



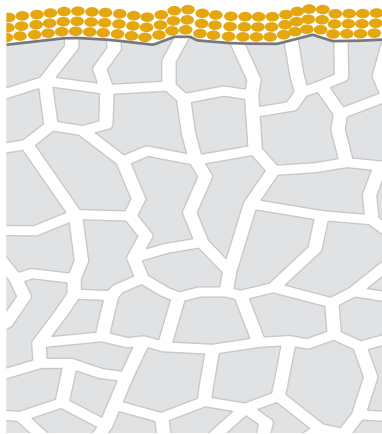
SWISS QUALITY.
SINCE 1938.



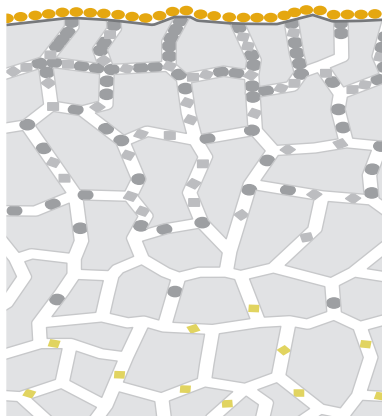
FILTROX® depth filter sheets
NOVOX® sheet filters

DEPTH FILTRATION FOR VALUABLE LIQUIDS.

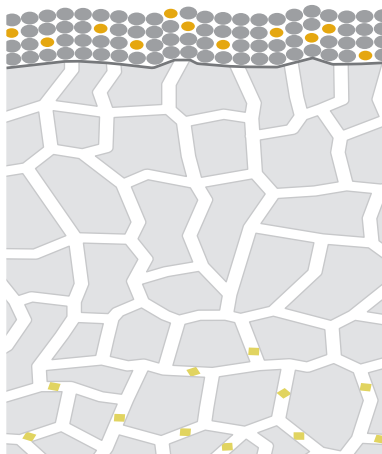
Principles of depth filtration



Surface filtration



Depth filtration



Alluvial filtration

- = Particles > 5 µm
- = Filter aid > 10 µm
- ◆ = Particles < 5 µm
- ◆ = Particles < 1 µm

Depth filters are used to remove particles from a liquid. This means that liquids can be clear, fine or sterile filtered.

“Thick” filter media (2.5–4.5 mm) are used with depth filtration. The particles are retained using two filtration principles: 1. surface filtration and 2. depth filtration. The liquid flows through a three-dimensional, asymmetrical fiber network in the depth filter. The solid components are retained using mechanical and electrokinetic effects. This significantly increases the intake and adsorbing capacity.

The purpose of a filtration process is either to purify a liquid (filtrate) or to retain solids (retentate). Depth filtration is mainly concentrated on the production of liquid filtrate.

Filter sheets consist of a combination of especially receptive fibers (e.g. cellulose) and powdery, anorganic filter aids such as kieselguhr and/or perlite. The retention rate can be specified by the grinding method and the volume and type of base material used as the filter aid. Small quantities of polymer resin are added as a wet-strength agent. Depending on the type of polymer resin, a lesser or greater positive charge – also called the “zeta potential” – is produced when passing through the filter sheet. The positive charge improves the adsorption of small, negatively-charged particles or micro-organisms. The interior absorption volume of a typical depth filter sheet is up to 4 l/m² of filter surface. During the filtration process, multiple depth filter sheets are used one after the other in a sheet filter (NOVOX®). This enables a large filter area to be created in a relatively small space. Another method of using depth filter sheets in a less time-consuming and more effortless way is to use depth filter modules (FILTRODISC™).

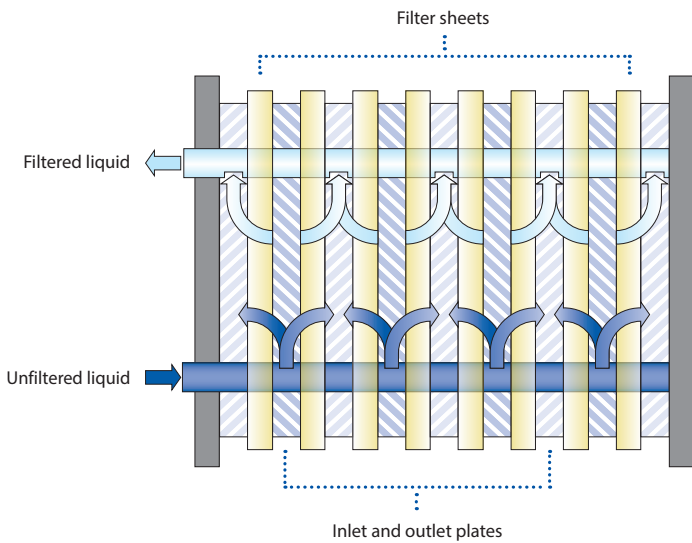
With this method, a pre-loaded filter pack is installed in a filter housing (DISCSTAR™). Depth filters are exhausted when the inner matrix is filled with slurry particles. One indication of this is the increasing difference in pressure between the inlet (unfiltrate) and the outlet (filtrate) and a lower flow rate of the liquid. After a certain point, the capacity of the depth filter is exhausted (1.5 bar for sterile filtration; 2.5–3 bar for clarifying filtration). Under certain circumstances it is possible for the filter to be regenerated.

