JVK® Filtration Systems

Membrane Chamber Plates
world-wide successful in operation

JVK MEMBRANE CHAMBER PLATES

JVK Membrane Chamber Plates and Filter Elements have been well proved in all industrial fields since 1962.

JVK has influenced all mayor developments in the filtration field of solid-liquid-separation with new ideas and designs.

JVK produces membrane chamber plates for filtration equipments in accordance to DIN standards or as special designs in polypropylene or other thermoplastics with the JVK developed ICM process.

JVK is offering a long-termed experience on the development, production and application of membrane chamber plates. In 1964 already the first trials had been done in a chemical plant with the first membrane chamber plates.

JVK started the series production of membrane chamber plates equipped with elastomere membranes in 1968.

JVK membrane chamber plates are successfully used world-wide due to the high quality standard and the continuous developments.

ADVANTAGES

PP FILTERPLATES

- Long life time
- Superior product quality
- Minimal cloth strain
- Excellent sealing
- Good heat insulation
- Easy cleaning
- Light weight

ADVANTAGES

JVK MEMBRANE SYSTEM

- Exchangeable membranes
- Short filtration and washing cycles
- Low residual cake moisture
- Large cross area of filtrate outlet
- High elasticity of membrane
- Sealing of filter plate system
- Safety factor of the membrane system
- Many fields of application

APPLICATION

WASTE WATER / SEWAGE PLANTS
Waste water treatment and
water purification for potable water
dewatering and decontamination of industrial and
municipal waste water:
sewage from dust scrubbers,
paper, leather and latex waste water,
grinds of wood and stone,
coal and ore suspensions from flotation processes
neutralization plants, oil refineries
metalhydroxide sludges (galvanic)
drilling mud of oil rigs

CHEMISTRY
Manufacturing of mineral pigments,
organic dyestuffs and titanium dioxide,
filtration of phosphoric compounds and ferments during
the production of wetting, washing and cleansing agents,
chemical intermediate products and fillers e.g.
kaolin, aluminum oxide, activated clay etc.
chlorine electrolysis, filtration of brine to produce
chlorine, sodium hydroxide, zeolite, silica etc.

PHARMACEUTICALS
Extraction and washing of intermediate products with sterilisation at temperatures up to 100 °C
filtration of blood plasma, syrup etc.

BIOTECHNOLOGY
Filtration of blood plasma and other substances, which may not get in contact with bacteria.

FOOD
Production of soup, soup flavours, rice noodles, sugar, vegetable oil, palm oil, fruit juice, wine , yeast, starch, gelatine, beer, agar-agar etc.

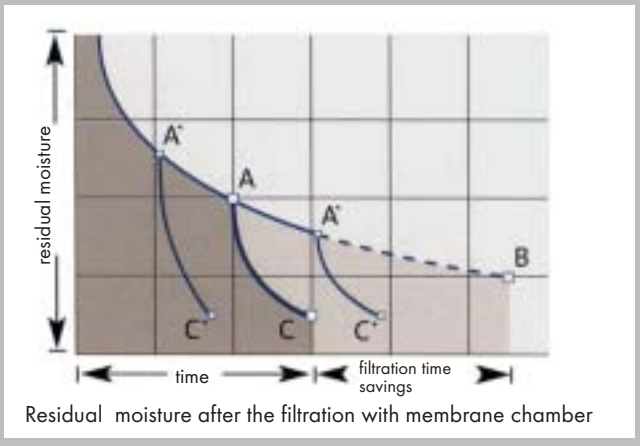
CERAMICS
Dewatering of caolin, chalk, clay, porcelain
and ceramic bulks

METALLURGY
Filtration of metallic salt solutions serving as first step of electrolysis when refining nickel, copper, silver, gold and uranium and by-products as molybdenum
electrolytic separating of metals reprocessing of batteries

PAPER INDUSTRY
Recovery of water and fibres etc.

SYNTHETIC FIBRES
Spinning fibres, gel filtration of viscose

TECHNICAL ADVANTAGES IN THE APPLICATION



Residual moisture after the filtration with membrane chamber

A = End of Filtration with membrane chamber plate
B = End of Filtration with chamber plates
C = Residual cake moisture after the squeezing with membrane chamber plate
A` and C` are possible product dependent operating values.

The optimal operating condition A can be determined after a few filtration cycles. Cake compressibility, filtercloth, pump capacity etc. will influence the process optimisation.

1. SHORT FILTRATION CYCLE

A low cake moisture content by pressure filtration can be achieved with resseced plates by high filtration pressure and long filtration time only (B).
The membrane system requires much lower filtration pressure to fill the chambers (A)
The low cake moisture content is caused by squeezing with a flexible membrane (C).
The production cycle is determined by

- fast feed of chambers at low filtration pressure
- cake squeezing in a few minutes

2. LOW RESIDUAL MOISTURE

application of squeezing pressure to filter cake by elastic membranes replaces the high pressure filtration phase of recessed plates.

Advantages:

- remarkable reduction of residual cake moisture in short time
- shortening of total filtration cycle time.
- increased filtrate output
- very short discharge time
- increase of solid content up to ca. 100 % with special vacuum process
- less cake adhesion on the filter cloth
- automatisation of filtration process
- lower costs for pumps
- savings in energy and deposit costs
- less transport costs due to compact and very dry filter cakes

3. SHORT WASHING CYCLE

JVK membrane technology creates homogeneous cake without cracks by applying a low membrane squeeze pressure during cake washing

- uniform capillar structure
- optimal cake washing and blowing effiency in short time
- reduced washing liquor consumption

4. EXCHANGEABLE MEMBRANE

The Membrane is easily exchangeable inside or outside of the filter press.

