

bakor

CDF

VACUUM DISC FILTERS

**FOR MINERAL AND MINING SLURRIES
WITH HIGH SOLIDS CONCENTRATION**

**HIGH RATE FILTRATION
LOW FINAL CAKE MOISTURE
LOW ENERGY CONSUMPTION
CONTINUOUS OPERATION
HIGH AVAILABILITY WITH MINIMAL DOWNTIME
CLEAN RECYCLE FILTRATES
LOWEST MAINTENANCE AND OPERATING COSTS**

WITH HIGH RATE CERAMIC FILTERING ELEMENTS

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ABOUT THE BAKOR

Bakor Group of Companies is based on the Scientific-Research and Technical Center NTC Bakor, established more than 25 years ago.

Now it is a leading company for research, development and production of high-tech ceramic filtration and refractory materials for application for the mineral process slurries, liquids and hot fume gas.

The head office for Bakor is located in Moscow, Russia.



BAKOR's in-depth knowledge and technologies in the formulation of Ceramic Filtering Elements lead to the development of products for use in the Mineral, Hydrometallurgical, Chemical, and Industrial markets.

Highly equipped research and production base enables development and production of up-to-date products from the idea and its scientific realization to the finished goods.



For more than 11 years Bakor have been developing and producing filtering elements made of porous ceramics, which have highly effective performance parameters.

The main focus in production of ceramic products is to design and produce filters for solid-liquid separation.

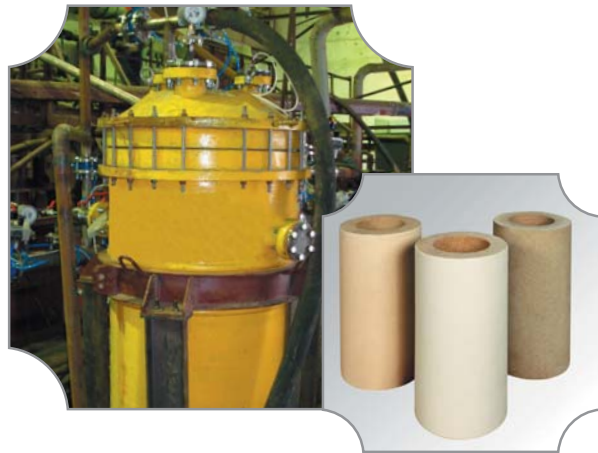
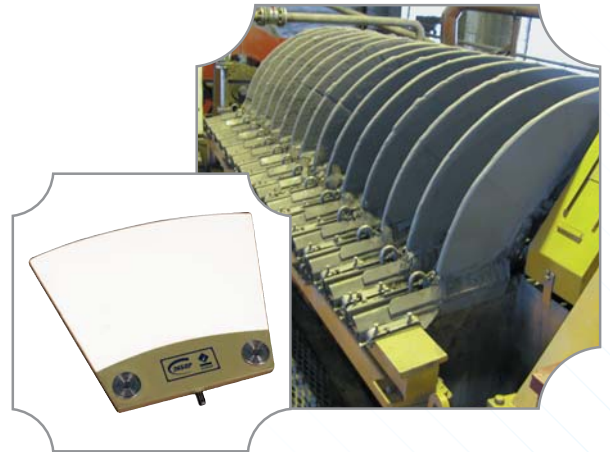
Currently Bakor produces filtering elements from porous ceramic materials with a number of valuable and considerable advantages comparing to the filter plates made of traditional materials:

- High mechanical strength
- Resistance to high temperatures
- Resistance to microbiological influence
- Resistance in aggressive environments
- High regeneration ability

Bakor offers high rate filtration equipment based on these technologies:

