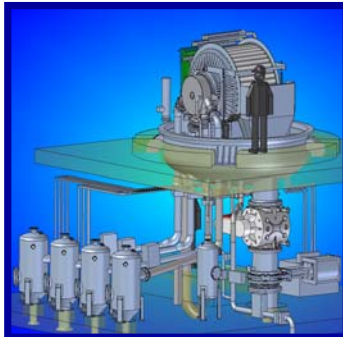


Hi-Bar Oyster Filter

Continuous Pressure
and Steam Pressure Filtration

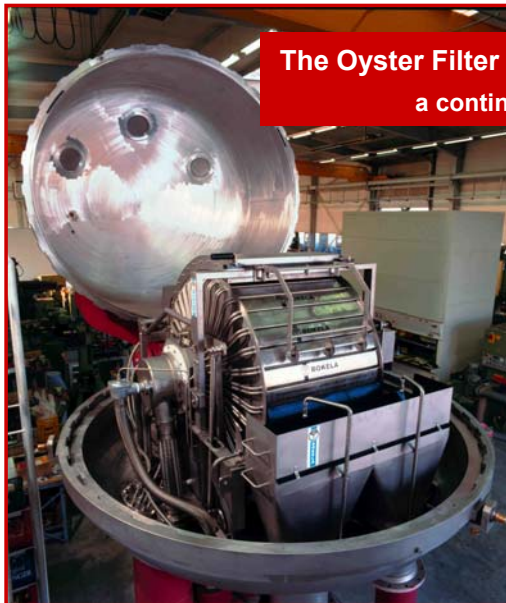


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BOKELA Hi-Bar Oyster Filter

Continuous Pressure and Steam Pressure Filtration



**The Oyster Filter –
a continuous pressure filter ...**

... especially designed for the chemical, pharmaceutical, food and life science industry.

The Oyster Filter is made for applications with:

- valuable products
- fine and difficult to filter particles
- toxic products like emitting suspensions
- low-boiling suspensions
- high temperatures
- high process pressures
- frequent product changing
- high quality standards

BOKELA Hi-Bar Oyster Filter

Continuous Pressure and Steam Pressure Filtration



The Hi-Bar Oyster Filter is part of the BOKELA Hi-Bar Filtration technology

Standard version of Hi-Bar Filtration:

- compressed air is used for filtration

Hi-Bar Steam Pressure Filtration:

- cake dewatering and cake washing with superheated steam

Outstanding Features of the Oyster Filter

- high specific throughput rates
- effective cake washing in up to 3-stage counter-current wash
- extremely low cake moisture
- pressures up to 7 bar,abs (in special applications up to 15 bar,abs)
- temperatures up to 200°C
- counterpressure filtration i.e. low filtration pressure difference at high process pressure
- single cell design
- drive systems for inside or outside of pressure vessel
- high flexibility
- compact plant design
- hermetic closed system
- excellent accessibility
- Cleaning-In-Place system

