

# Pusher centrifuge SHS



Efficient separation  
of solids and liquids

Our administration building at Raffelbergpark in Mülheim an der Ruhr



The factory located in the industrial area of Mülheim on Weseler Strasse



View of the Technical Center on Weseler Strasse



# SIEBTECHNIK pusher centrifuges

## production-related down to the smallest detail

The SIEBTECHNIK pusher centrifuge fulfils its separation task reliably and efficiently in numerous applications for the chemical, pharmaceutical and food industries. Its strengths are most evident for special process requirements: long retention times, low solids loss in the filtrate, low crystal breakage and abrasion, intensive solids wash and minimum wear. These features make it an outstanding machine for most crystalline products, e. g. sodium or potassium chloride, sodium, ammonium and ferrous sulfate, but also as a solution to dewater "exotic" products like granulate, seeds, fibers, and crushed animal-bones (or your product?).

While a trend to standardization is generally observed, SIEBTECHNIK continues to focus on details. Our specialists design and construct this machine for standard products, but also in cooperation with customers for special or difficult applications. In this manner, optimum efficiency can be achieved and individual requirements met.

**We are your partners!**

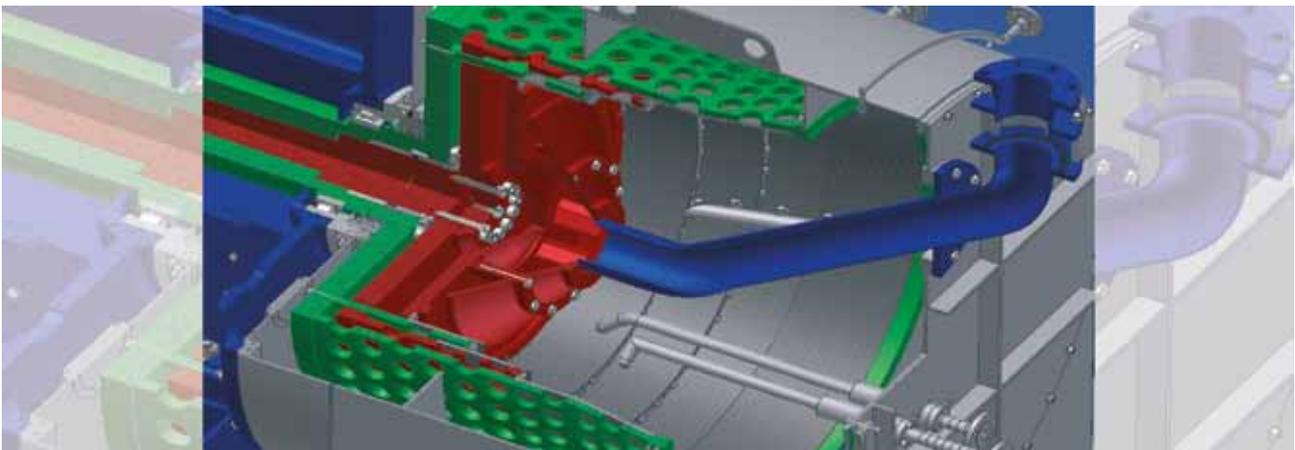
Included in a product-specific design of the pusher centrifuge is our wide-ranging program of variables. Screen geometries take into consideration the process and product characteristics involved. The centrifuge must be designed for the product, process and operating parameters to meet the customer's performance and efficiency requirements. Here, our existing operating knowledge, tests at the customer's plant or tests in the SIEBTECHNIK Technology Center will answer any unknowns for new applications.

Special equipment designs and components to reduce operating and production costs are always included with SIEBTECHNIK pusher centrifuges.