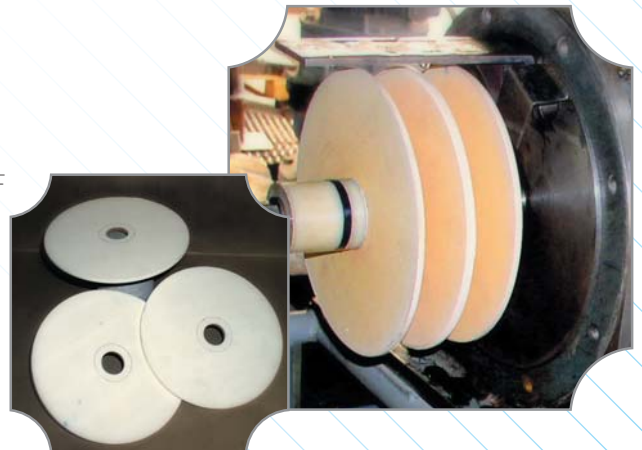
CORE BAKOR PRODUCTS

- VACUUM DISC FILTERS CDF



- PRESSURE CERAMIC FILTERS PCF

- TANGENTIAL FILTERS TTF





APPLICATION

CDF vacuum disc filters with ceramic filter plates are the best solution for filtration (dewatering) of slurries with high concentration of solids (from 15 to 70%), when it is required to obtain the dry final cake with minimum operational costs, high filtration rate due to a big filtration area. Ceramic disc filter is the best filter type when the production space is limited.

■ MINING AND MINERAL INDUSTRIES, FERROUS AND NONFERROUS METALLURGY:

- Filtration of concentrates
- Filtration of tails and slimes

■ ALUMINA PRODUCTION

- Filtration of concentrates

■ MUNICIPAL ENGINEERING, CHEMICAL AND FOOD INDUSTRIES:

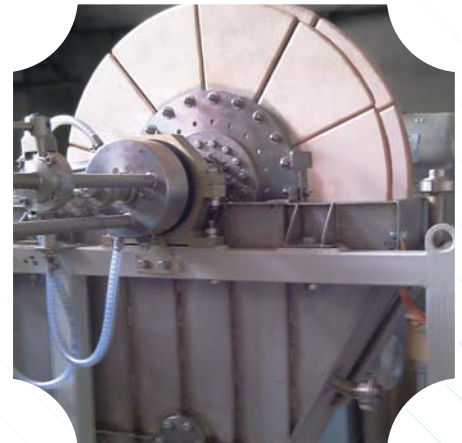
- Organization of local water-looped cycles

TYPICAL CONCENTRATE RESULTS

Material	Final cake moisture, %	Filtration rate, kg/m ² per hour
Copper concntrate	7.0-8.5	800-1500*
Zinc concntrate	6.0-9.0	700-950
Lead concntrate	4.0-7.0	800-3500
Oxidized lead-silver concntrate	10.0-12.0	400
Oxidized lead-gold concntrate	10.0-12.0	400
Pyrite concntrate	7.0-9.0	800-1100
Fluorite concntrate	12.0-18.0	800-1500
Aluminum hydroxide	5.3-10.5	1450-3500
Chome concntrate	6.0-8.0	1100-1500
Iron-ore concntrate	7.5-8.5	900-3500
Apatite concntrate	5.8-7.7	600-1100
Zirconium concntrate	5.85-7.2	600-670
Rutile concntrate	5.16-7.7	600-700
Ilmenite concntrate	7.8-8.2	600-800
Kaoline	20.0	400-600
Coal	9.5-13	300-800
Molybdenic concntrate	8.0	900-1000
Bentonitic concntrate	2.0-4.0	600
Quartz sand	4.0-6.0	1100-1500

Bakor offers innovative products and high-quality services for energy-effective and cost efficient filtration, based on CDF Filters:

- Scientific research of customers' projects and problems
- Design and development of filtration processes
- Development of the most efficient solutions for customer's tasks
- Test works
- Production and delivery of filtration equipment
- Continuous audit and service
- Continuous development of our products at clients
- Repair and reduction of customers' operation costs by refurbishment of the ceramic filters with Bacor filtering elements.





