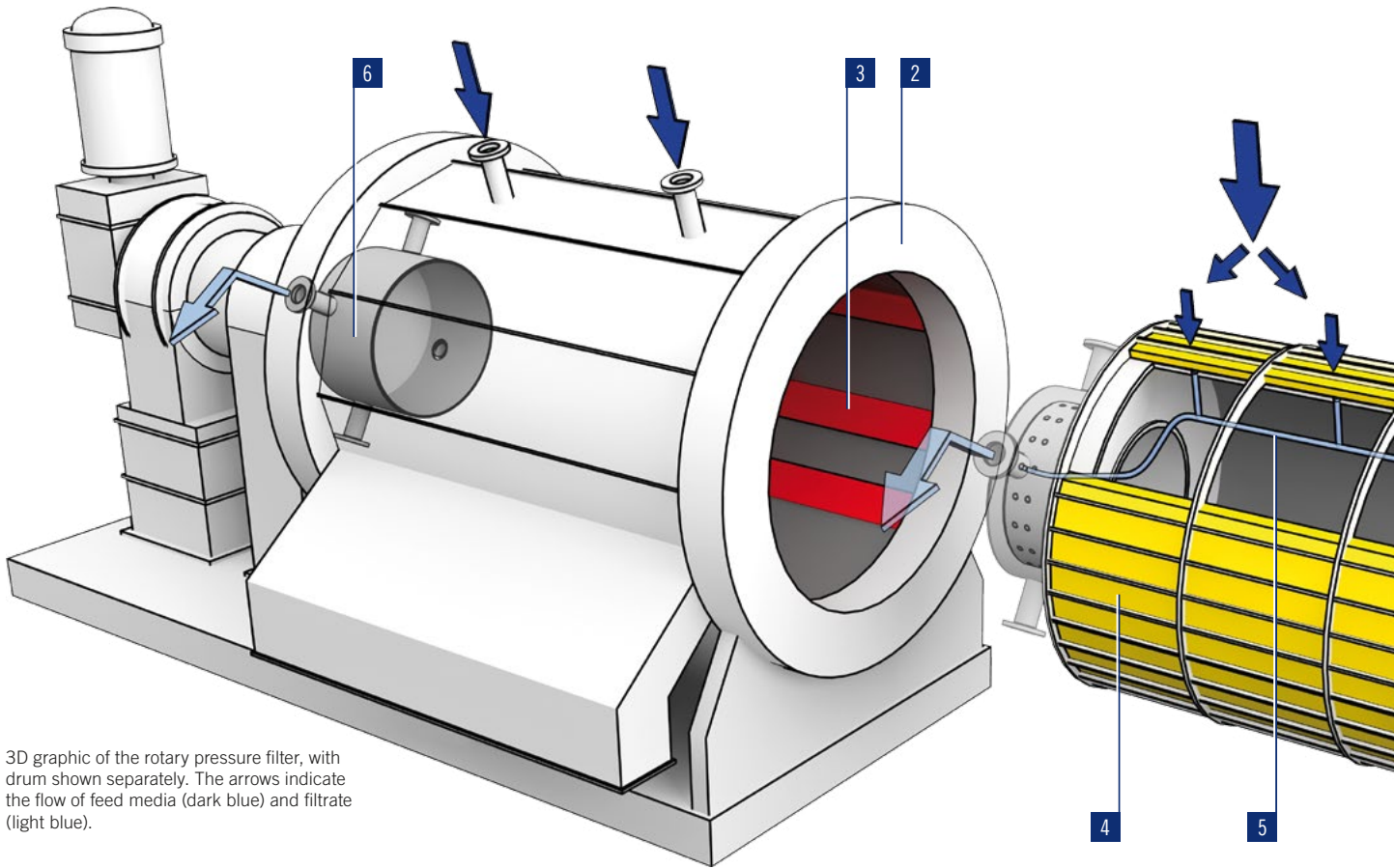
Each process step is sealed off as an independent segment zone inside the rotary pressure filter by means of pressure-tight separating elements. The cake can be discharged directly at atmospheric pressure.

Materials

Depending on the specific application, we use different qualities of stainless steel. For certain applications, high-quality sealing materials and state-of-the-art plastics are used.