- no exchange of the complete filter plate
- only replacement of membrane necessary

5. LOAD ON MEMBRANE

The membrane doesn`t cover the PP sealing rim and the support bosses of the plate

- no direct press closing force is applied to the membrane
- no need for an additional filter press closing force control in most applications

6. HIGH ELASTICITY OF MEMBRANE

The elastic membrane adjusts itself, without permanent deformation, caused by uneven cake surface, or different cake densities.

- this creates uniform cakes of equal density
- more even cake for washing and blowing
- Extension of the membrane into empty chamber without any problems

7. SEALING OF FILTER PLATE SYSTEM

- perfect sealing by plan-parallel machining of membrane chamber plates according to DIN 7129
- complete gasketed version (CGR) available

8. LARGE FILTRATE OUTLET CROSS AREA

diameter and quantity of filtrate outlet ports can be adapted to process requirements

- big filtrate volumes can easily be drained off
- no blocking due to solids and/or cristallisation
- no clogging by filtercloth.

9. FIELDS OF APPLICATION

The materials used by JVK, allow installations in almost every field of application and can be adapted to any working conditions:

- temperatures –20 up to 140° C
- filtration pressure up to 1,5 MPa (15 bar)
- Squeezing pressure up to 6,0 MPa (60bar)
- extreme temperature variations
- variety of chemicals

10. SAFETY OF MEMBRANE SYSTEM

JVK membrane is neither bolted nor welded as a rigid connection into the sealing area.

- Squeezing medium pressure can only be maintained under full closing pressure of the filter press.
- The membrane is immediately released from groove, if the closing pressure is lower than the squeezing pressure.

The use of the operating manual grants a safe working with JVK membrane chamber plates.

DESIGN

The design covers all relevant technical requirements

- designed to operating conditions
- simple construction
- outstanding functional safety
- trouble free maintenance

1. BASIC CONSTRUCTION
- standard and special designs
- feed and corner ports internal or external of filter plates in different positions

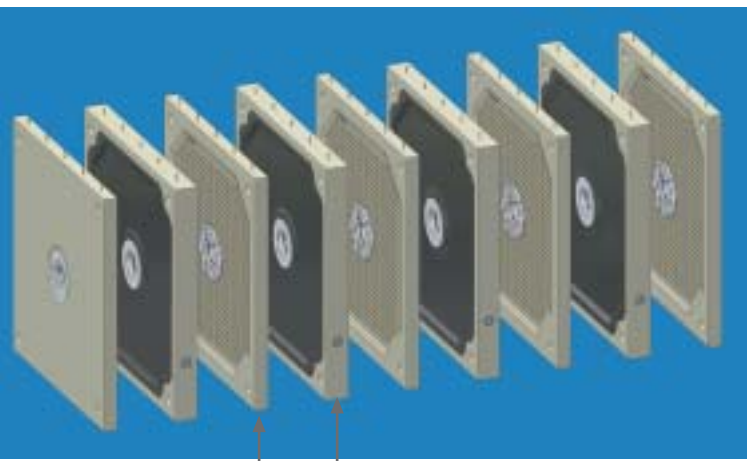
2. MEMBRANE CORE PLATE
- one piece moulded with JVK ICM technology
- ultra high molecular high heat stabilized polypropylene (PP)
- machined according DIN 7129
- other materials available

3. MEMBRANE
- vulcanised or made from thermoplastic special elastomers EPDM, NBR, SBR, PP-TPE, FKM (VITON) etc.

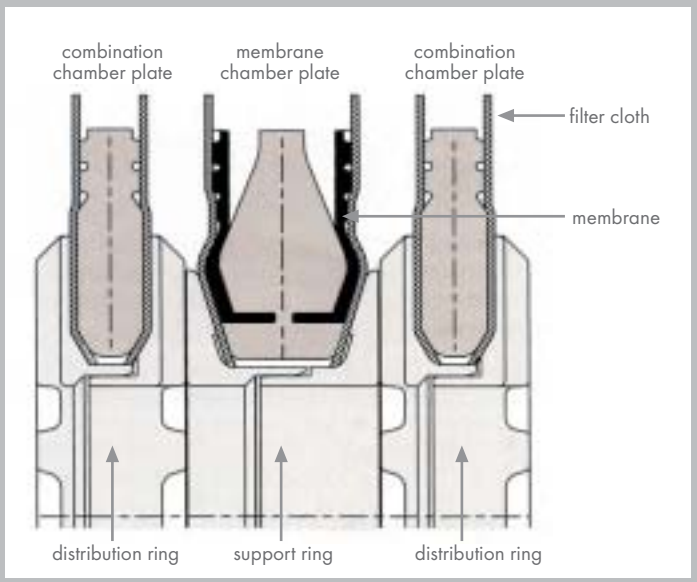
4. SQUEEZING MEDIUM
- air or liquid
- external manifold with single plate supply
- internal channel

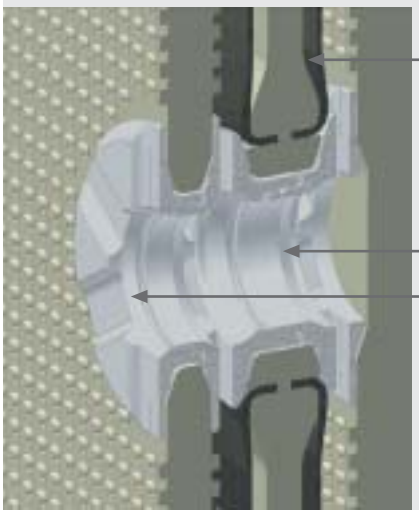
5. MEMBRANE INSTALLATION
- the membrane is detachable installed in sealing rim, support boss and feed hole
- no metal parts inside chamber

6. FILTERCLOTH
- barrel neck
- drape over also with grip ring
- barrel neck or drape over with support and distribution rings



The combination of JVK membrane- and combination chamber plates is a proven design. The advantages are significantly: Reduced installation costs and no restrictions as for non-elastic membranes.