**MAKING THE DIFFERENCE:
BAKOR'S NANO CERAMIC SECTOR – THE BEST OF CLASS TECHNOLOGY**

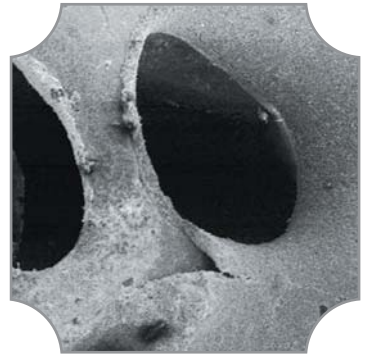
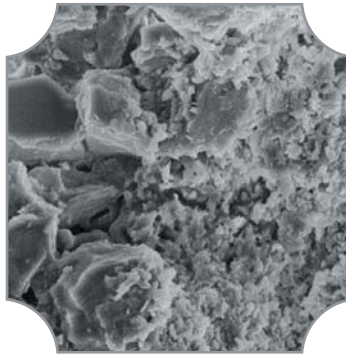
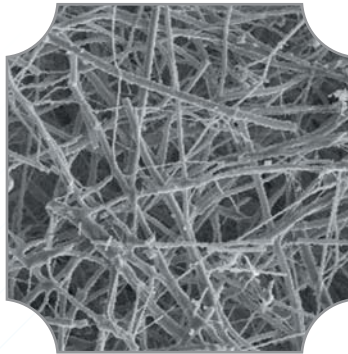
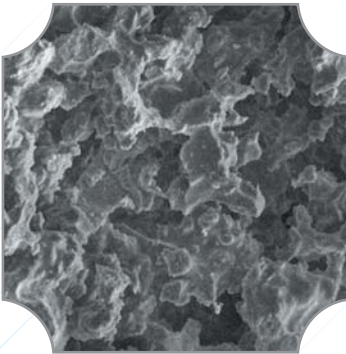


The CDF filter technology is solely dependent on Bakor's long history in the development of the nano-ceramic element design driven by the exclusive objective of meeting the process needs of the mineral industry.



Ceramic vacuum filters are equipped with discs each consisting of ceramic sector-shape filtering plates, which provide removal of the liquid from slurry by the capillary action of ceramic media.

Bakor's scientific know-how has led to the design of superior Nano-modified porous structure and plate membrane ceramic filter elements thus providing the mineral industry with Cost Effective Solutions



ADVANTAGE – BAKOR CERAMIC SECTOR

- HIGH RATE TURBO DESIGN
- PORE SIZE CONTROL
- MATERIAL SELECTION FOR APPLICATION SPECIFIC
- MAXIMIZING MECHANICAL ROBUSTNESS
- NON-CLOGGING DESIGN
- ABRASION RESISTANT
- HIGH TEMPERATURE RESISTANCE
- RESISTANCE IN AGGRESSIVE ENVIRONMENTS



- Maximizing Throughput Capacity
- Reduced Maintenance Costs
- On-Line Availability
- Maximum Life Span Optimizing Process Control
- Minimum Final Cake Moisture & Maximum Filter Productivity
- Maximizing Overall Performance



PHYSICAL AND TECHNICAL PARAMETERS

Indicators	Units of measure	Value
Open porosity	%	40-45
Pore diameter	microns	1-10
Ultimate compressive strength (minimum)	MPa	30.0
Structural bending strength of the filtering element (minimum)	KH	19.0
Acid resistance (minimum)	%	97.0
Alkali resistance (minimum)	%	92.0





THE BAKOR FOCUS

- Advance the Technology of High Rate Ceramic Filtering Elements
- Continuous Improvement of the CDF Filter Design & Regeneration Technologies

Objective:

Provide Our Valued Customers with First Class Filtration Products, Technologies, and Service

THE BAKOR CDF ADVANTAGES

1. DRY CAKE

- Concentrate filter cake moisture content 7–8 wt %

2. POWER CONSUMPTION ECONOMY

- 10-20 times less power consumption, compared to vacuum and pressure filter designs
- Concentrate driers eliminated
- Reduction of heavy duty electrical components

3. MAINTENANCE AND OPERATING COSTS SAVINGS

- Move available than any other dewatering system
- Low filter elements replacement costs
- No component wear from abrasive solids in filtrate system
- Minimal Operating & Maintenance manpower required
- Heavy Duty corrosion resistant filter design

4. CONTINUOUS OPERATION

- Cost reduction in conveyance equipment
- Operator' man power reduction
- Highest Capacity per installed filter area
- Highest availability compared to the alternatives

5. HIGH SPECIFIC OUTPUT

- 1,5-5 times higher than other vacuum and pressure filters
- Big filtration area per the unit of plant space

