SEPARATION

INNOVATIVE SOLUTION FOR HIGHLY CORROSIVE APPLICATIONS

CORES™ VACUUM DRUM FILTER

ANDRITZ

ENGINEERED SUCCESS

Advanced design for high reliability

Vacuum drum filters are the state-of-the-art technology for highly corrosive applications such as producing titanium dioxide (TiO_2) in sulfuric acid (H_2SO_4) processes or in processes where slurries with a high content of hydrochloric acid (HCl) are used. The CORES™* vacuum drum filter from ANDRITZ provides a very reliable, long-life solution with an innovative design that offers maximum corrosion resistance.

CHALLENGING REQUIREMENTS

Conventional vacuum drum filters are made of carbon steel covered with a rubber lining to protect the structural design of the machine against corrosive attack. The disadvantage of this rubber lining is a partial embrittlement with a tendency to form cracks in a relatively short time and massive corrosion of structural elements, resulting in high maintenance costs with unscheduled breaks in production.

In the past, glass fiber filters have also proven to be unsuitable for long-term operation because of structural weaknesses in this material caused by chemical attacks along the glass fibers due to capillary effects. PP (polypropylene) filters were also built in the past because of their very high chemical resistance in such processes, but failed ultimately due to their poor mechanical properties.

FIRST CHOICE IN CORROSIVE APPLICATIONS

With the CORES™ vacuum drum filter, ANDRITZ has developed an innovative filter design that effectively incorporates the strengths of each material used. The CORES™ vacuum drum filter is a significant innovation to prevent corrosion. The patented sandwich design provides a permanently chemically resistant surface and can be implemented with different materials to ensure resistance to chemicals. Depending on the size required, the structure itself is made of steel or completely of GRP (glass fiber-reinforced plastic). In addition, all parts in contact with the product are covered with a layer of corrosion-resistant, non-reinforced plastic, such as PP, which is commonly used in the chemical industry. Furthermore, some internal wetted parts are made entirely of resistant plastic and are welded together with external surfaces made of plastic to provide a closed surface for corrosive applications.

YOUR BENEFITS

- Highest corrosion resistance: No corrosion on parts of the machine coming into contact with the product due to the corrosion-resistant design
- High availability and less downtime
- Significantly reduced maintenance costs
- Continuous and automatic processing

The corrosion resistance of the CORES™ vacuum drum filter is significantly higher than with a traditional carbon steel design with rubber lining or conventional GRP filters without a layer of PP covering.

*CORES is a registered European Union Trademark of the ANDRITZ GROUP. For information regarding ownership and countries of registration, please visit andritz.com/trademarks.

MAIN APPLICATIONS

- Titanium dioxide
- Sulfuric acid applications
- Hyper chloride applications
- Processes with potentially unknown acids

CONSTRUCTION MATERIALS

Depending on process requirements, the outer surfaces in contact with the product of the CORES™ vacuum drum filter are made of resistant plastic, such as PP, PE, PVDF or ECTFE. These plastics are embedded into the structural GRP and create a lasting connection of these two materials. The GRP parts are formed layer by layer with resin. This is also used to connect them to the specially shaped steel parts of the design.

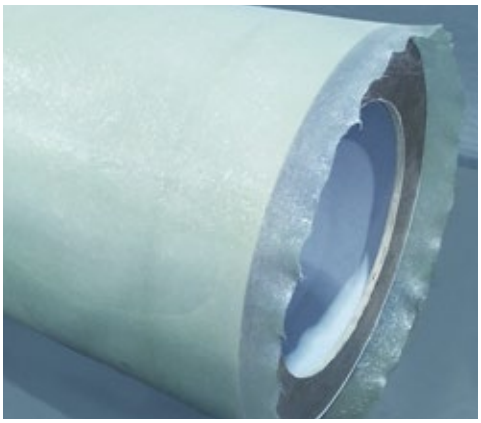
SPECIAL DESIGN

In addition to corrosion, all forces and moments have to be handled. Thus, the structural design, including the shaft, the head walls of the drum, and the framework of the trough, are made of steel, completely of GRP, or of a combination of both in critical areas, depending on the size. A special design for these parts ensures smooth distribution of moments, torques, and forces, and the shaft design allows body support, which is important for large sizes. Furthermore, the drum body is secured to the shaft with a clamping set, which allows the use of different materials according to the properties required. All parts are designed according to an FEM calculation carried out for this new development. The support structure of the drum body can be made of GRP only because it is exposed to much fewer forces. The GRP is embedded into resin and laminated onto the steel structure. Finally, all parts in contact with the product are covered with a layer of non-reinforced plastic, such as PP, for long-term use to ensure chemical resistance. The entire plastic covering is tightly welded, so no single gap or screw remains inside the process area. Used plastics have been applied in the chemical industry for a long time and are well established.