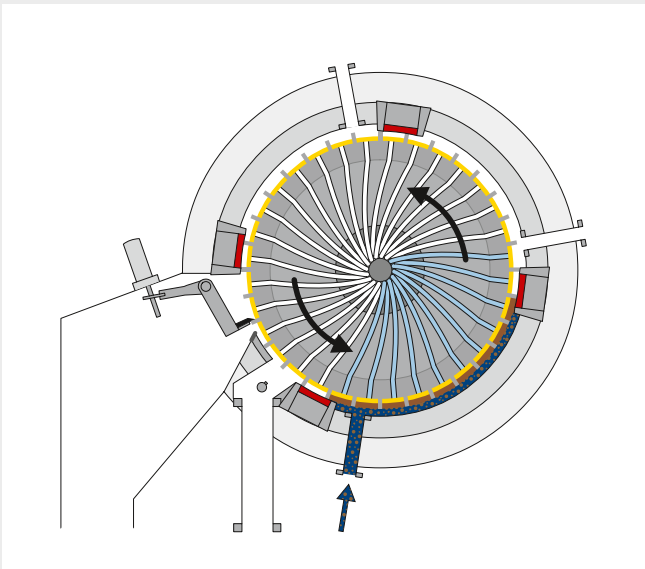
ATEX

We are ATEX certified. For applications in the pharmaceutical, food and bioprocess industries, we make specially equipped filters.



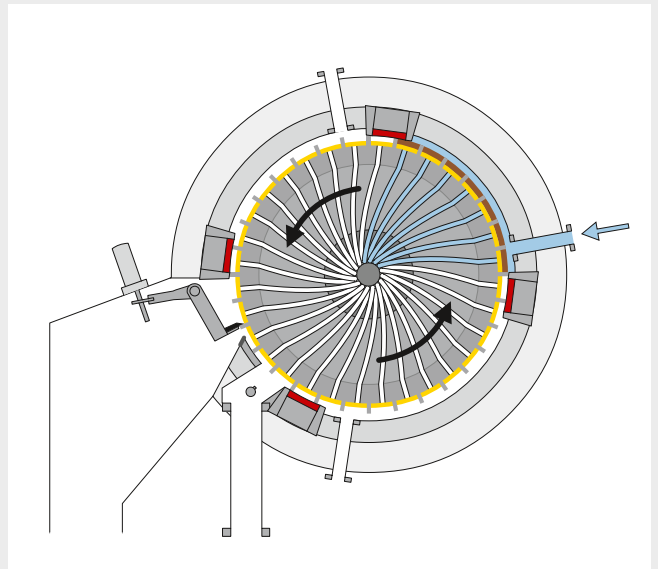
3D graphic of the rotary pressure filter, with drum shown separately. The arrows indicate the flow of feed media (dark blue) and filtrate (light blue).

Description of the individual process steps in the rotary pressure filter



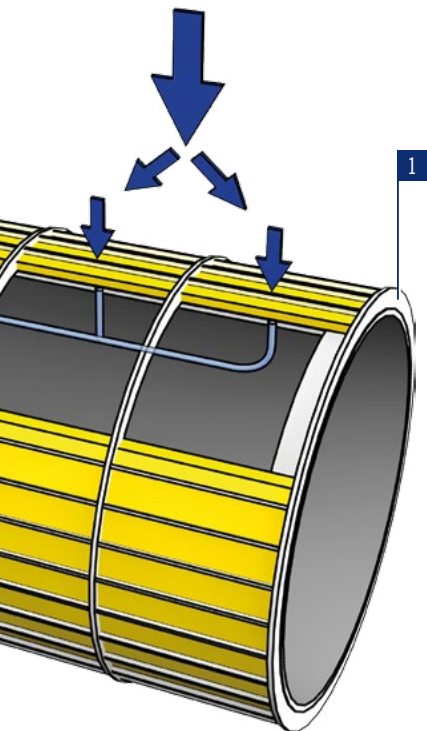
Suspension feed & filtration

The suspension is fed continuously and under pressure to the filter. In the filter cells, the filter cake forms on the filter elements and is conveyed into the downstream segment zones by rotation of the drum. The filtrate drains off the cells through the pipe systems to the control head.