6. CERAMIC FILTERING ELEMENTS

- Continuous improvements
- Ceramic filtering elements' life is 36 months
- Redesign of filter elements construction
- High thermal resistance and strength
- High abrasion resistance
- Membrane coating to optimize performance
- Maximum hydraulic capacity through pore size technology
- High open porosity – up to 45%

7. OPERATION ADVANTAGES

- Major reduction in maintenance costs
- Simple design and assembly and operation simplicity
- Compactness and minimum operation space
- Continuous Operation & Automated Control

8. PLANT ENVIRONMENTAL AND SAFETY

- No aerosol blowouts and reduction in man power leads to improved safety record
- Clin filtrat without solids allows to use it in the looped water cycle

9. CLEAR FILTRATE, RAW MATERIALS ECONOMY

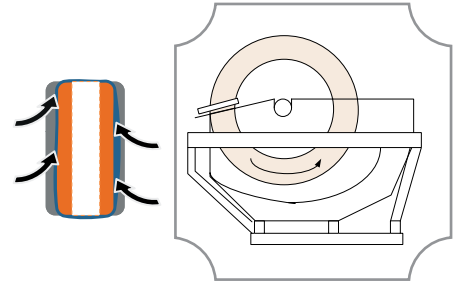
- Allows to filtrate without losses the fine-grained - 0.040 mm concentrates up to 99%
- No losses of solids within filtrate (content of filtrate solids: 0.001-0.005 gram/liter)
- Use of the filtrate in the looped water cycle for reduction of water consumption to 30-50%
- Reduction of polymer consumption in thick-ener

CDF FILTER OPERATING CYCLES

Fully automatic/programmable filter operation

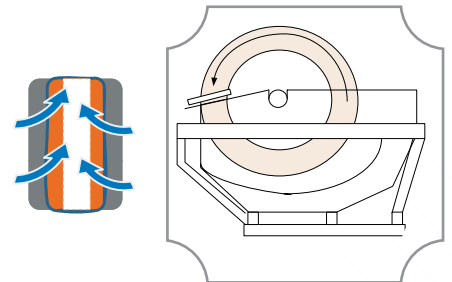
■ CAKE FORMATION

When the microporous plates are submerged into the pulp, filtering elements remove the liquid in contact with their surface due to the capillary effect. The vacuum pump applies the driving force to move the slurry liquor through the ceramic elements and into filtrate pipes. On the outer surface of the elements the filter cake forms rapidly, the effective design of the sectors prevents the passage of fine solids and air through the filtrate system.



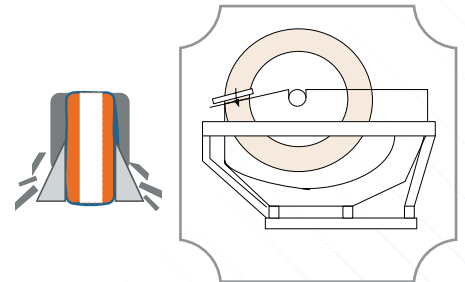
■ FILTER CAKE DEWATERING

As the ceramic filter elements rotate above the slurry level, the capillary action within the ceramic elements continuously removes the residual moisture from the filter cake. This highly efficient dewatering process produces low final cake moistures at minimum operation and maintenance costs, comparing to the traditional dewatering systems.



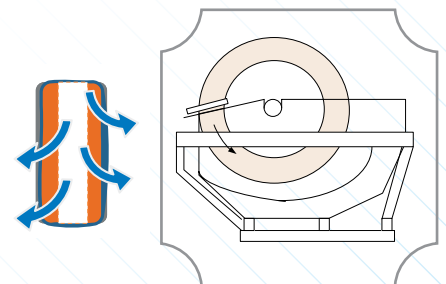
■ CAKE DISCHARGE

The ceramic scraper knives cleanly and effectively shave through the formed and dewatered filter cake. A layer of solids remains on the filter element providing protection from the mechanical abrasive action. This design results in reduction of the maintenance costs and increase of the service life of the ceramic filters.



■ ELEMENT BACK-FLUSHING (REGENERATION)

At this stage clean plant water is applied to the back wash the internals of the ceramic filter elements and to remove the residual filter cake. This process effectively cleans both the ceramic sectors to maintain maximum filtration rates and lowest final cake moistures. The pressure and flow of the wash water during this regeneration operation automatic control under.