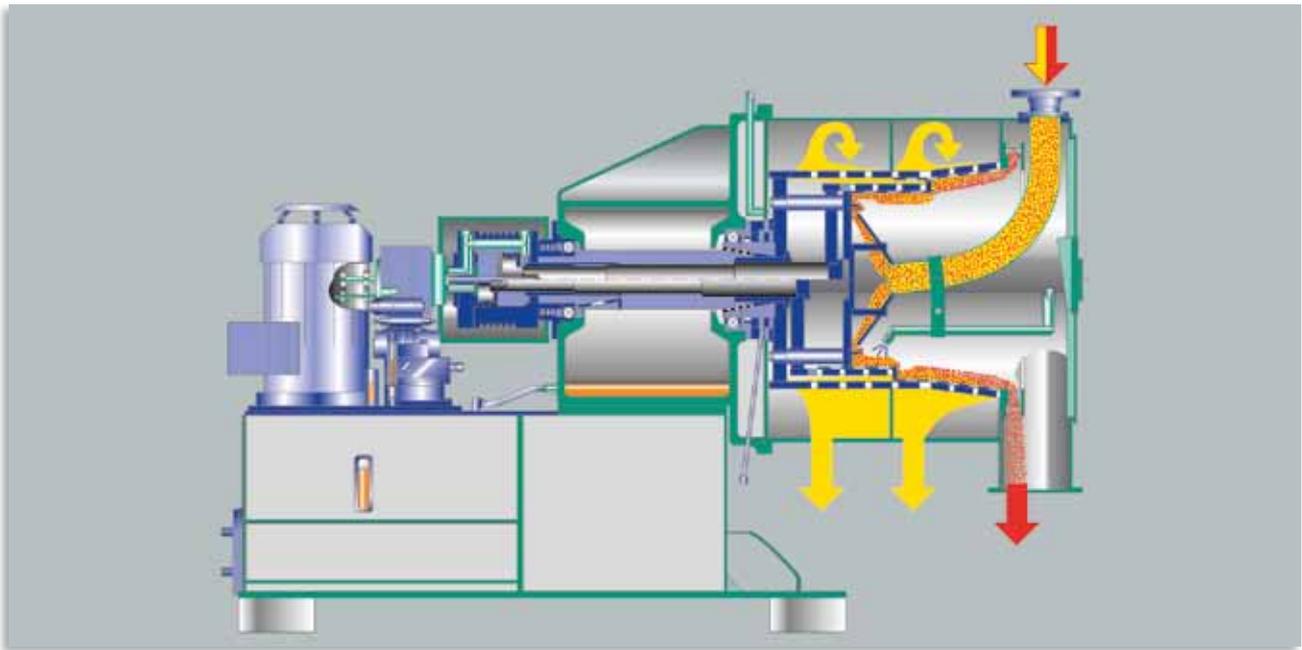
Modern and time-tested drive systems ensure no production interruptions when operated and maintained properly. Safety for the operators as well as for the environment, are always of utmost importance with all SIEBTECHNIK equipment.

From the design of the operating machine to specific construction details, modern EDP systems and 3D-CAD programs support the development process.

**Test us!**



# Function and design variables



The pusher centrifuge belongs to the group of continuously working filtration centrifuges. The solids are retained as a cake on the wedge wire basket and transported by an oscillating step-by-step movement of the inner basket axially in the direction of the solids discharge. With the pusher centrifuge, the transport speed of the solids on the wedge wire basket is slower than with a worm/screen centrifuge. This results in a longer retention time of the material allowing increased wash efficiency and lower discharge moistures. The size of the separated solid particles is preferably greater than 80 µm. The thick, dense filter cake ensures a good yield of even very fine particles.

Both factors – long retention time and dense filter cake – allow additional dewatering of solids with high fines content coming from other types of filters, e. g. filter press or belt filters.

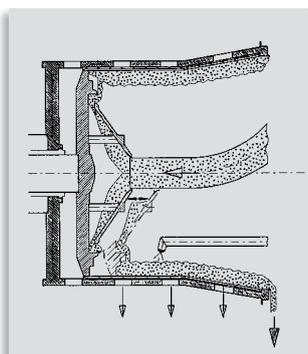
A diverse range of pusher centrifuges has been designed and supplied by SIEBTECHNIK for a wide variety of products. These proven designs can be used for similar applications or as a basis for a new process or product.

Currently we manufacture 13 sizes with internal basket diameters from 250 mm to 1,200 mm. SIEBTECHNIK pusher centrifuges are designed with one, two or three stage rotating parts depending on the application and filtration rate of the product concerned.