Simple installation of filter cloth without screws. Suitable for drape over and barrel neck.

The use of support and distribution rings secures the even filling of chambers. Differental pressures and plate bending are reduced.

squeezing medium connection

OPERATION

1. FEEDING OF FILTER PRESS

During the feed step (1) the elastic membrane (2) moves back towards the core plate (3) under low tension.
Press feeding finishes when the optimal operating point is achieved.
Filtration finishes prematurely at lower pressure and less time compared to chamber plates.

2. WASHING THROUGH FEEED PORT

To be done after filtration cycle, no squeezing pressure and no chamber overfilling allowed (4) .
Cake washing fluid is forced through the pasty center to both sides of the cake.

3. PRE-SQEEZING AND WASHING THROUGH CORNER PORTS

The filtercake is consolidated in the chamber by applying low membrane pressure to avoid gaps or cracks.
Following washing versions can be used:

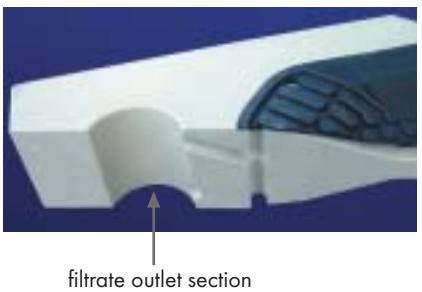
- washing in one direction right to left
- washing in alternate directions or diagonal
- washing top to bottom or
- bottom to top (flooded)
- washing media is forced to penetrate the cake from the membrane chamber plate to the combination chamber plate.

4. SQEEZING OF FILTER CAKE

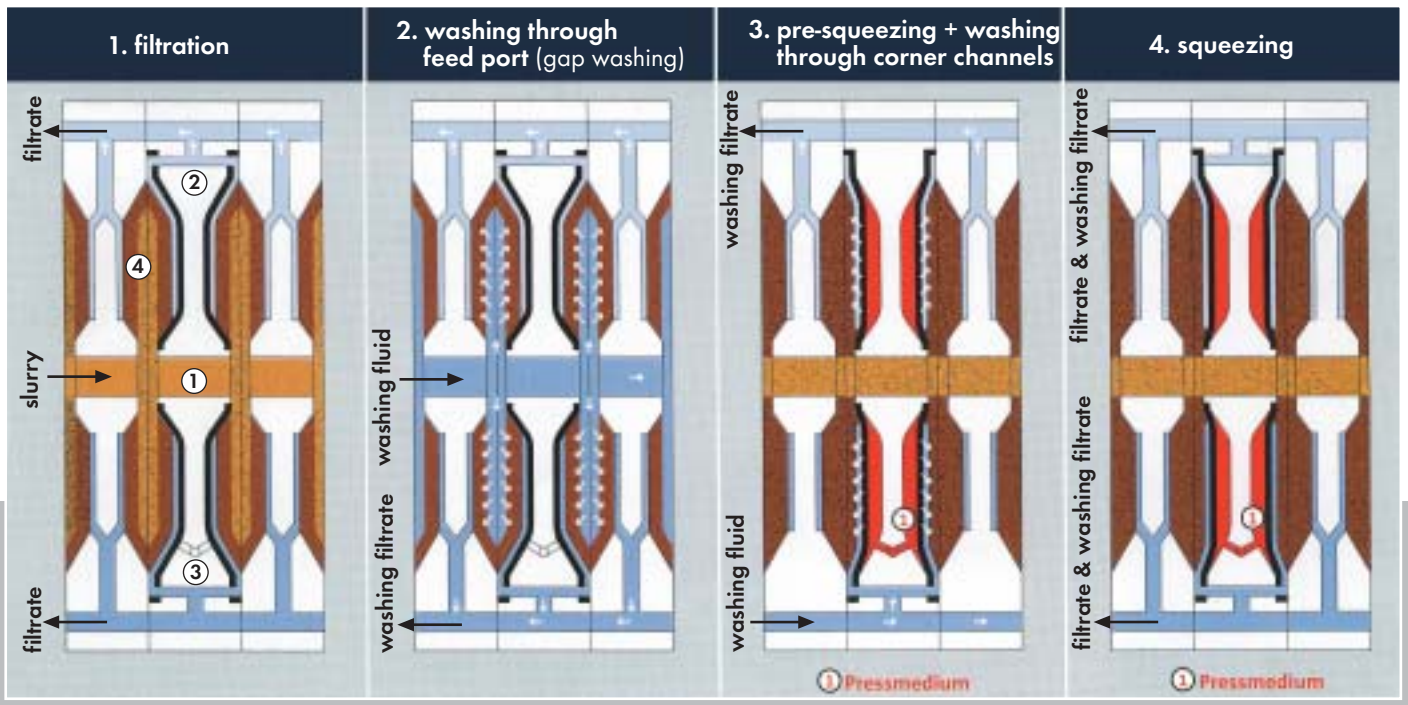
According to the cake structure the membrane pressure is reducing the residual moisture content in the filter cake significantly.
The squeezing pressure is normally higher than the filtration or the pre-squeezing pressure.
After squeezing the cake thickness should be smaller than the chamber depth. Otherwise overfilling of the chambers could be existent.