The design of the CDF filter provides ultrasonic cleaning of ceramic filter elements, which ensures the most efficient performance of the ceramic filter elements. Ultrasonic cleaning can either be used on a regular basis or from time to time, depending on the necessities, and it also can be used separately or in combination with acid back-flushing.



CDF HEAVY DUTY CONSTRUCTION

Through continuous focus on product improvement, the Bakor CDF filter now provides the industry with the next generation of best-of-class vacuum ceramic disc filter technology.

These improvements maximize the operating performance, reduce the maintenance & operating costs, and provide the best design and technology to our valued partners in the mineral industry.

These improvements provide ease of maintenance and access to the filter working areas (due to shaft design), ease of assembly, and maximize the availability and operation reliability.

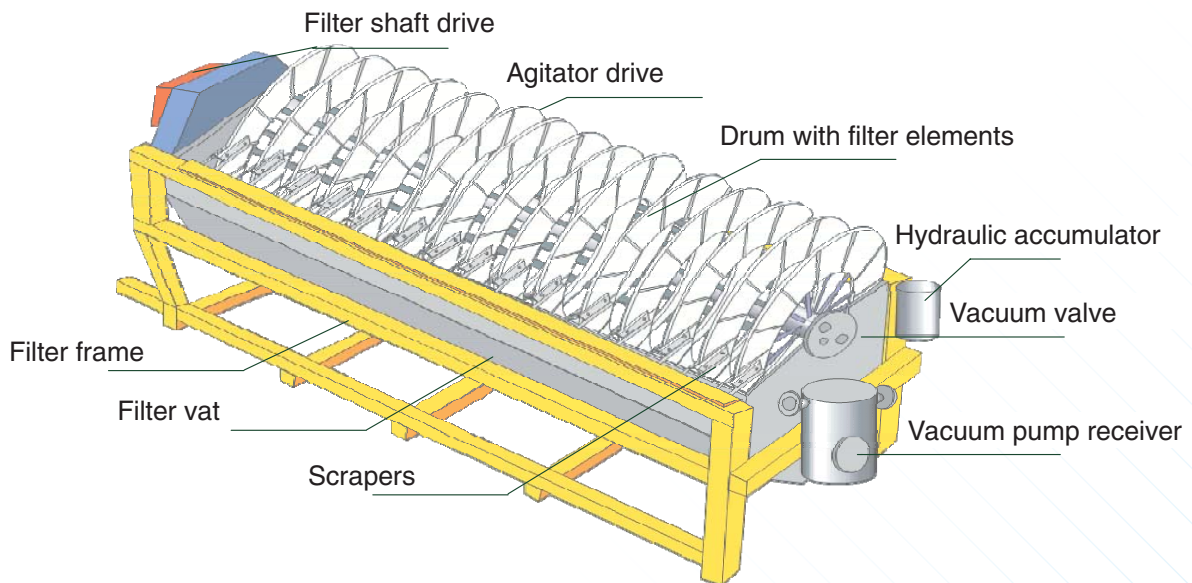
Best of class design of the back washing and ultrasonic cleaning systems optimizes the regeneration function and therefore maximizes filter capacity and minimizes final cake moistures.



Filter drum patented design maximizes stability, providing:

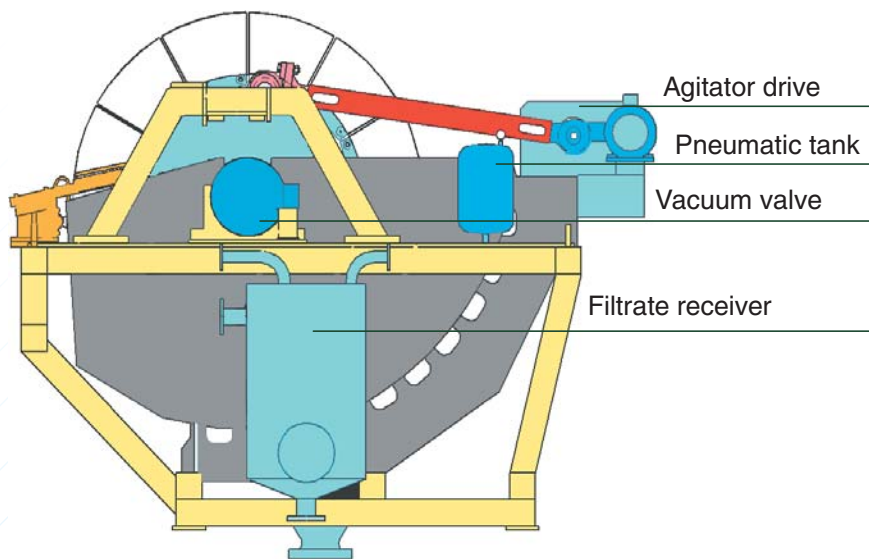
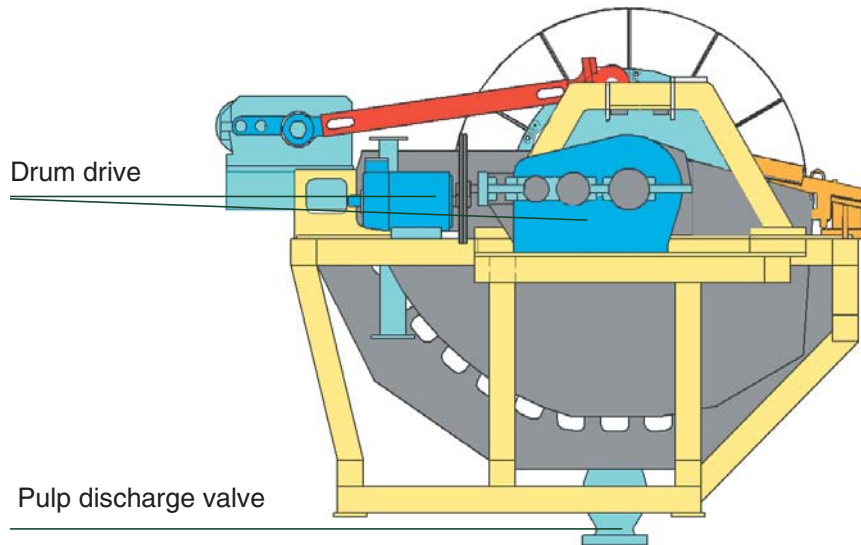


- 100% blockage of the cake forming and cake dewatering zones from backwashing water or filtrate,
- possibility to regulate the vacuum zones of cake forming and dewatering,
- possibility to increase the backwashing pressure.
- designs of vat bottom and agitator provide the best agitation of slurry due to the curvature angle of the bottom and mechanical trajectory of the agitator.





Best design of agitator, shaft, agitator drive and filter vat provides uniform mixing of high density slurries and therefore maximizes process performance.



TECHNICAL SPECIFICATIONS

Parameters		CDF	CDF	CDF	CDF	CDF
		0.5	1	3	15	30
Filtration area	m ²	0.5	1	3	15	30
Number of plates per disc	pcs	10	10	12	12	12
Disc diameter	mm	720	720	1900	~2260	~2260
Filter sizes:	mm					
Length		975	1275	1800	~3600	~4850
Width		995	995	2500	~3910	~3910
Height		1280	1280	2800	~3300	~3300
Vacuum pump drive capacity		0.75	1.5	1.5	2.2	2.2
Installed power	kW	1.75	2.7	16	18	20
Filter weight	kg	210	300	1800	8100	11500
Filter operating area	m ²	6	8	17	35	45
Filter vat slurry level	m ²	0.1	0.4	1.3	3.8	5.8

Parameters		CDF	CDF	CDF	CDF
		45	45-1	60	150
Filtration area	m ²	45	45	60	150
Number of plates per disc	pcs	12	12	12	12
Disc diameter	mm	1900	~2260	~2260	~2260
Filter sizes:	mm				
Length		7222	~6350	~6950	~7950
Width		3546	~3910	~3910	~5100
Height		2685	~3300	~3300	~3300
Vacuum pump drive capacity		2.2	2.2	6	15
Installed power	kW	15.2	26.8	34.5	70
Filter weight	kg	15360	15050	15950	44200
Filter operating area	m ²	51.1	49.5	53	50.7
Filter vat slurry level	m ²	7.4	8	9.5	31