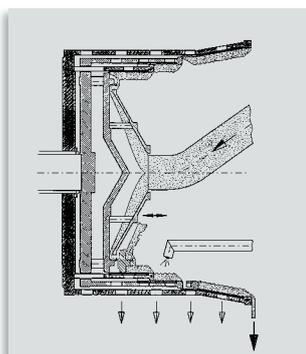
Which design is correct for your use is dependent on operational factors:

- Type of product
- Capacity
- Particle size
- Solids concentration
- Product washing

Rotor single-step  
cylindrical - conical



Rotor three-step  
cylindrical - conical

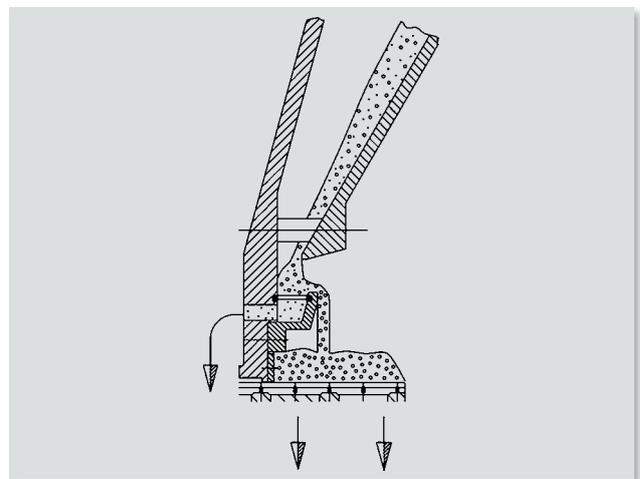


The outer basket is a cylindrical-conical (ZK) for many products. Our "ZK" design increases the release of the trapped liquid inside the filter cake. The conical section of the "ZK" machine also reduces the energy required to transport the solids to discharge.

The patented filling system with acceleration cone and ring pocket ensures extremely gentle acceleration and uniform distribution of the solids. Even with unfavorable feed conditions, this results in reduced abrasion in the feed zone of the centrifuge.

This same ring pocket can be equipped with a screening element to pre-dewater the slurry before it reaches the screen basket. This optimizes cake formation in the feed zone of the machine and allows lower feed concentrations to be successfully handled by this machine design.

Separate mother liquor and wash liquid discharges can be supplied via internal partitions within the filtrate area of the product housing.



Ring pocket with pre-dewatering screen

### Advantages from SIEBTECHNIK pusher centrifuges due to product requirements:

- |  |   |   |
|--|---|---|
| ■ a long retention time for solids is required     | ↔ | slow solids transport speed   |
| ■ the loss of solids in the filtrate must be low   | ↔ | thick, dense filter cake (inherent filtration)  |
| ■ crystal breakage and abrasion must be low        | ↔ | no mechanical stress by transport elements, patented filling system   |
| ■ intensive washing of the filter cake is required | ↔ | direct spray of the washing medium onto the cake  |
| ■ high abrasion from product expected              | ↔ | low transport speed, wedge wire screen in direction of transport, wear resistant materials of construction, patented filling system |

Its high degree of adaptability enables the SIEBTECHNIK pusher centrifuge to be successfully used in a wide product range, examples are:

ABS polymerisate  
 Adipic acid  
 Ammonium chloride  
 Ammonium hydrogen carbonate  
 Ammonium molybdate  
 Ammonium sulphate  
 Animal bone  
 Calcium nitrate  
 Calcium propionate  
 Chloride hydrate  
 Copper sulphate  
 Dicalcium phosphate  
 Fibrous materials  
 Flotation concentrate and residue from the potassium industry