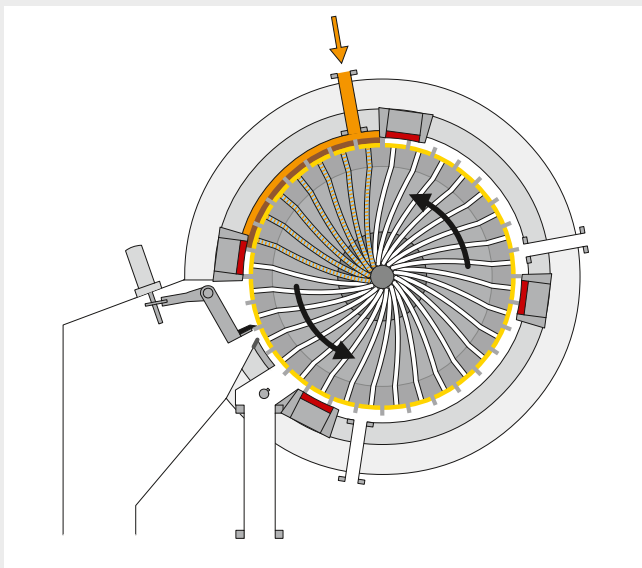


Cake washing

Depending on the specific requirements, washing, extraction or steaming can take place in one or more stages. As the segment zones are completely filled, an ideal single-phase displacement flow is ensured through the cake. The washing fluid is drained through the pipe system to the control head, where it can be collected in unmixed form.

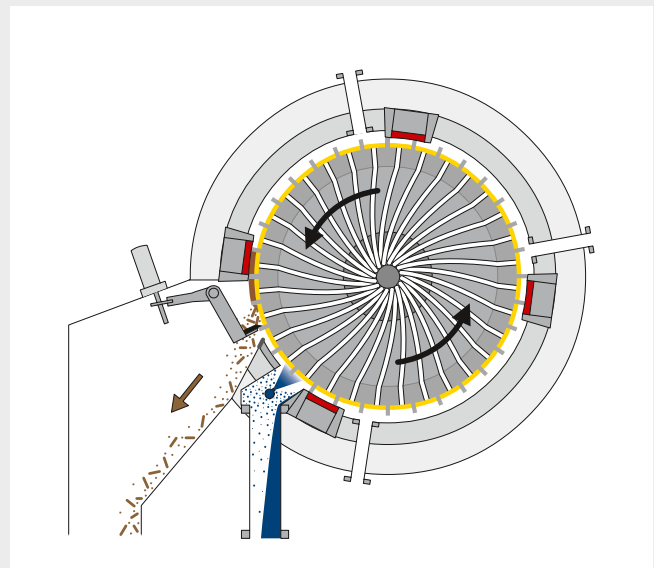


The filter drum **1** rotates continuously in a pressure-sealed housing **2** at infinitely variable speed. The annular space between drum and housing is sealed to the sides by specially designed stuffing boxes and divided longitudinally into a number of pressure-tight segment zones by separating elements **3**. The surface of the drum consists of filter cells **4** connected to the control head **6** via drainage pipes **5**.



Cake drying

In the next step, the filter cake can be dried. Targeted dewatering is accomplished by means of compressed air, nitrogen or steam.



Cake discharge

In the non-pressurized discharge zone – which can be provided with a gas-tight hood if required – the cake is discharged by backblowing and optionally by a mobile scraper. The filter cloth can then be washed.

LAYOUT OF A ROTARY PRESSURE FILTER

1 Housing

The housing is divided into segment zones by the separating elements. The suspension or individual treatment agents are pressure-fed to the corresponding segment zones from the outside. The operating pressure is 3 bar (g) in normal applications or up to 7 bar (g) for high-performance filters.

2 Drum

The drum surface is divided by separating ledges and drum rings into individual cells which serve to collect the filter cake. The cells contain the cell inserts. These are covered with the filter medium and fastened to the drum. The cake thickness can be optimally set for the specific process. The maximum cake thickness is 175 mm. The drum can be equipped with a double jacket for heating or cooling.