PROCESSING PARAMETERS

Average particle size	1–300 µm
Solids throughput	Up to 1,500 kg/m²/h
Filtration capacity	100–2,000 l/m²/h
Washing ratio	Up to 1:1 water to dry solids
Process temperature	80 °C for PP

Internal clamping set to secure the drum body to the shaft, non-wetted section



GRP shell during manufacturing

PP part

PP covering

OPERATION

The suspension to be filtered is fed continuously to the filter trough. Depending on the application, different systems are available to guarantee homogeneous mixing of the slurry. Either a specially designed pendulum agitator from ANDRITZ is used or use of an agitator can be avoided entirely by performing a successful CFD simulation of slurry mixing in the trough with special inlet geometry to prevent sedimentation of the solids.

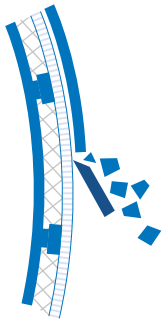
The shell of the filter drum is divided into cells and covered by a filter cloth. Approximately 37% of the filtration area is submerged in the suspension, and the drum rotates at up to 4 rpm. The CORES™ vacuum drum filter builds up a vacuum with a liquid seal pump, which is connected to the drum cells via separators, control head, and filtrate pipes. This causes the liquid to filter through the filter cloth. The solids contained in the suspension are deposited in a uniform layer on the filter cloth, thus forming a filter cake.

The filtrate is discharged either by pumping or by utilizing the barometric height. The filtered solids layer emerges from the slurry as the drum rotates and is then washed, dried, and removed from the filter cloth. In the course of one revolution, each point of the drum area passes through these zones in succession.

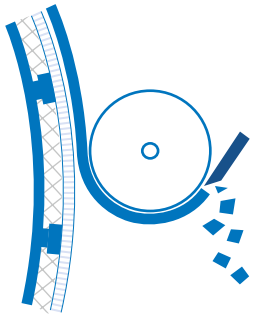
The wash liquid is applied to the cake either directly by washing devices (weirs, spray nozzles) or through a wash belt placed on top of the solids layer. The filtrates from the washing zones can be drained off separately, enabling multi-stage counter-current washing. The filter cake is discharged by means of a discharge device that covers the entire drum width and is specially suited to the cake thickness, consistency, structure, and so on (scraper, roller, pre-coat scraper, string, or belt discharge).

As the drum rotates, it is re-immersed in the suspension. The filter cloth can be cleaned before the next filtration cycle, either with water jets, bubbling, or both. For transport of solids, the drum filters can be fitted with screw or belt conveyors as well as specially designed chutes if the next process step is located close to the filter.