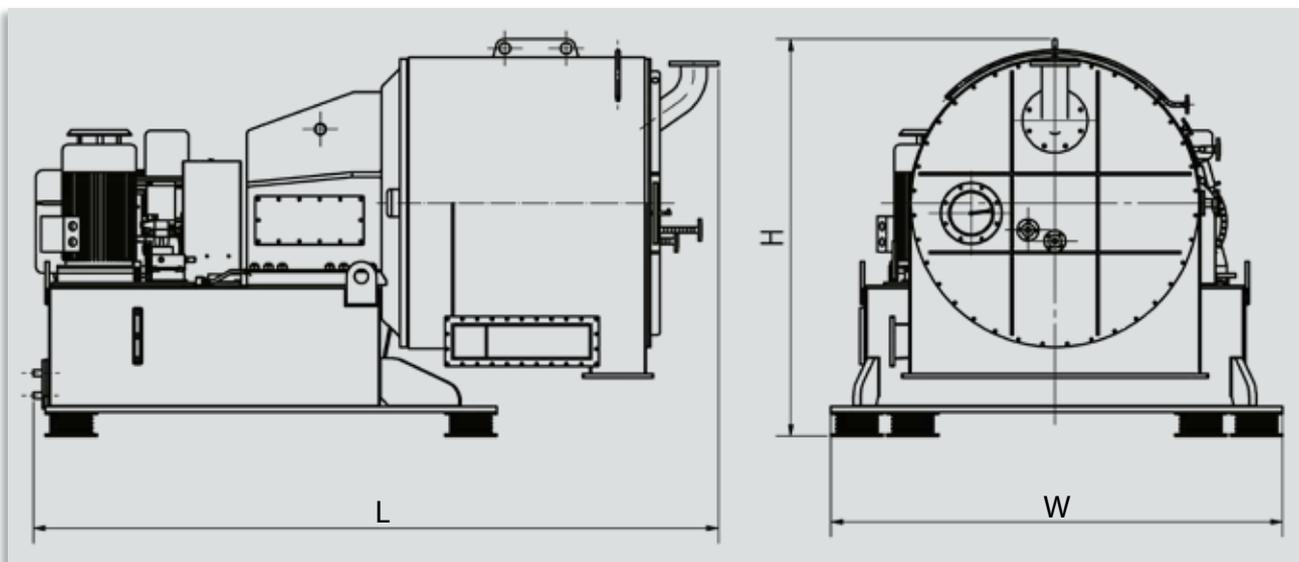
Foodstuffs applications  
 Glauber salt  
 Granulate  
 Hexamine  
 Ferrous sulphate  
 Melamine  
 Methacrylamide  
 Milk sugar  
 Nickel sulphate  
 Pentaeritrol  
 Phosphate  
 Potassium chloride  
 Potassium nitrate  
 Potassium sulphate  
 Rape coarse grain

Seed grains  
 Silicone fluoride  
 Sodium acetate  
 Sodium chlorate  
 Sodium chloride  
 Sodium formiate  
 Sodium carbonate  
 Sodium nitrate  
 Sodium perborate  
 Sodium sulphate anhydride  
 Sorbic acid  
 Soya coarse grain  
 Tartaric acid  
 Various mixed salts  
 Zinc sulphate

### Available sizes - Type SHS

Nominal basket diameter		250-300	350-400	450-500	600-700	800-900	1000-1200
Length	app. mm	1,500	1,750	1,900	2,600	2,750	3,600
Width	app. mm	850	950	1,100	1,800	2,000	2,500
Height	app. mm	950	1,020	1,100	1,700	2,000	2,200
Operating weight	app. kg	850	1,100	2,100	5,500	9,500	15,000

We reserve the right to make alterations necessitated by technical progress or process requirements.



The SIEBTECHNIK pusher centrifuge shows clear separation of the:

- Process area
- Bearing and drive assemblies
- Hydraulic mechanism

The rotating parts are in a horizontal position, ensuring easy access to the product side and drive.