3 Control head

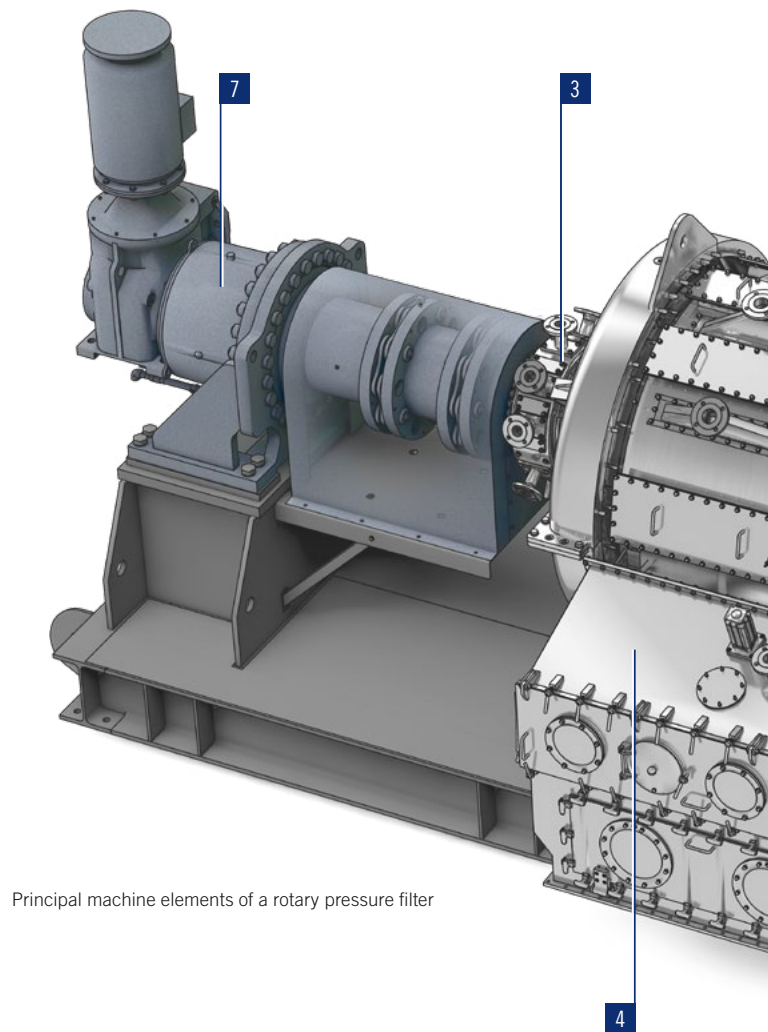
The control head is responsible for separately draining the individual filtrates and controlling the backblow process for discharging the cake and cleaning the cloth. The control head consists of a core that is firmly connected to the drum and contains the filtrate tube outlets. Between the rotating core and the fixed control head housing is an annular space that is divided into segment zones by separating plugs, corresponding to the process zones on the filter. This enables the filtrates and treatment agents to be discharged separately from one another.

4 Cake discharge hopper

The cake is discharged in a non-pressurized zone of the filter by means of a backblow of air, steam or nitrogen. Cake discharge can optionally be assisted by an independently operating scraper. If required, this zone is provided with a gas-tight hood. A device for cleaning the filter cloth either continuously or on demand follows the cake discharge.

5 Cell inserts in the drum

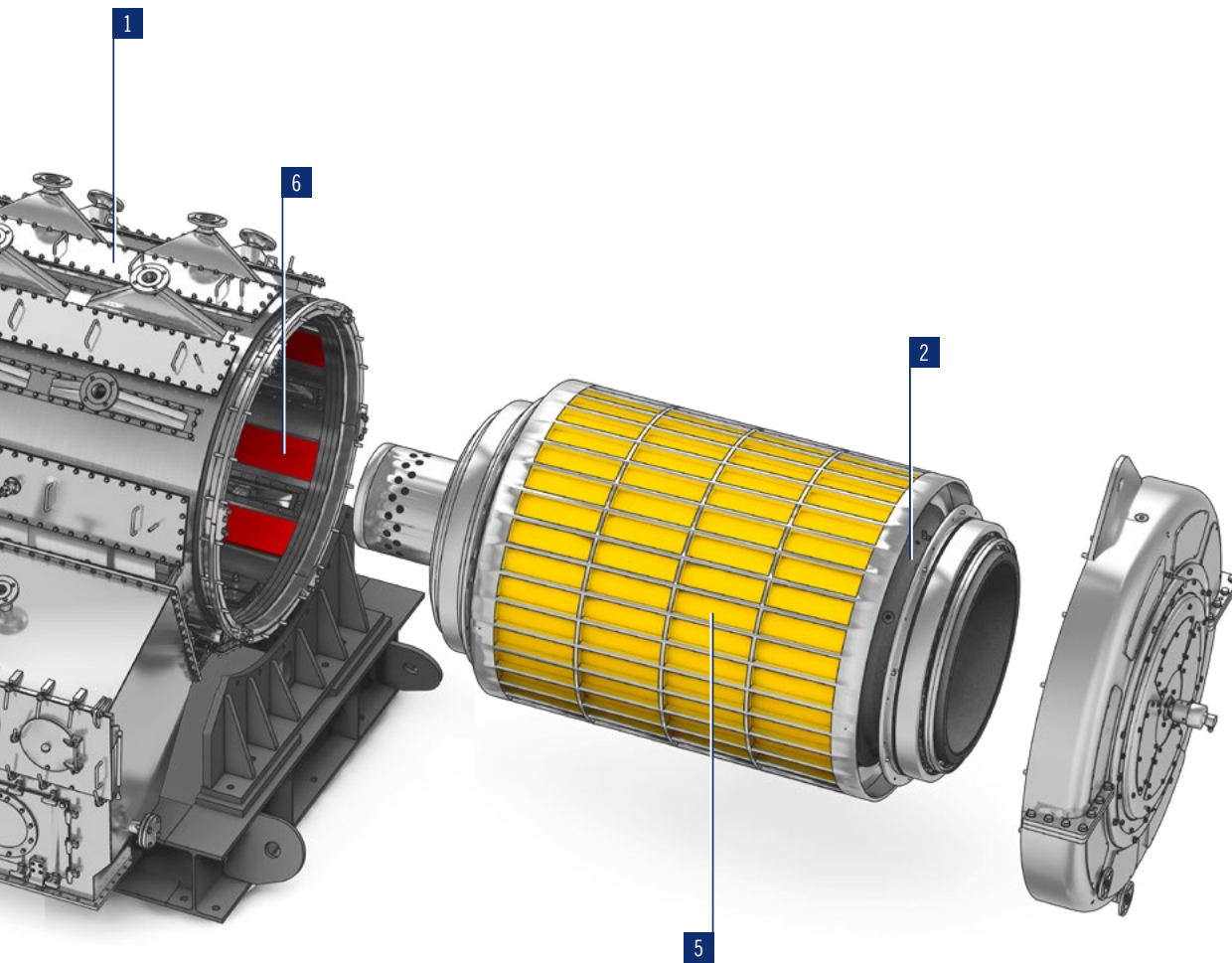
The filter cells contain the cell inserts, which constitute the actual filter elements. The cell inserts separate the solids from the suspension. They are bolted to the drum and contain the filtrate drain, backing fabric and filter cloth. The filter cloth can be made of plastic fabric or metal fabric, as required by the application.