5. FILTER CAKE BLOW

Filter cake blow is performed by corner ports.
Non compressible filter cakes can be dried additional under assistance of squeezing pressure.



filtrate outlet section



slurry
cake
washing fluid
slurry thickened
membrane
washing fluid/filtrate
squeezing medium (pressmedium)

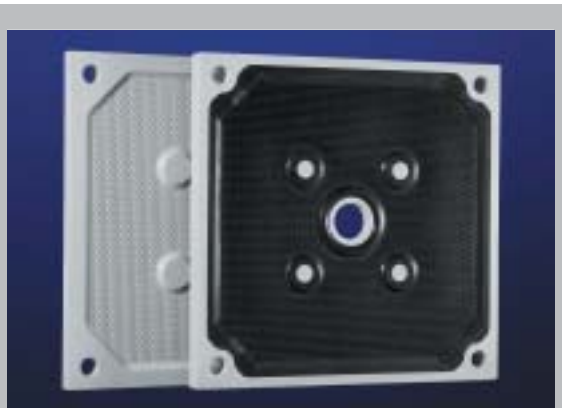
STANDARD MEMBRANE- AND COMBINATION CHAMBER PLATES

APPLICATION IN ALL INDUSTRIES

Sizes and Designs from 150 x150 mm to 2000 x 2000 mm
and 2500 x 3000 mm as a special design available

2000 x 1500 mm center feed

1200 x1200 mm top center feed



1500 x1500 mm center feed

ACCESSORIES FOR MEMBRANE- AND COMBINATION CHAMBER PLATES

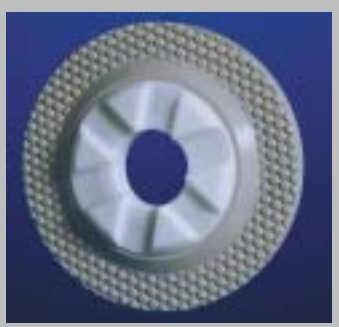
Squeeze Indicator
Indication of the end of squeezing process.
Early detection of leakages in the package.
Installation in existing membrane chamber plates possible.

squeeze indicator integrated in the handle of a membrane chamber plate

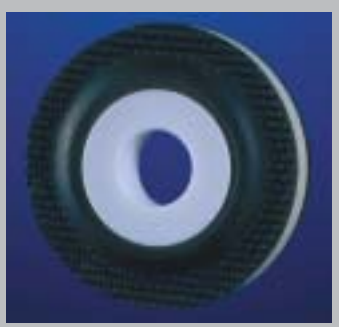
ACCESSORIES

membranes
support- and distribution rings
membrane clamping rings
cloth fixing rings
grip rings
filtercloth
filter cloth locking unions
filter cloth pegs
liner
O-rings, caulking rubber
handles
outlet taps
threat inserts
scrapers

CGR gasketed design membrane- and combination chamber plates are available in all sizes .



distribution ring



support ring

distribution ring for corner feed

support ring for corner feed

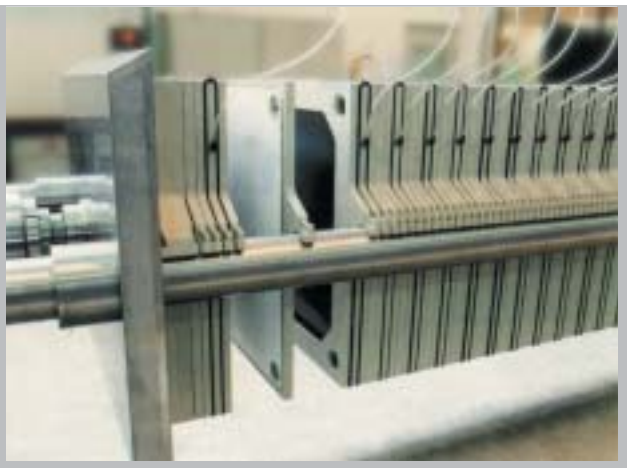
cloth grip rings

membrane clamping ring

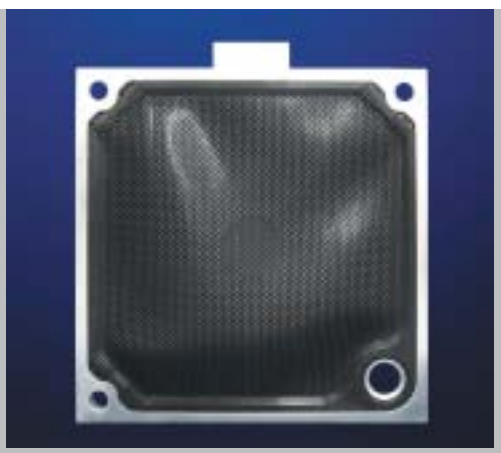
SPECIAL DESIGNS

APPLICATION IN SPECIAL INDUSTRIES

Membrane plate in combination with filter plate and frame for blood plasma filtration 815 x 815 mm.



Filter press with filter plate combination for blood plasma filtration



Aluminum chamber plate 1200 x 1200 mm in combination with FKM (VITON) membranes

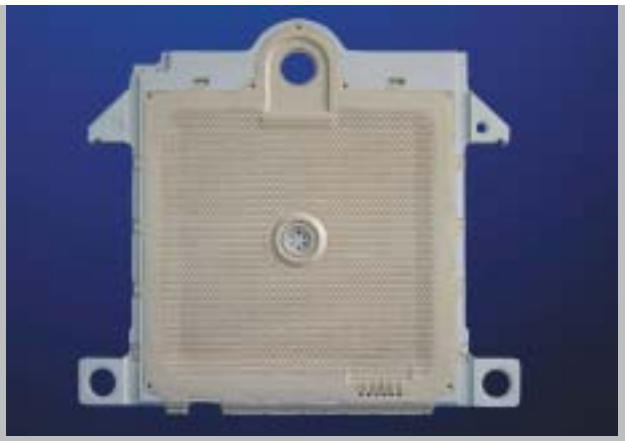
Filter press with membrane- and combination chamber plates 1200 x 1200 mm. Filtration of metal pigments with solvents, 16 bar squeezing pressure

Membrane- and combination chamber plate 1200 x 1200 mm. PVDF plate and EPDM membrane are electric dischargeable. Application at extremely high temperatures and/or with aggressive chemicals.