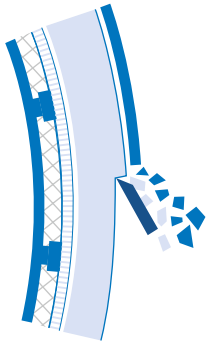
YOUR DISCHARGE OPTIONS



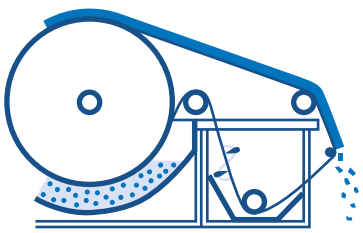
Scraper discharge



Roller discharge



Pre-coat scraper discharge

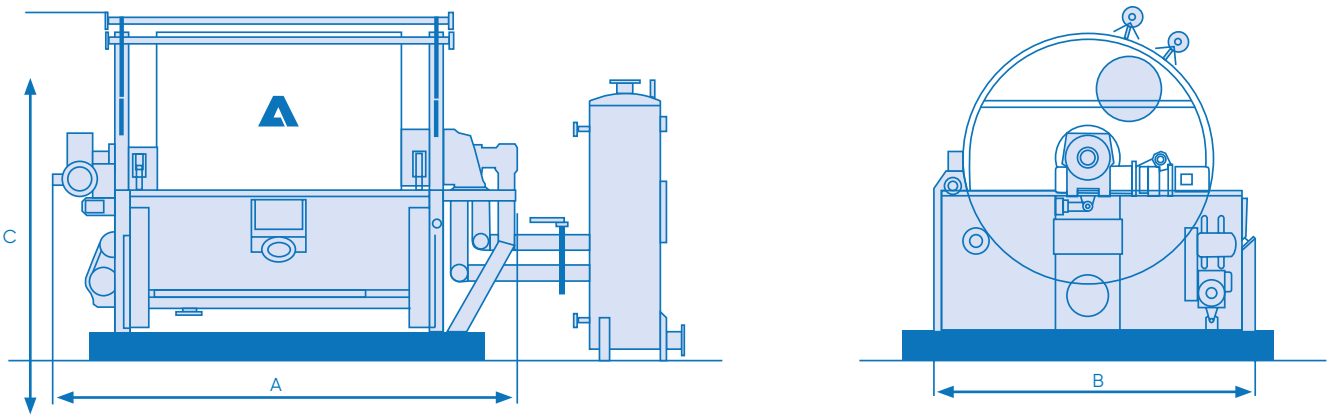


String/belt discharge

Technical data

Filter type	Filter area	Drum diameter	Drum width	Number of cells	A	B	C	Weight**	Drive***
	[m²]	[mm]	[mm]		[mm]	[mm]	[mm]	[t]	[kW]
CORES™* 9.2	0.72-4.30	920	250-1,500	14	2,050-3,300	2,050	1,700	1.4-2.4	1.1
CORES™* 13.1	6.00-12.00	1,310	1,500-3,000	20	3,400-4,700	2,300	2,000	3.4-5.3	1.5
CORES™* 20.9	16.00-30.00	2,090	2,500-4,500	16	4,500-6,500	3,700	2,800	9.5-13.5	2.2
CORES™* 31.4	35.00-60.00	3,140	3,500-6,000	24	5,900-8,400	4,700	4,000	20.5-31.5	4.0

All information is subject to change.
* CORES™ vacuum drum filter
** Operating weight of filter includes filling (approx. data)
*** Power requirements in kW for drum drive and pendulum agitator drive (excl. vacuum and filtrate pump), depending on application



Outline of the CORES™ vacuum drum filter

Intelligence for machine and process control

With Metris addIQ, you have a well-proven, intelligent control solution for industrial processes and machines. Our solid/liquid separation specialists use their in-depth expertise to provide scalable solutions that are individually tailored to regional and application requirements. Whether you're automating new equipment or upgrading to extend the lifecycle of existing systems, we find the ideal solution for you.

ANDRITZ offers a broad and constantly growing range of innovative products and services in the industrial digitalization sector under the brand name Metris, helping customers to enhance plant efficiency and profitability, optimize the use of resources, achieve constant and highest product quality, reduce production downtime, and maximize user-friendliness.

METRIS addIQ CONTROL SYSTEMS

Our tailored turnkey systems from a single supplier can improve entire plants or individual machines. By providing state-of-the-art automation technologies and digitalization, we ensure best-in-class performance. Automating machine and plant equipment measurably reduces gaps in many different production process steps. By using automation from ANDRITZ, you can reduce downtime thanks to features such as predictive analysis that allow you to optimize productivity.

Metris addIQ covers all levels of automation, starting at basic automation (machine, process, and plant control), to upgrades, and add-ons for process optimization. Together, you have a full range of optimized solutions that help reduce maintenance efforts and ensure preventive service for your machines and plants. These are all delivered from a single source and always individually tailored to your business demands. addIQ control systems are part of Metris, the ANDRITZ brand for digital solutions.

Your full-service provider

With ANDRITZ, you gain access to one of the world's largest OEM manufacturers for solid/liquid separation systems, including such well-known brands as 3Sys Technologies, Bird, Delkor Capital Equipment (Pty) Ltd., Escher Wyss dryers, Guinard Centrifugation, KHD Humboldt Wedag, Krauss-Maffei centrifuges, dryers, and filters, Lenser, Netzsch Filtration, Rittershaus & Blecher, Royal GMF Gouda, Sprout Bauer, and Vandenbroek.

Whether you need spare parts, rentals, local service, repairs, upgrades, or modernization of your equipment, ANDRITZ is your true full-service provider. From initial consulting through to service agreements, process optimization, and training programs, we are always looking for ways to minimize downtime and increase predictability in operations while raising your overall production efficiency. Wherever you operate, our network of 550 service specialists and global service centers ensures we'll always be there to support you for many life cycles to come. Let's sit down and see how we could take your operations to the next level.

LOCAL SUPPORT
Responsive local service centers and field service technicians

REPAIRS & UPGRADES
Optimization of machine and process performance, repair work, retrofitting, and modernization

SECOND-HAND & RENTALS
Certified second-hand and rental machines

TRAINING
Operator training and tailored seminars for operating and maintenance personnel

OEM SPARE PARTS
Filter cloths, spare and wear parts from OEMs or with OEM level quality, all readily available

SERVICE AGREEMENTS
Preventive maintenance, contracts for spare parts, maintenance, inspections, repairs, upgrades, operation, and equipment monitoring

PROCESS OPTIMIZATION
Automation tools and process expertise to boost your profit

LAB AND ON-SITE TESTS
Lab and testing capabilities for process optimization and machine upgrades

WHAT'S YOUR SEPARATION CHALLENGE?

ANDRITZ Separation is the world's leading separation specialist with the broadest technology portfolio and more than 2,000 specialists in 40 countries. For more than 150 years, we have been a driving force in the evolution of separation solutions and services for industries ranging from environment to food, chemicals, and mining & minerals. As the OEM for many of the world's leading brands, we have the solutions and services to transform your business to meet tomorrow's changing demands – wherever you are and whatever your separation challenge. **Ask your separation specialist!**

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