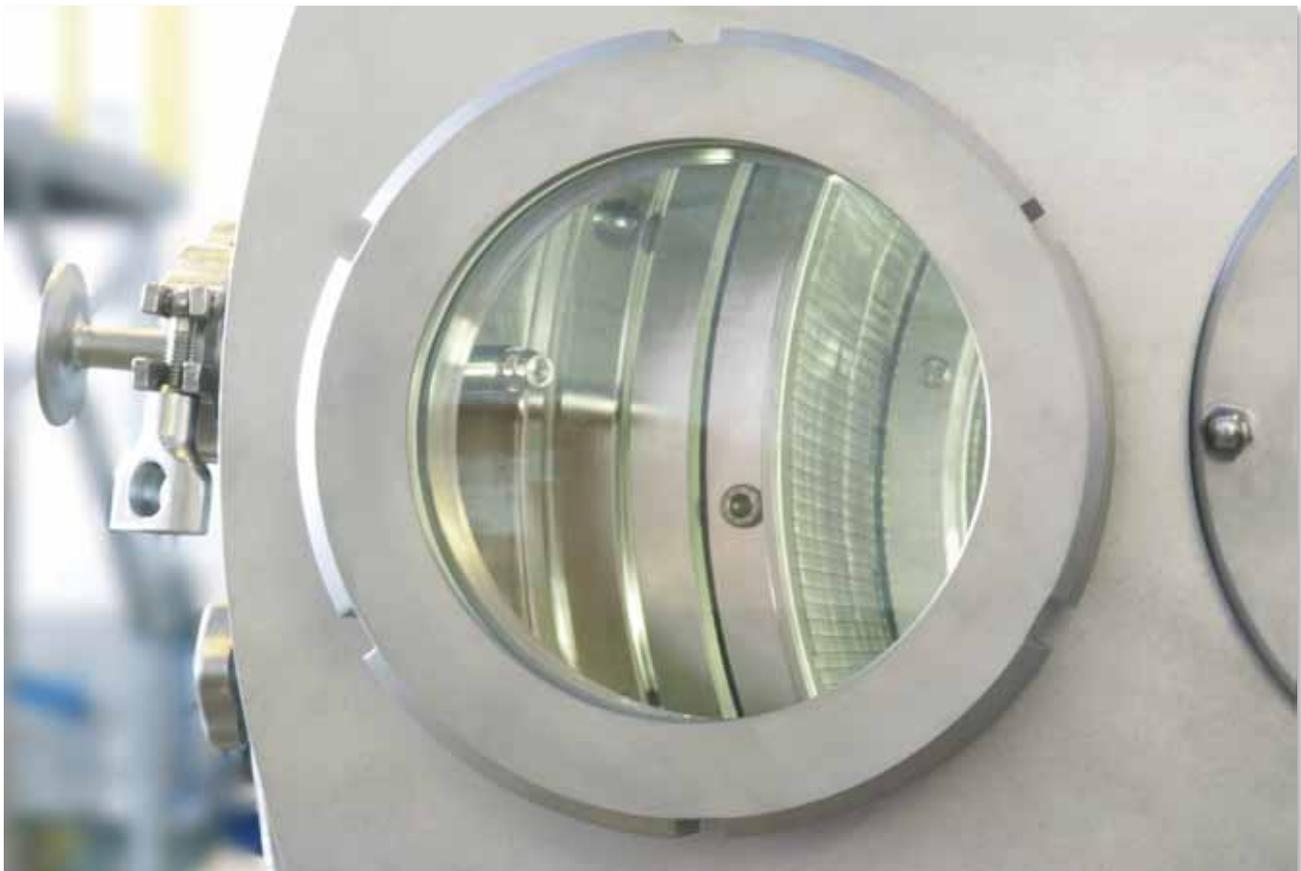
This centrifuge has a modular design to meet constructional and operational criteria. The basic element is the machine housing which includes

- the bearing area
- the drive for the rotating and pushing movements
- the pump unit (including the electrical-hydraulic control system)

The basic machine housing is subdivided into two separate chambers:

The 1<sup>st</sup> chamber serves as an oil reservoir for the hydraulic oil including the internal oil cooler.

The 2<sup>nd</sup> chamber is designed to be filled with concrete, making any additional foundation requirements unnecessary.



# Machine Design

The complete pusher centrifuge is bolted elastically to the support steel or floor via vibration isolators, which have a low point of gravity. This eliminates the need for a "force block" foundation.

The product housing and all rotating parts are an overhung design from the bearing housing and divided into filtrate and solids discharge areas.

The baskets which hold the wedge wire screens contain large staggered holes allowing free drainage of the filtrate. The wedge wire screens are fabricated with slotted openings in the direction of the pushing movement and the solids travel. The front of the product housing is equipped with a large front cover, which can be supplied in a one-piece or split-door design.

The rotating components (baskets and screens) along with the feed pipe, solids discharge ring, feed cone, etc. are all easily accessible through the front cover to allow assembly and disassembly of all items subject to wear and abrasion.

The rotating parts are driven via V-belt transmission. The basket speed can be changed by installing different V-belt pulleys or the use of a frequency converter.

The pushing parts are operated by a modern electrical-hydraulic system. The oil volume and oil pressure is supplied by a motor-driven screw spindle pump. All hydraulic components are mounted on a common plate that bolts to the top of the machine housing over the oil sump. In addition to the pump, the valve unit, pressure gauge, thermometer or thermowell, return hydraulic line and vented fill port are mounted to this "hydraulic aggregate". This allows quick and easy exchange if any maintenance or troubleshooting is required, greatly reducing downtime.

The pushing mechanism is monitored by an SPS control system which is included with supply of the machine.