Filter press with PVDF membrane- and combination chamber plate 1200 x 1200 mm, application Metallurgy, chemistry etc.

SPECIAL DESIGNS

APPLICATION IN SPECIAL INDUSTRIES



Membrane chamber plate 1500 x 1500 mm for LASTA filter presses (Ishigaki). Application mining industry, metallurgy etc.

Combination chamber plate 1500 x 1500 mm for LASTA filter presses.

Membrane and combination chamber plate
1500 x 1500 mm for SALA filter press.
Application mining-, chemical industry, metallurgy, etc.

SALA filter press with JVK membrane- and combination chamber plates 1500 x 1500 mm

Membrane chamber plate 2000 x 2000 mm for filtration of flotation suspensions in mining industry, metallurgy etc.

Combination chamber plate 2000 x 2000 mm with maximum chamber volume for high throughput. Abrasion protection at the slurry feed hole.

SPECIAL DESIGN

HIGH PERFORMANCE MEMBRANE CHAMBER PLATE FOR HIGH SQUEEZING PRESSURE UP TO 6,0 MPa

PATENT No. DE 102 21 061 world-wide applied.

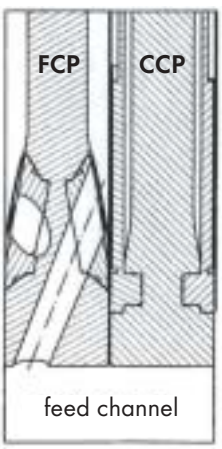
With exchangeable, non perforated membranes

feed- and combination chamber plate 1500 x 1500 mm

APPLICATION

This plate system can be used in all industries

- cooling – heating - temperature control of the filter cake
- squeezing pressure up to 6,0 MPa (60 bar)
- full automatic operation in the filterpress with perfect cake discharge
- the cake thickness 20–50 mm depends on the squeezing pressure



feed hole with inlet nozzle for cloth clamping

feed- and combination chamber plate 2000 x 1500 mm

OPERATION

- the chamber gets filled by the feed chamber plate (FCP) only
- the filter cloth is clamped leakage-free by a feed nozzle
- the cake is squeezed by the compression chamber plate (CCP)

ADVANTAGES

- extremely high dry solid content in the cake
- no perforations in the membrane
- no blockage of feedport by optimal cake discharge
- full automatic filtration cycle
- any wanted suspension inlet in every chamber possible
- long life time of the membrane
- simple installation
- safe sealing
- use of drape over filter cloth

filter press with high performance membrane chamber plates 1500 x 1500 mm up to 5,0 MPa (50 bar)

SPECIAL DESIGN

HORIZONTAL MEMBRANE CHAMBER PLATE

PATENT No. DE 19905674
Filter press with horizontal filter plates set-up

JVK presents a new developed membrane chamber plate system for tower filter presses with easy replaceable membranes.
For the stability and the compensation of the thermal expansion the membrane plates are flexible supported by a steel frame.

APPLICATION

This plate system can be used in many industries.
The typical operating conditions are:

- filtration pressure up to 0,6 MPa (6 bar)
- squeezing pressure up to 1,5 MPa (15 bar)
- filtration temperature up to 90°C

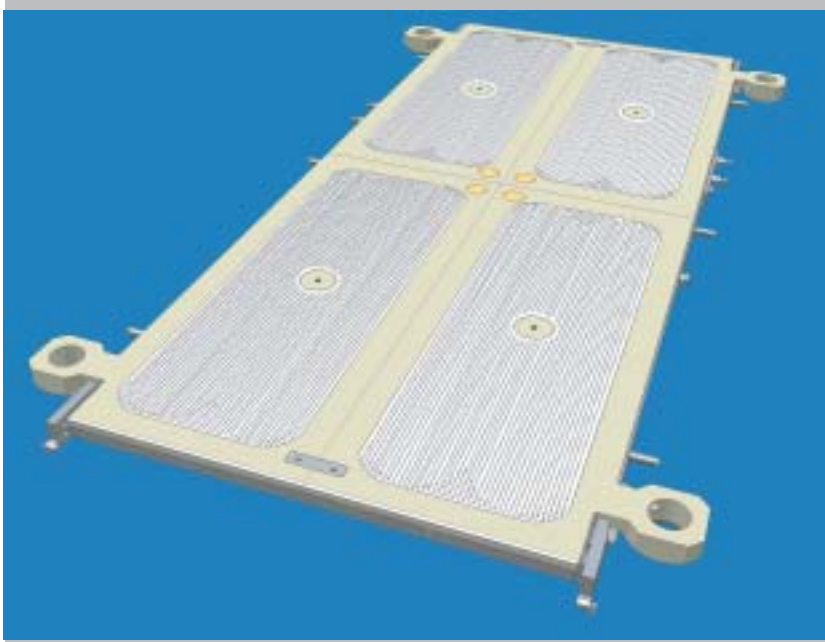
ADVANTAGES

- simple conversion of existing plates without reconstruction of the filter press
- fast and easy installation
- minimum 2 chambers per plate with small membranes
- long life time of the small membranes
- fast exchange of the membranes inside the filter press possible
- low weight of the plate
- corrosion resistant PP core plate, easy to clean
- one piece moulded plate
- grid drainage made from abrasion resistant PE