Oyster Disc Filter



Oyster Drum Filter

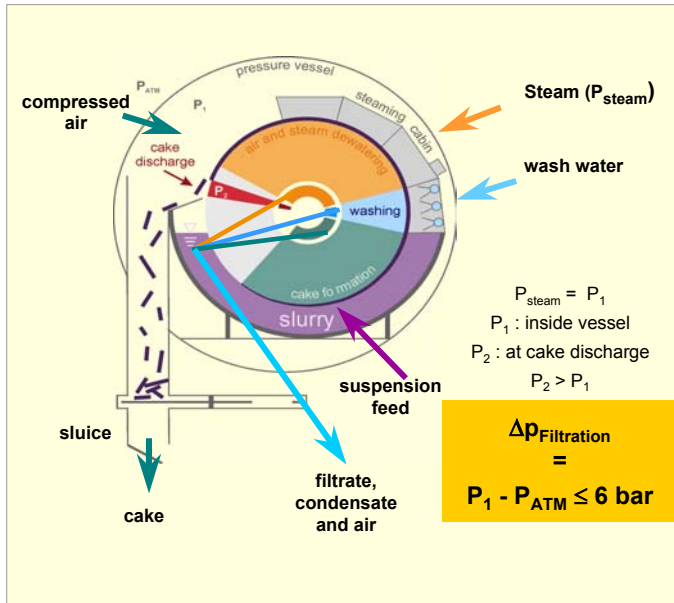


BOKELA Hi-Bar Filtration

Process and Plant Principle



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Standard design (large units) with horizontal pressure vessel for bulk materials with high throughput rates



Oyster design (small units) with vertical pressure vessel for sophisticated separation tasks in the chemical, pharmaceutical & food industry, etc.

Hi-Bar Steam Pressure Filtration

Innovative and Patented Hybrid Process



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Model of the Condensate Front

filter cake: before ... during ... after steaming

cold and saturated

hot and dry

filter cloth

Dewatering time t_2

Condensate Front:

- continuous moving of an even condensate front
- homogeneous heating of the filter cake
- emptying of nearly all pores
- viscosity reduction of the residual liquid leading to:
 - **excellent washing out (extraction)**
 - **extremely low moisture content**

Vacuum filtration

wet & sticky cake
mc = 35 %

Steam Pressure Filtration

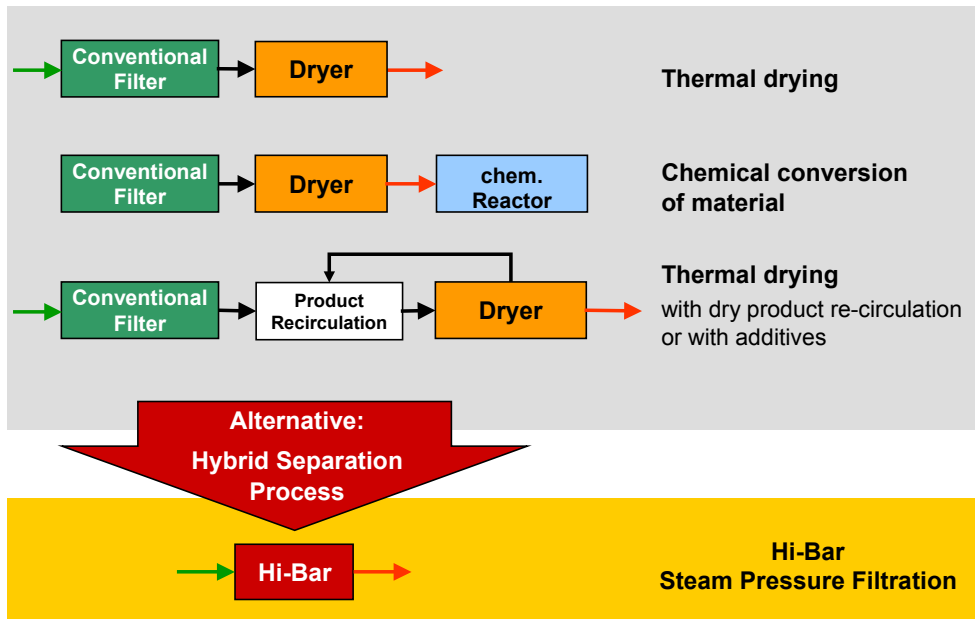
dry cake
mc = 23 %

Why Steam Pressure Filtration?