Principal machine elements of a rotary pressure filter

6 Separating elements

Separating elements pressed pneumatically against the drum provide a dependable and pressure-tight seal between the individual segment zones. The sealing effect is achieved by means of high-grade, chemical-resistant plastics, such as PE or PEEK. The exchangeable sealing plates are mounted on dimensionally stable supports.

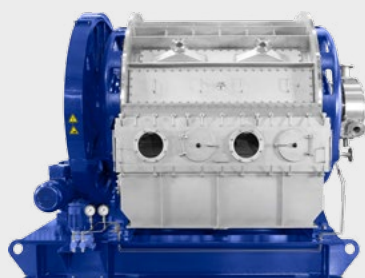


7 Drive system

The filter is equipped with a variable-speed drive enabling adaption to changing throughput rates and filtration properties. This drive consists of a reduction gear unit, an optional coupling and a frequency-controlled drive motor. Three alternatives are available:

Spur gear drive

The drum is driven by an open spur gear drive on the drive side with a reduction gear unit and frequency-controlled electric motor.



CenterDrive

The CenterDrive is an enclosed drive on the control head side with a reduction gear unit, coupling and frequency-controlled drive motor.



TwinDrive

The TwinDrive variant comprises an enclosed spur gear drive featuring two reduction gear units and two drive motors with common frequency control.





Intermediate plastic products
Examples: PTA, ABS, HDPE, PVC, bisphenol A



Pharmaceuticals
Examples: antibiotics, hormone derivatives, statins, antiviral drugs



Organic chemicals
Examples: vulcanization derivatives, sodium hydrosulfite, phenyls, amines, paraffins, raw materials for detergents



Dyes and pigments
Examples: pearlescent pigments, aniline dyes, silicate pigments