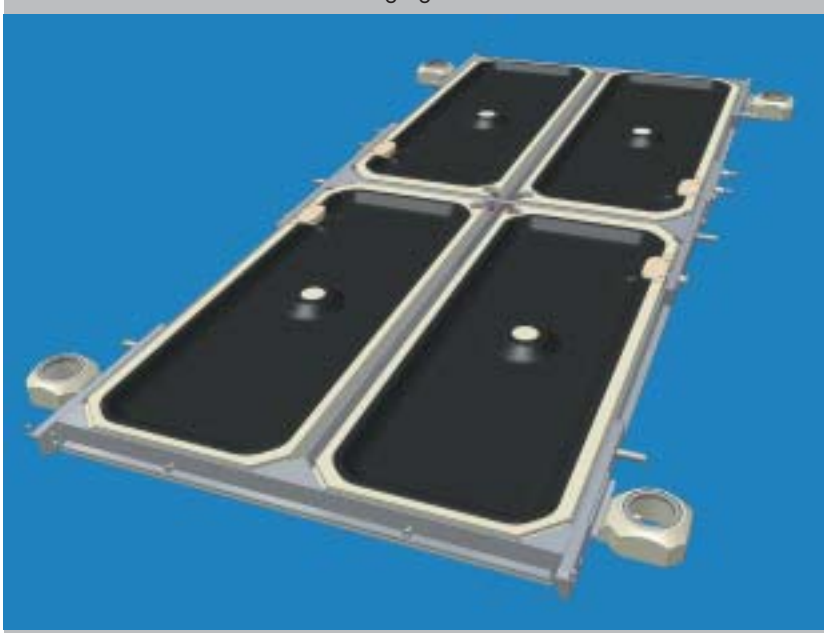
Horizontal membrane plate 2000 x 1000 mm
view on abrasion resistant PE drainage grid

Horizontal membrane plate 2000 x 1000 mm
membrane view

Available in the sizes:
2000 x 1000 mm
4000 x 1700 mm
Special designs possible



Horizontal membrane plate **4000 x 1700 mm**
view on abrasion resistant PE drainage grid



Horizontal membrane plate **4000 x 1700 mm** membrane view

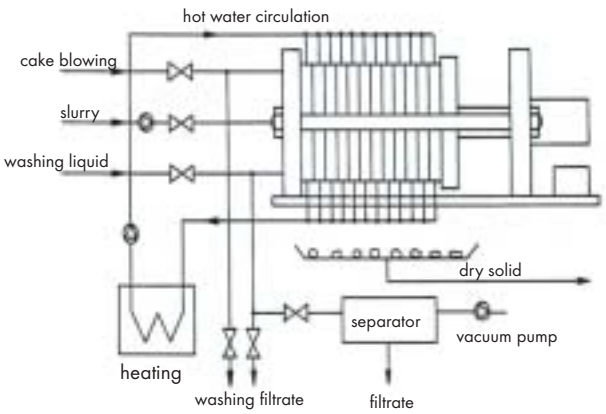
SPECIAL DESIGN

CAKE DRYING WITH MEMBRANE CHAMBER PLATES

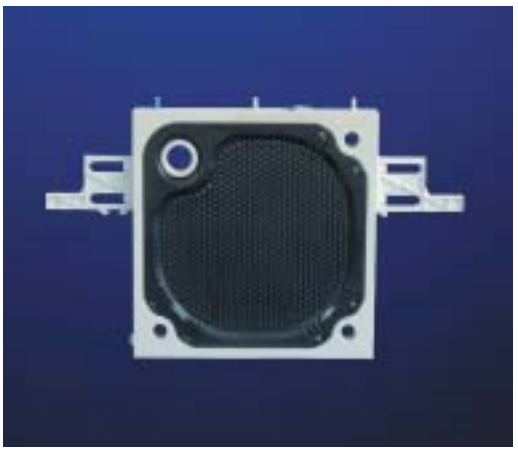
PATENT No. DE 3713419

APPLICATION

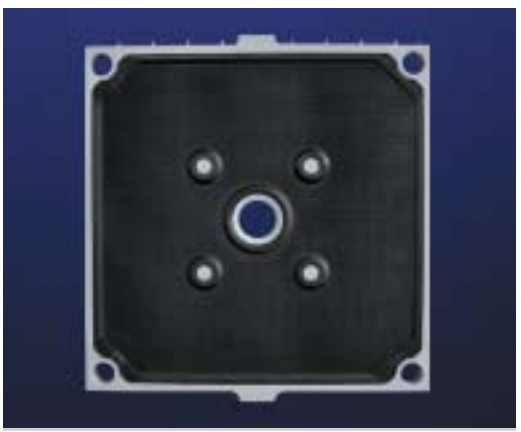
- Cake drying with JVK membrane chamber plates combines dewatering and drying in one filter press only
- the cake drying with heated membranes is patented
- after filtration the cavity between membrane and core plate is filled with hot water or steam to heat the membrane
- the generated water vapor from the filter cake is removed by vacuum or by pressure shocks with hot dry air
- the permanent cake shrinkage is compensated by the expanding membrane keeping the heat contact to the cake
- washing, sterilizing and cake blowing before drying process is possible with this new JVK System
- special membranes with high thermal conductivity and fast heat transfer have been developed



filter press for cake drying with membrane chamber plates
1200 x1200 mm



membrane chamber plate 500 x 500 mm



membrane chamber plate 1500 x 1500 mm

ADVANTAGES

- for the process steps of filtration and drying no additional drier is necessary
- easy conversion of exsisting filter presses to cake drying system
- this new development allows to use also a mixed package
- possibility to work with normal membrane chamber plates instead of special filter plates
- the cake volume is not reduced by seperate heating plates
- treatment of different batch sizes by constant product quality
- minimum thermal losses
- due to the drying in the filter press there is no risk of explosion or dust combustion
- no protection against abrasion and corrosion needed
- low disposal costs by maximum weight and volume reduction of the cake