CERAMIC PLATES TYPES



Test Sample of Filtering Element

Indicators	Size
Overall height	192 mm
Thickness	24,3 mm
Overall width	165 mm
Filtration area (a sum for both sides)	0,016 m ²
Weight Al ₂ O ₃	0,97 kg
Weight SiC	0,87 kg



Filtering Element for CDF-0,5

Indicators	Dimensions
Overall height	260 mm
Thickness	24,3 mm
Overall width	215 mm
Filtration area (a sum for both sides)	0,05 m ²
Weight Al ₂ O ₃	1,64 kg
Weight SiC	1,5 kg



Standard - 30 mm

Indicators	Dimensions
Overall height	425 mm
Thickness	30 mm
Overall width	486 mm
Filtration area (a sum for both sides)	0,25 m ²
Weight Al ₂ O ₃	9,9 kg
Weight SiC	8,9 kg



Standard - 24 mm

Indicators	Dimensions
Overall height	425 mm
Thickness	24,3 mm
Overall width	486 mm
Filtration area (a sum for both sides)	0,25 m ²
Weight Al ₂ O ₃	7,8 kg
Weight SiC	7,0 kg



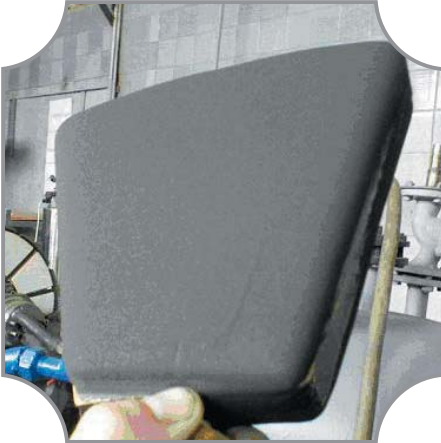
Large Filtering Element

Indicators	Dimensions
Overall height	598 mm
Thickness	35 mm
Overall width	573 mm
Filtration area (a sum for both sides)	0,416 m ²
Weight Al ₂ O ₃	18,6 kg
Weight SiC	16,7 kg

LABORATORY AND SITE TESTING

The Bakor Research Department offers in-depth process analysis of all process slurries using either our CDF-0,03 Laboratory pilot plant filter or the bench-scale leaf filter.

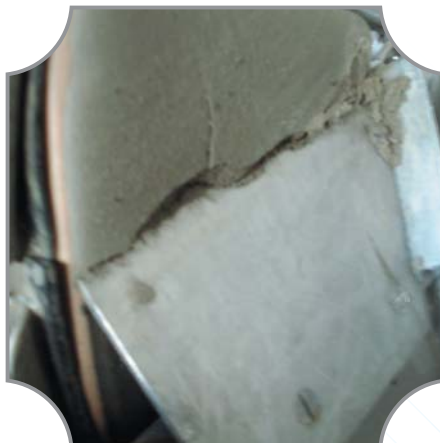
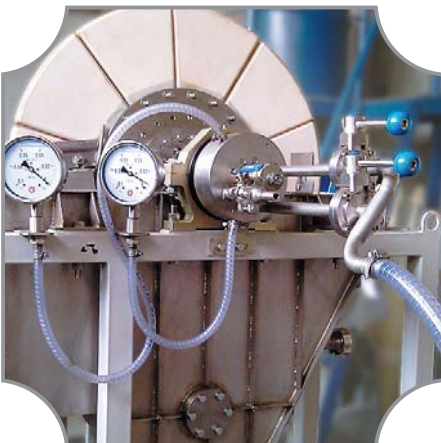
The preliminary research of slurry filterability is conducted at the testing laboratory unit under laboratory conditions or in the customers shops.

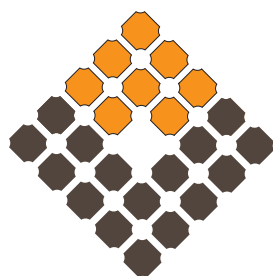


Test-CDF- 0.5

When on test results are positive, then the laboratory test using the CDF-0.5 testing filter with a filtering area 0.5 m² is performed.

The CDF-0.5 is an industrial filter.





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