Process Simplification



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-5-

Hi-Bar Steam Pressure Filtration

One (1) Oyster Filter Replaces Six (6) Centrifuges



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Hi-Bar Oyster Filter with Steam Cabin
Filter Area: 3.75 m²

Separation and washing of a chemical crystallization product:

replacing a 2-step wash with large peeler centrifuges (re-slurry) by 1 Oyster Filter with 3.75 m² filtration area

Washing Task

- reduction of organic content
- low moisture content

Results of Oyster Filter		Operation values	Required values
moisture content	(wt-%)	1	< 4
organic in solids	(ppm)	80	< 100
(wash water / suspension)	(kg/kg)	0.3	< 0.4
specific solids throughput	(kg/m ² h)	1000	
cake height	(mm)	30	

-6-

Steam Pressure Filtration with the Oyster Filter

Filtration, Washing and Drying of an Inorganic Compound



Oyster Drum Filter with steam cabin
& exchangeable filter cells
filter area: 3.6 m²

Filtration, washing and drying of an valuable inorganic compound

- ➔ moisture content $\leq 20\%$
- ➔ thermal drying of filter cake not longer necessary

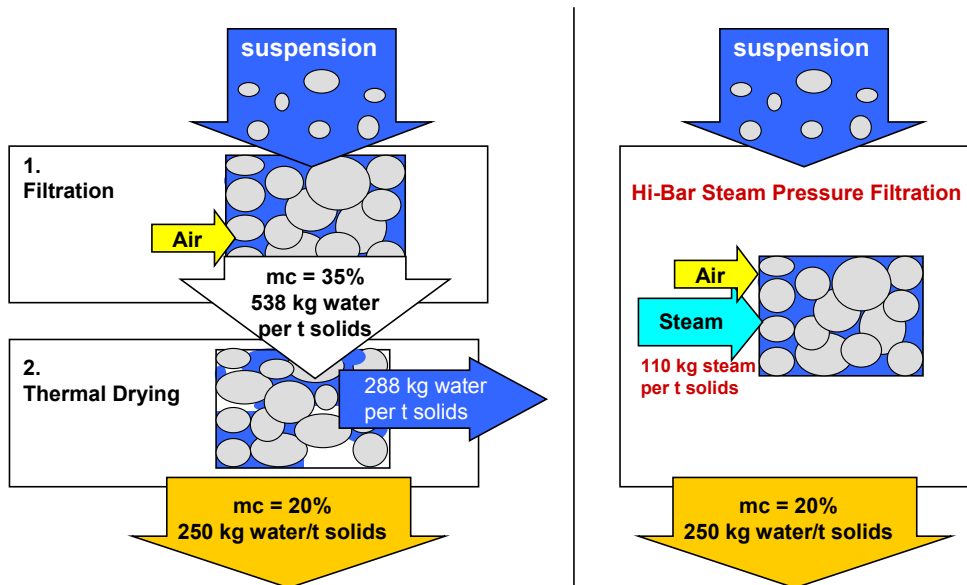
- operating pressure 4 bar
- 3 month life time of filter cloth
- filter cloth change in 30 min
- > 96 % availability per year
- inspection + spare parts < 2.5 % of invest / year

Steam Pressure Filtration with the Oyster Filter

Filtration, Washing and Drying of an Inorganic Compound



Synergy of Steam Pressure Filtration



Filtration and Washing of Terephthalic Acid

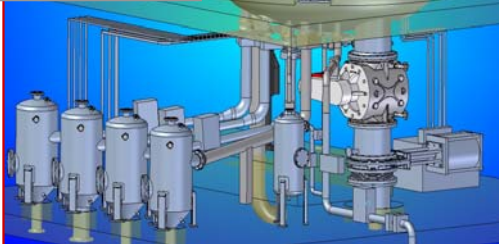
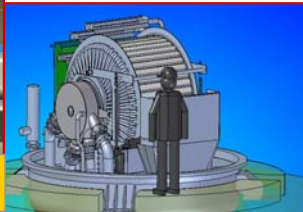


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Process Simplification for PTA, CTA and QTA by the Oyster Filter