SPECIAL DESIGN

MEMBRANE CHAMBER PLATE FOR THE SUGAR INDUSTRY

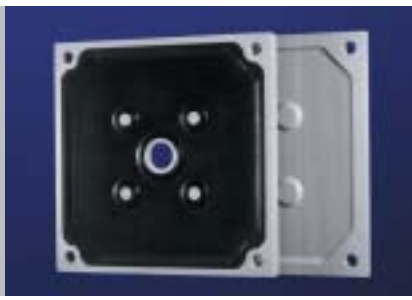
PATENT No. DE 19905674

APPLICATION

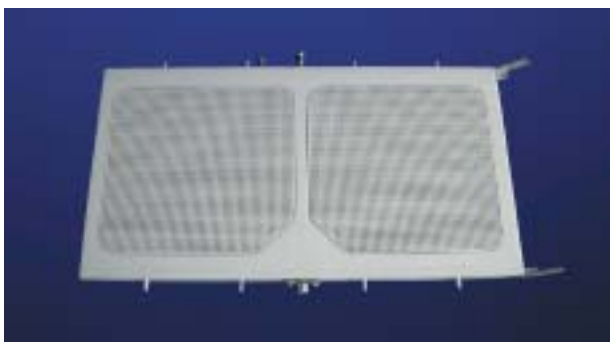
- Use in carbonated lime filtration from first stage of carbonization
- full automatical filtration cycle and cake release
- for all kind of filter presses in raw juice filtration of sugar beets
- for filter presses 1000 x 1000 mm to 1500 x 1500 mm with corner-, center-, or bottom feed port
- membrane plates for tower filter presses with stainless steel frame, plate sizes 2000 x 1000 mm and 4000 x 1700 mm, patented design
- in the sugar industry more than 3000 filter plates are successful in operation

Membrane- and combination chamber plate 1200 x 1200 mm corner feed

Membrane- and combination chamber plate 1200 x 1200 mm center feed



Horizontal membrane filter plate 2000 x 1000 mm membrane view



Horizontal membrane filter plate with stainless steel frame drainage grid made from abrasion resistant PE

MEMBRANE PLATES IN TOWER FILTER PRESSES			
sizes [mm x mm]	feed port	support bosses	cake thickness [mm]
2000 x 1000	corner	0	45
4000 x 1700	lateral	1	45

Usual press capacities:
1,3 to 1,8 m^3 total volume and 34 m^2 bis 47 m^2 filter area

MEMBRANE FILTER PLATES IN FILTER PRESSES			
Sizes [mm x mm]	feed port	support bosses	cake thickness [mm]
1000 x 1000	center	0	50
1200 x 1200	corner	0/1	50
1200 x 1200	center	4	50
1200 x 1200	bottom	1	40/50
1300 x 1300	top	1	50
1500 x 1500	corner	1	50
1500 x 1500	center	4	50

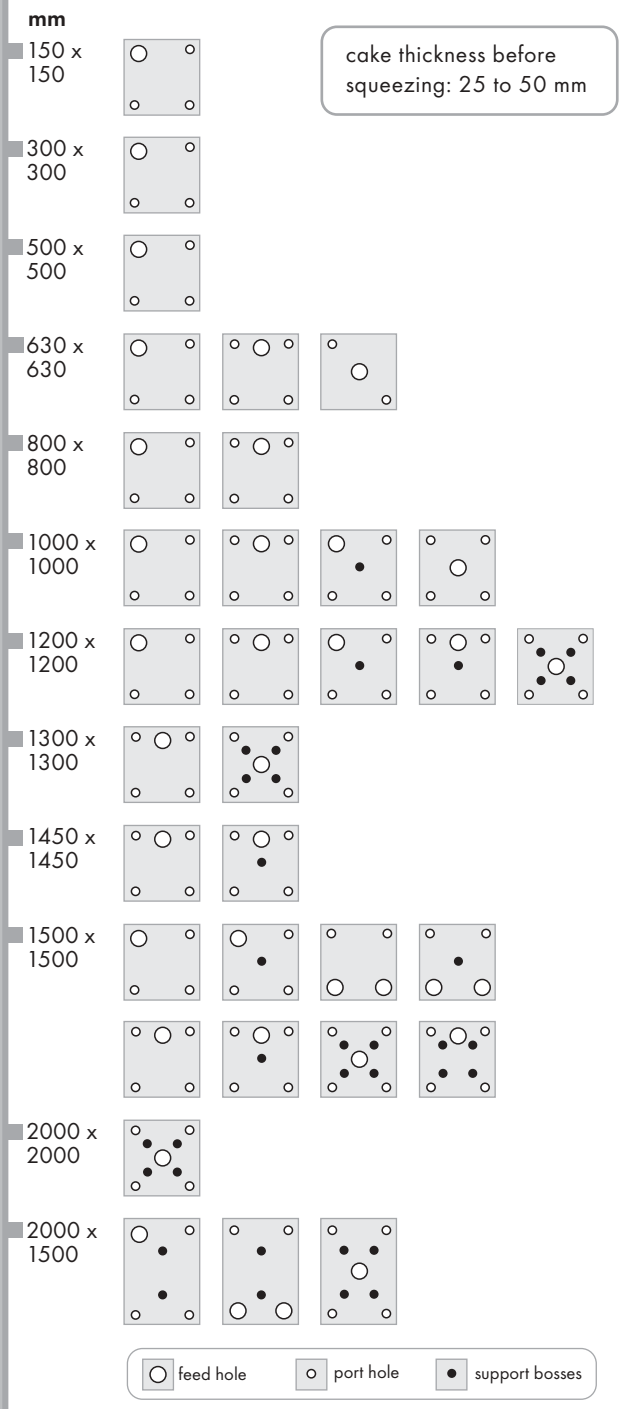
Usual press capacities:
1,6 to 3,2 m^3 total volume and 70 m^2 to 145 m^2 filter area