Cellulose products
Examples: MC, HEC, HMEC, CMC



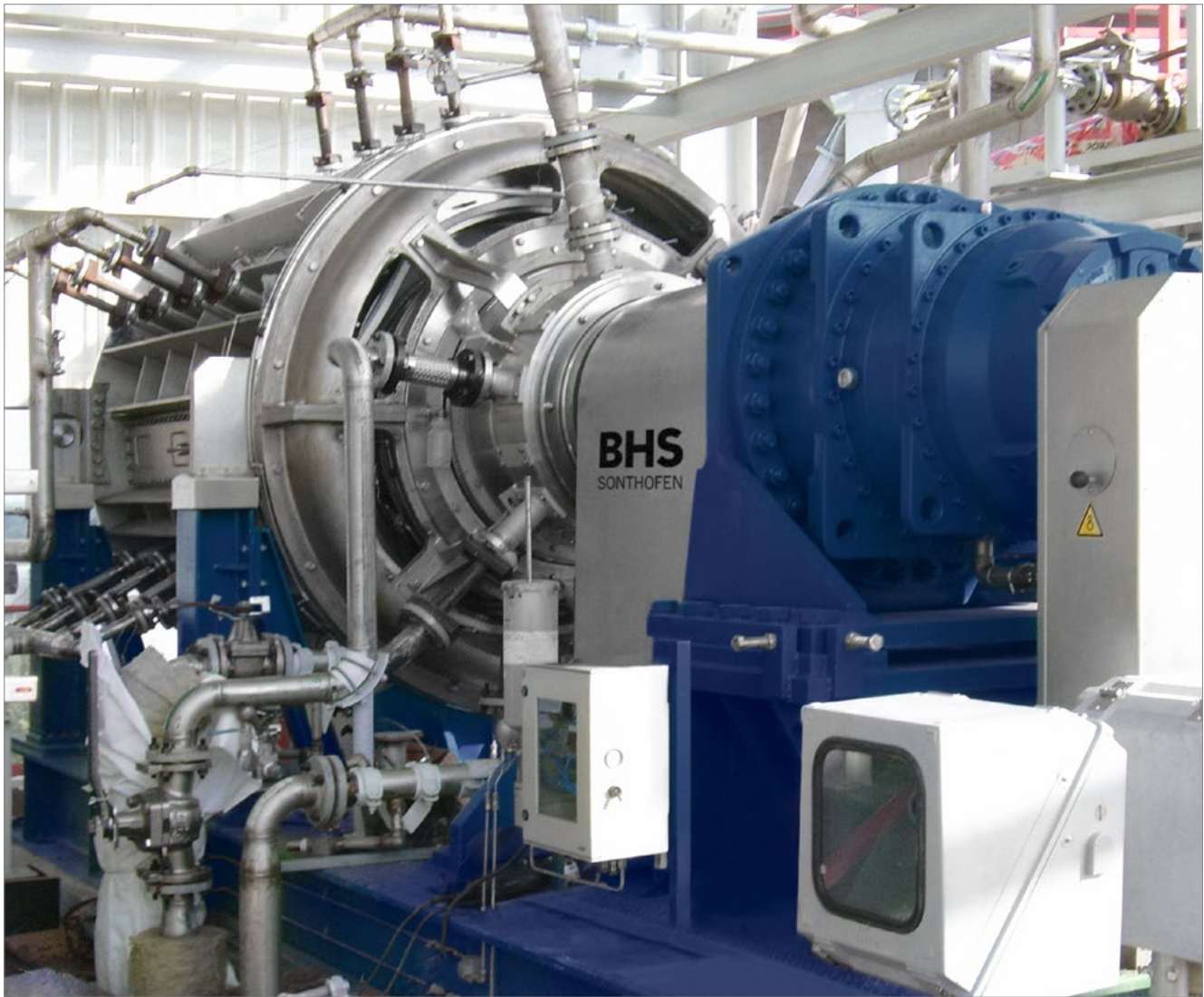
Agrochemicals
Examples: phosphates, molluscicides, fertilizers, herbicides, insecticides, fungicides



Foodstuffs
Examples: coffee, starch



Natural extracts
Examples: leaf extracts, flower extracts, tobacco, amino acids



RPF B16 rotary pressure filter for the production of plastic intermediates

Spur gear filter

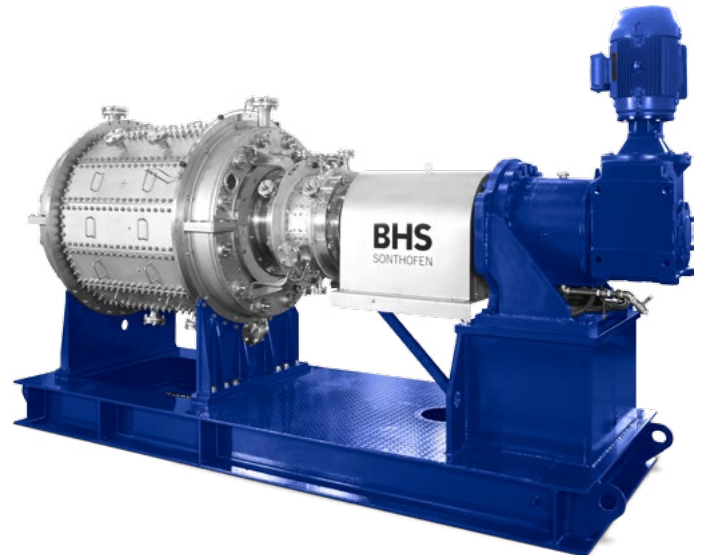
Spur gear filters are usually designed for a continuous suspension throughput of up to 25 m³/h with a cake thickness of up to 30 mm. The maximum operating pressure is 3 bar (g).