## Construction characteristics and features

- Exact separation of the pusher hydraulics and bearing system with secure sealing - no high pressure oil near the product.
- The hydraulic multipath rotating unit is externally mounted and easily accessible
- The hydraulic control unit is also externally mounted and contains an integrated safety valve
- Stroke length is controlled via limit switches mounted at the rear of the machine and can be readily and easily adjusted; this is totally independent of pressure setting.
- Pump unit is submerged in the machine housing, but easily accessible, on the "hydraulic aggregate", - this mounting arrangement yields low noise level during operation.
- Automatic continuous lubrication of the main bearings via hydraulic oil drip feed.
- Due to vibration isolators no special foundation or support is required.



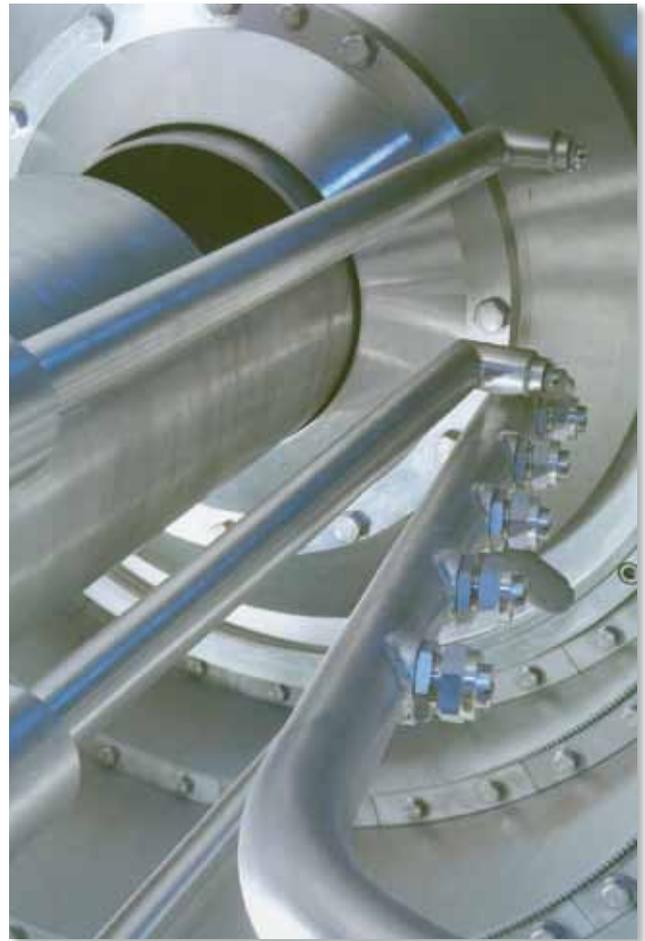
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## Materials

Dependant on the application, all product contact parts are fabricated of stainless steel, austenitic steel, special bronze, Hastelloy, nickel, titanium, etc. For high wear abrasive products, we protect vulnerable areas with wear-resistant materials.

## Special executions

- Filling system with pre-dewatering (DBP)
- Product feed via screw feeder
- Separate discharge and ventilation of mother-liquid and washing liquid with double-filtrate cyclone
- Gas-tight execution
- Explosion-proof execution in accordance with Directive 94/9/EC (ATEX 100a)
- Food-service execution
- Other special executions available on request