ADVANTAGES

- increase of throughput up to ca. 400 % compared to normal recessed plates
- reproduceable lower residual moisture in filter cake in the range of 25% – 32%
- reproduceable de-sweetening results of around 0,1% can be achieved easily
- very short cycle times realized by using special developed elastomere membrane material for high temperatures
- very long life time under rough operation conditions by one piece moulded plates
- process safety by large filtrate outlets, blockage by filtercloth or crystallization extremely reduced
- overhang filter cloth and elimination of support cloth contributes to additional cost savings

SIZES AND DESIGNS

Standard Plate sizes according to DIN 7129



PROPERTIES (guide-line)

PLATE MATERIAL: thermoplastic materials

Property	Test DIN/ISO	Unit	PEHM	PPH	PPC	PVDF
density at 23°	1183	g/cm^3	0,92-0,95	0,90-0,92	0,90-0,92	1,76-1,78
melt flow index MFI 230^0 C/2,16 kg	1133	g/10 min	0,10-0,15	0,25-0,35	0,20-0,35	< 3,0
tensile modulus	527	N/mm^2	1200-1350	1100-1500	950-1300	1800-2000
tensile strength at yield	527	N/mm^2	27-28	28-33	22-28	50-52
elongation at yield	527	%	9-11	10-14	12-16	9-11
impact strength Charpy 23 ^{0}C	179	kj/m^2	10-12	10-50	40-70	8-14
thermal conductivity	52612	Wm^{-1}k^{-1}	0,38-0,41	0,20-0,22	0,20-0,22	0,15-0,17
thermal expansion	53752	10^{-4}k^{-1}	1,3-2,0	1,2-1,4	1,2-1,4	1,0-1,2
temperature-range		°C	10/70	15/110	-10/+70	-20/+130

Please note that these are recommended standard values only which might vary depending on the specific application. I.e. the maximum allowable filtration temperature amongst others depends on filtration pressure, chemical composition of the slurry, cycle time, choice of materials etc.
Our qualified expert team will assist you anytime in determining the right materials for your specific application.

MEMBRANE MATERIAL: vulcanized and thermopl. elastomeres

Property	Prüfung DIN/ISO	Einheit	EPDM	NBR	TPV	FKM
hardness	53505	ShA	65-75	70-80	70-90	70-75
density at 23°	1183	g/cm^3	1,1-1,2	1,2-1,3	0,93-0,97	1,8-2,0
tensile strength	53504	N/mm^2	10-16	15-20	8,5-15,5	12-17
elongation at break	53504	%	400-600	250-450	400-700	150-200
tear strength	34-2	N	25-30	45-60		20-25
compression set at 24h/70^0 C/25 %	815	%	18-30	15-30	26-50	9-11
thermal conductivity	52612	Wm^{-1}k^{-1}	0,30-0,35	0,30-0,35	0,30-0,35	0,2-0,25
temperature range		°C	-30/+120	-20/+100	-20/+100	-20/+180

SPECIAL DESIGNS

- Special sizes and designs up to ca. **3000 x 2500 mm** according to customers requirements are possible to be developed and manufactured.
- For the waste water filtration with polymer conditioning plates with extremely big filtrate outlets are available.
- For temperatures higher than 110°C and for the filtration of organic solvents we recommend PVDF or Aluminum instead of Polypropylen for plate material.

JVK SERVICE

Our service team will support you at installation of the JVK Membrane Chamber Plates:

- Development for special application
- Calculation
- Efficiency tests on JVK or customer site possible
- Process optimization
- Commissioning

COMPANY PROFILE

1962 J. J. VOWINCKEL GMBH was the first company to start the production of polyoleofine filter elements in the filtration field of application. Even today filter plates manufactured at that time are still in operation.

1982 JVK took over production equipment and know-how for manufacturing of filter elements from Vowinckel GmbH.

1989 JVK acquired competitor HANSEN BTR.
Membrane chamber plates with exchangeable rubber membranes completed the JVK product line.

In **1992** JVK expanded the production capacity by taking over the production facilities for filter plates from a filter press manufacturer.

JVK is one of the leading manufacturers of innovative filter elements made from thermoplastic and other materials, which are successfully used worldwide.

JVK offers since almost 45 years high technical standard and know-how, long experience in the field of the solid-liquid separation, as well as engeneering and processing to manufacture filter elements.

company

JVK PRODUCTION FACILITIES

for manufacturing of standard and customized filter elements to DIN 7129 are on highest technical leval:

Presses for the production of filter plates up to sizes of 3000 x 2500 mm and to a thickness of 200 mm, according to the JVK ICM- process, with the following advantages:

- homogenous material, one piece moulded without welded joints and inlay parts
- minimal thermal load during production
- extremely even distribution of micro crystallites
- low internal tensions
- excellent mechanical characteristics
- high chemical resistance

moulding department

CNC – milling machinery for highest precision in the mechanical handling of large and small series of plates up to 3000 mm x 2500 mm.

Workshops are well equipped for mould construction, electronic installations, maintenance, machine- and tool repair.

Design Department equipped with the newest 3D CAD Systems.

Engineering and **Research Department** for the continuous development of innovative technical solutions and new JVK products.

Laboratory and **quality control** for testing and controlling to guarantee and ensure the high quality of the **JVK** products.

CNC milling department

Certificate according to DIN EN ISO 2000 : 9001
TÜV Rheinland Group
Certificate Registration No. 01 100 041 208

The designs of JVK products are world-wide protected by patents and trademark rights.

RELY ON THE EXPERTS IN FILTRATION

JVK® Filtration Systems GmbH
P. O. Box 60
Obere Lerch 2
D – 91166 Georgensgmünd (Germany)

Phone: +49 (0)9172 707 - 0
Fax: +49 (0)9172 707 - 77
E-mail: jvk@jvk.de
Internet: www.jvk.de