RPF B16 spur gear filter

Rotary pressure filter with secondary containment

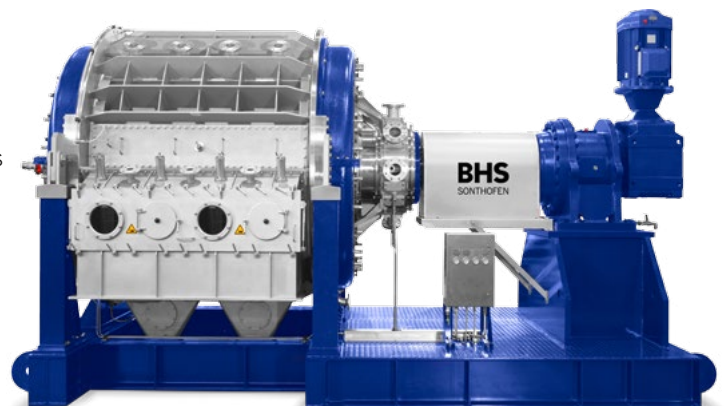
Additional, pressure-tight sealing of the working spaces from the environment – known as a “secondary containment” – increases the safety of the rotary pressure filter in the event of possible failure of the primary sealing arrangement. Any liquids or gases that escape are systematically detected in the secondary sealing chamber on the housing and control head and selectively discharged – without contaminating the environment with highly toxic and/or volatile substances.



RPF A09 completely enclosed rotary pressure filter with additional secondary containment

High-performance filter

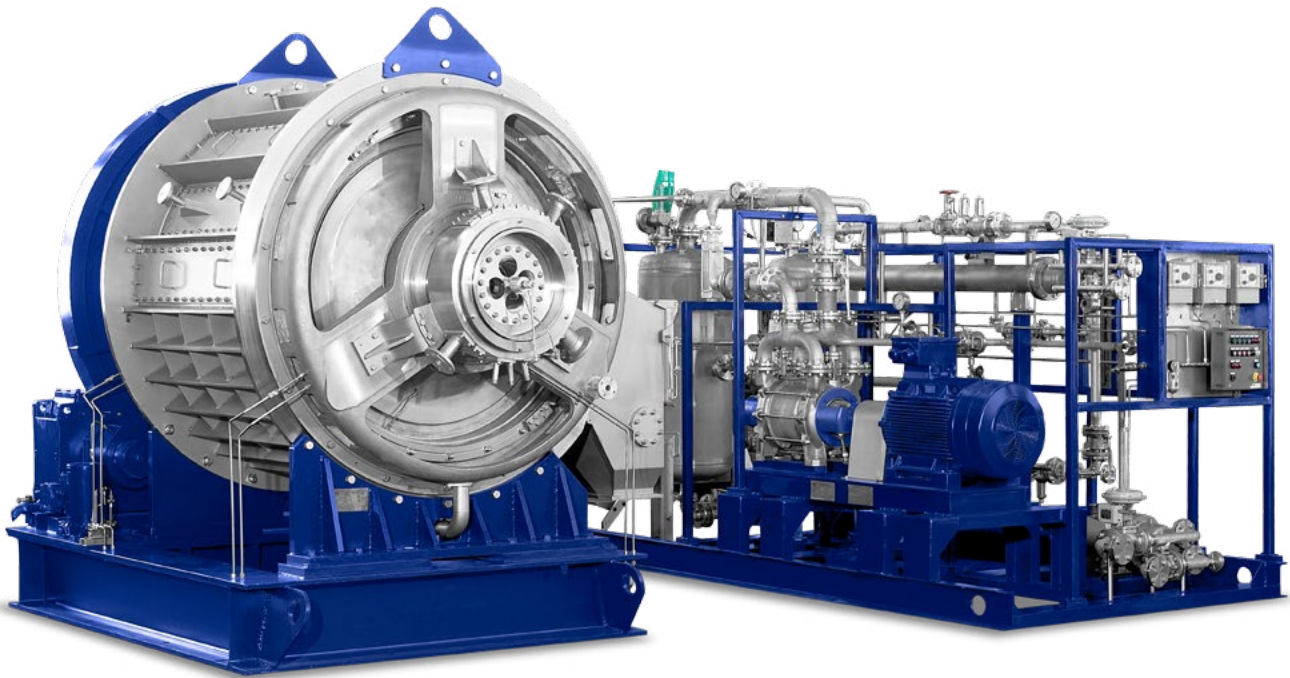
High-performance filters are suitable for a continuous suspension throughput of up to 250 m³/h and a cake thickness of up to 175 mm with operating pressures of up to 7 bar (g) and a pressure-tight filtrate discharge of up to 6 bar (g).