Oyster Filter in the workshop



Two Hi-Bar Oyster Filters in a PTA plant

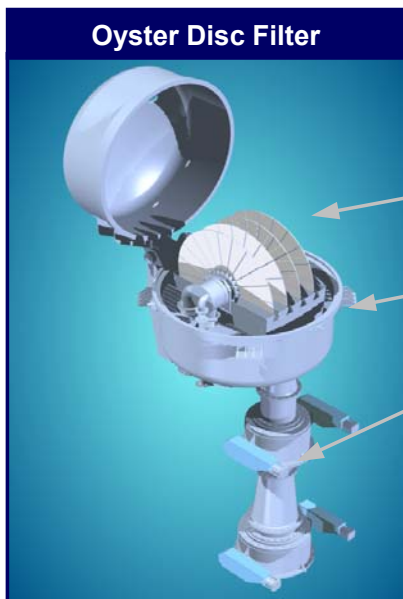
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BOKELA Hi-Bar Oyster Filter

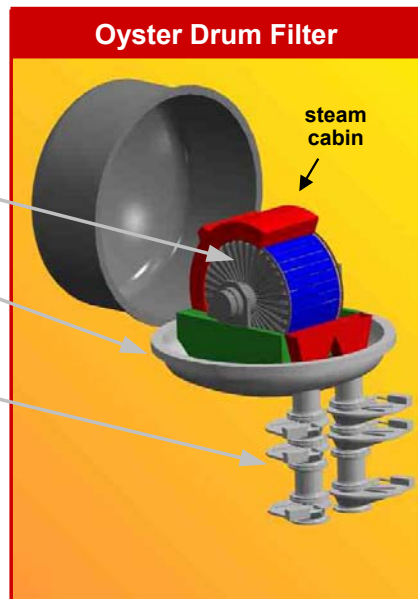
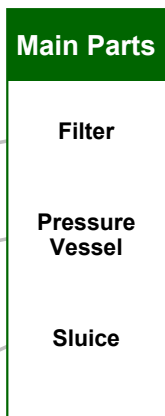
Disc and Drum Filter



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Oyster Disc Filter



Oyster Drum Filter

steam cabin

-10-

BOKELA Hi-Bar Oyster Filter

Disc and Drum Filter



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Oyster Disc Filter

- large filtration area in small volume for high throughput
- low price related to filtration area
- for less sophisticated separation tasks

disc & drum

- enclosed system
- excellent accessibility
- steam pressure filtration possible
- very low residual moisture
- optimum cake discharge
- CIP-equipment
- high availability

Oyster Drum Filter

- excellent process adaptation by flexible control zones
- intensive cake wash, even multi-stage
- several filtrate pipes per filter cell
- exchangeable filter cells

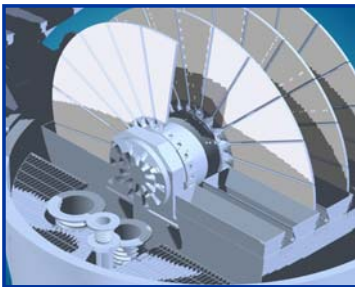
-11-

BOKELA Hi-Bar Oyster Filter

Exchangeable Filter Cells / Segments



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Disc Filter Segments Prepared for Fitting



Exchangeable Drum Filter Cells

Simple and quick cloth change with exchangeable filter segments

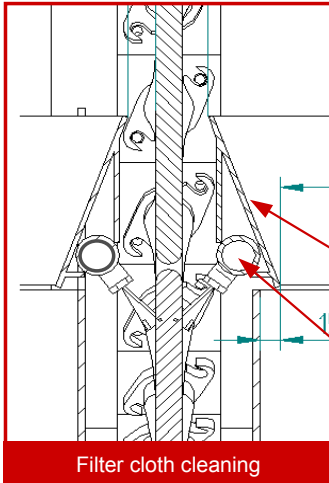
-12-

BOKELA Hi-Bar Oyster Filter

Cleaning in Place



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Enclosed system:

- No emissions to atmosphere or surrounding
- No pollution of product
- Cleaning in Place of complete system possible

deflector plates

Cloth wash bar with nozzle



Several Rotating CIP-Nozzles installed inside the vessel

-13-

BOKELA Hi-Bar Oyster Filter

Excellent Accessibility - Easy Maintenance



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Excellent accessibility for maintenance work by completely hinged pressure vessel

➔ no "release of vessel" inspection required

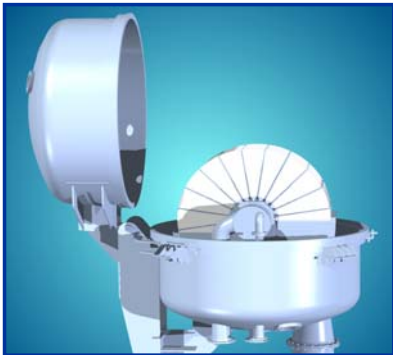


- smooth design of all components
- avoiding of unnecessary clearance volume
- no unnecessary seals
- CIP-equipment

-14-

BOKELA Hi-Bar Oyster Filter

Pressure Vessel



- Vertical pressure vessel for optimum accessibility
- Opens and closes automatically
- MOC: stainless steel possible

BOKELA Hi-Bar Oyster Filter

Discharge Sluice



Chamber Discharge Sluice - different solutions available



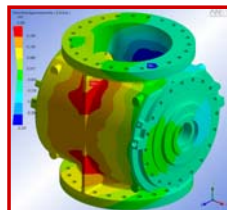
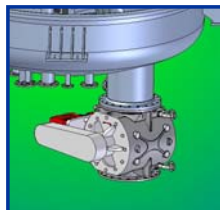
Dome Valves



Swing Valves

- Proven double valve arrangement
- Conical intermediate chamber to avoid solids bridging
- Heating / CIP as required

COPERION Rotary Valve



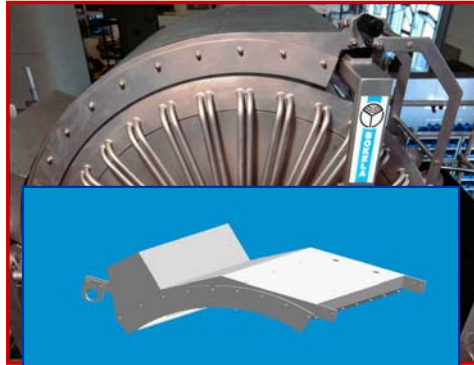
reliable and proven equipment for PTA and other non-abrasive products

BOKELA Hi-Bar Oyster Filter

Steam Cabin for Steam Pressure Filtration



Steam cabin of the Hi-Bar Oyster Filter



Process and design aspects:

- Extent of steam zone
- Steam supply
- Steam distribution
- Condensate formation

BOKELA Hi-Bar Oyster Filter

Sizing



	Type	Diameter	Filter Area	Floor Space
Drum Filter	XS1	0.9 m	1.0 m ²	2,2 x 2.4 m
	XS2	0.9 m	2.0 m ²	2.2 x 2.4 m
	S4	1.4 m	3.6 m ²	2,8 x 2,8 m
	S5	1.4 m	5.0 m ²	2.8 x 2.8 m
	M7	1.9 m	6.8 m ²	3.5 x 3.5 m
	M9*	1.9 m	8.8 m ²	3.5 x 3.5 m
	M11*	1.9 m	10.8 m ²	4,5 x 4.5 m
	M12*	1.9 m	12.8 m ²	4.5 x 4,5 m

* no single cell design

	Type	Diameter	Discs	Filter Area	Floor Space
Disc Filter	XS1	2.2 m	1	6.0 m ²	3.5 x 3.5 m
	XS2	2.2 m	2	12.0 m ²	3.5 x 3.5 m
	XS3	2.2 m	3	18.0 m ²	3.5 x 3.5 m
	XS4	2.2 m	4	24.0 m ²	3.5 x 3.5 m



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