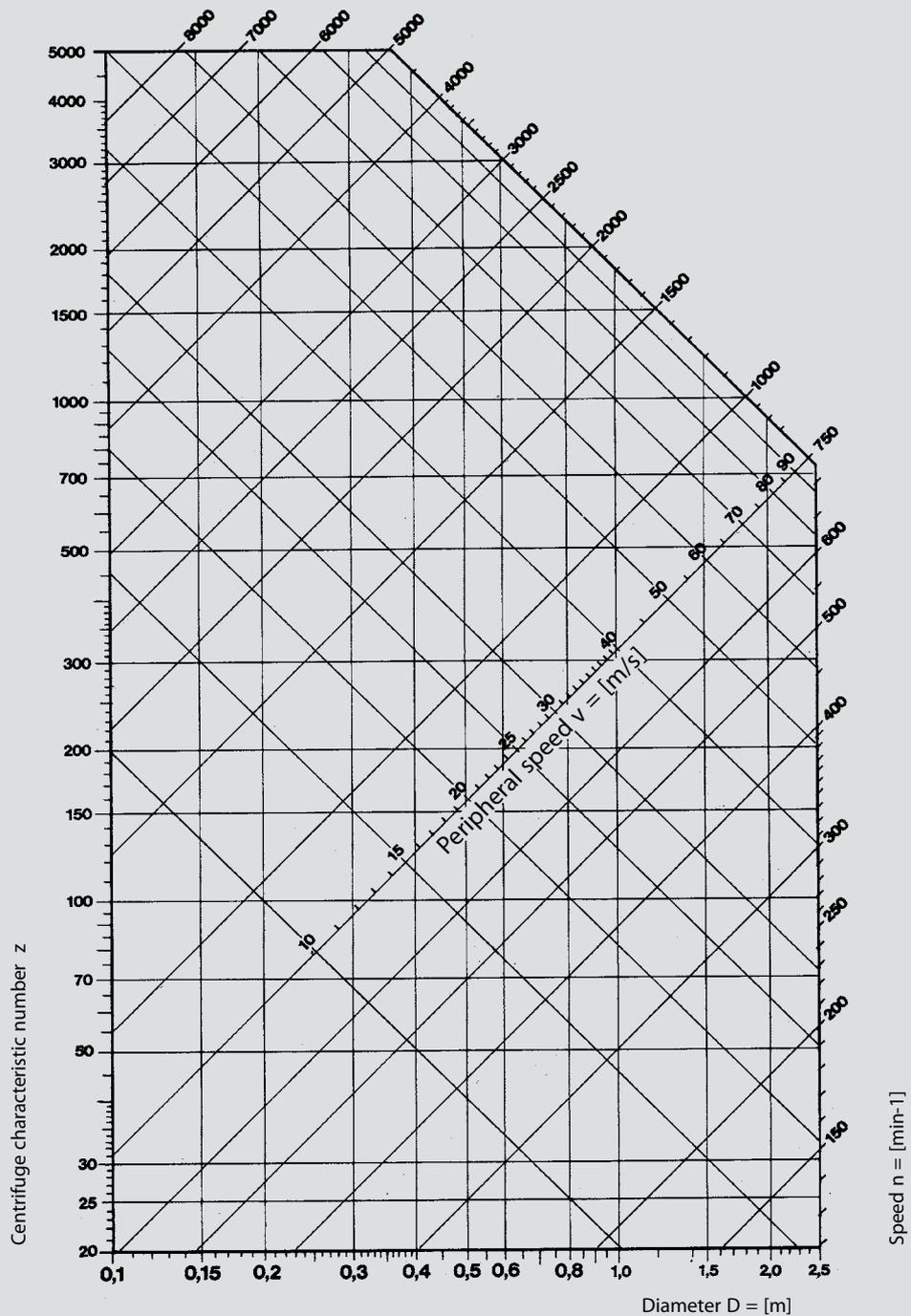
## G-force calculation (z)

$$z = \frac{V^2}{r \cdot g} \cong \left( \frac{n}{30} \right)^2 \cdot r$$

Speed  $n = [\text{min}^{-1}]$   
 Diameter  $D = [\text{m}]$   
 Radius  $r = D/2[\text{m}]$

## Calculation of the peripheral speed

$$v = \frac{\pi r n}{30} [\text{m/s}]$$



The product's centrifuging factor and retention time are parameters affecting the capacity of the centrifuge both for screening as well as for decanting machines.



SHS 602 ZK



SHS 1002 ZK



SHS 1203 ZK



SHS 252 ZK



SHS 903 ZK



SHS 452

# Delivery Program

## Screening Machines Process Equipment

circular and elliptical motion screens  
double counterweight screens  
multideck horizontal screen  
round screens  
jigs

## Sampling Systems, Airtube Systems, Size Reduction Machines, Laboratory Equipment, Control Screening Machines and Automation

individual units and complete installations  
for sampling and sample preparation  
airtube systems  
jaw crushers  
roller mills  
hammer and hammer impact mills  
eccentric vibrating mills and ball mills  
control screening machines  
analytical screening machines  
splitter  
testing drums  
automation

## Centrifuges

scroll-screen centrifuges  
pusher centrifuges  
sliding discharge centrifuges  
vibratory centrifuges  
decanter centrifuges