RPF X16 high-performance rotary pressure filter with CenterDrive

Nitrogen recirculation

The BHS nitrogen recirculation system is implemented to enable the nitrogen employed in inerted processes to be re-used. In this system, the nitrogen needed for drying and discharging the filter cake is separated from entrained solvent and compressed to the required process pressure. The central component is a liquid ring compressor with an operating fluid corresponding to the solvent of the last cake wash in the rotary pressure filter. Depending on the application, the BHS nitrogen system can be rated at 3 bar (g) or up to 7 bar (g). Twin units for serving two or more rotary pressure filters are also possible. The overall nitrogen consumption is thus considerably reduced.



RPF B12 rotary pressure filter connected to a nitrogen recirculation system

Tests give certainty

We perform initial tests with our pocket leaf filters. These tests can be performed quickly and easily at your location or in our well-equipped laboratories in Sonthofen/Germany or in Charlotte/USA. Basic data can thus be obtained about the filterability of a suspension and the general design of a production filter.

For more extensive tests, even spanning several weeks, we can rent out pilot and lab filters for all BHS filter types. Filters made of different materials are also available. If necessary, the filters can be equipped to meet specific customer requirements.

These filters can be used to examine filter behavior methodically and reliably. Machine parameters can be varied and alternative materials can be explored. The test results provide a sound basis for the layout of a production machine and the process technology. The ideal mode of operation can also be determined. Your investment decision is thus placed on a secure footing.



RPF P01 pilot filtration plant

Performance data, dimensions and weights

Type	Drum diameter	Effective drum length	Active filter area	Dimensions (L x W x H)	Weight
RPF P01	0.75 m	0.1 m	0.18 m ²	2 x 1.2 x 2 m	2,500 kg
RPF P02	0.75 m	0.25 m	0.45 m ²	2.1 x 1.2 x 2 m	3,500 kg
RPF A03	1 m	0.3 m	0.72 m ²	3.9 x 2.1 x 2.2 m	7,000 kg
RPF A06	1 m	0.6 m	1.44 m ²	4.2 x 2.1 x 2.2 m	10,000 kg
RPF A09	1 m	0.9 m	2.16 m ²	4.5 x 2.1 x 2.2 m	13,000 kg
RPF A12	1 m	1.2 m	2.88 m ²	4.8 x 2.1 x 2.2 m	15,000 kg
RPF B09	1.5 m	0.9 m	3.2 m ²	5 x 2.9 x 3.2 m	20,000 kg
RPF B12	1.5 m	1.2 m	4.3 m ²	5.4 x 3 x 3.2 m	30,000 kg
RPF B16	1.5 m	1.6 m	5.8 m ²	5.8 x 3 x 3.2 m	35,000 kg
RPF X16	1.8 m	1.6 m	6.9 m ²	5.8 x 3.3 x 3.6 m	40,000 kg
RPF X20	1.8 m	2 m	8.6 m ²	6.2 x 3.3 x 3.6 m	42,000 kg

All specifications apply to a high-performance filter with CenterDrive. The shown dimensions and weights are approximate figures. The technical data for other designs may vary from the information shown here. All technical data may change due to development. Subject to modification without notice.


Process criteria

Mode of operation	continuous
Operating pressure	up to 6 bar (g)
Operating temperature	up to 160 °C
Solids content (suspension)	up to 60% (weight)
Cake thickness	up to 175 mm
Particle size	10 - 500 µm
Filtration capacity – suspension	up to 30 m ³ /m ² h
Filtration capacity – dry solid	up to 15,000 kg/m ² h
Active filter area	0.18 - 8.6 m ²

BHS FIELDS OF COMPETENCE



MIXING
TECHNOLOGY



CRUSHING
TECHNOLOGY



RECYCLING
TECHNOLOGY



FILTRATION
TECHNOLOGY