With high particle loads (approx. 1.5%), standard depth filters can blind fast.

By using a filter aid such as kieselguhr (alluvial filtration process), the capacity can be increased. With alluvial filtration, filter aids are suspended in a liquid and then floated onto a supporting sheet in a plate & frame filter to form a filter cake. When doing this, the FILTRODUR® supporting sheets themselves function not as filters, but merely as a support for the filter cakes, which is where the actual slurry removal takes place. The separation of particles in this process uses a mechanism similar to that with filter sheets. As with sheet filtration, an increase in the differential pressure indicates when the filter configuration is exhausted. As the filter cake is usually thicker than the filter sheets, alluvial filters have a longer lifetime due to their greater slurry absorption capacity. After filtration, the filter cake gets removed and disposed of depending on the nature of the slurry.

Functional principle

Functional principle sheet filtration



In a NOVOX® sheet filter, three types of filtrations can be performed:

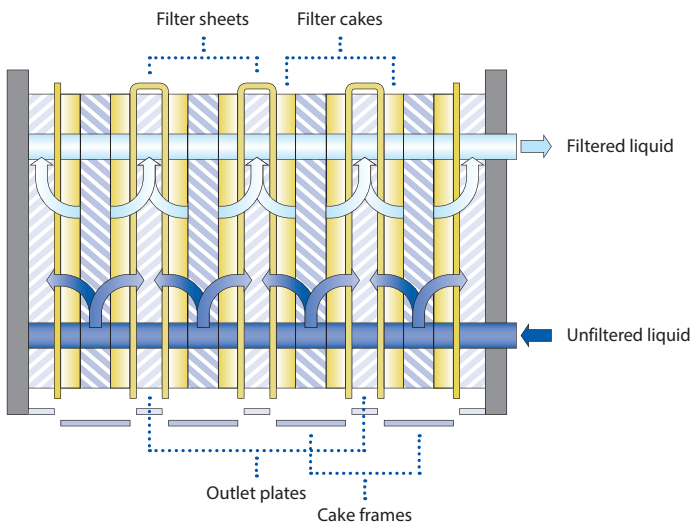
1. sheet filtration (SF)
2. alluvial filtration (ASF)
3. two-stage filtration SF-SF or ASF-SF

For the sheet filtration, the NOVOX® sheet filter is loaded with inlet and outlet plates, as well as depth filter sheets between those. For the alluvial filtration, cake frames are used instead of inlet plates, to ensure the build-up of a filter cake.

By adding a conversion plate or conversion chamber, it is possible to perform a two-stage filtration within one system. Thereby, either two sheet filtration steps (pre- and fine filtration) or an alluvial and a sheet filtration can be combined.

The unfiltered liquid is pumped through the piping on the inlet side into the filter and fills the inlet plates or cake frames. By means of differential pressure (pressure difference between inlet and outlet side), the unfiltered liquid is pushed upwards within the inlet plates and through the filter sheets into the outlet plates. The filtered liquid then leaves the filter through the piping on the outlet side.

Functional principle alluvial filtration



FILTROX® depth filter sheets

Depth filter sheets are available in various grades for a wide variety of applications. The filter sheets show nominal retention rates from coarse (55–20 µm) to fine (15–1 µm) to sterile (0.6–0.04 µm). Therefore, they can be used for clarifying, fine and sterile filtration. They are available in all common sizes from 47 mm rounds up to 2.4 m x 1.2 m filter sheets. In between, practically all sizes are possible for all the different sheet filters available on the market.

During the filtration process, particles are slowed down within the filter sheet and eventually retained either mechanically by size or by electro-kinetic forces. Due to this effect, a long operating time can be reached before plugging and the depth filter sheets have a holding capacity of up to 4 l/m².

All filter sheets are also available in lenticular module format (FILTRDISC™, see brochure DISCSTAR™ and FILTRDISC™).



FIBRAFIX® TS

Technical depth filter sheets

FIBRAFIX® AF

Standard depth filter sheets

PURAFIX® CH P

Filter sheets with low ion and pyrogen values

PURAFIX® CH ZP

Filter sheets with high zeta potential. Highly charged filter sheets.

PURAFIX® ET-R

Solution for endotoxin removal

PURAFIX® PF-P

Filter sheets with synthetic components and low ion, pyrogen and beta-glucan values

SYNTHAFIX™ SY

Filter sheets with synthetic components

CARBOFIL™

Filter sheets with integrated activated carbon

FILTRODUR®

Filter sheet specifically developed as support sheet for alluvial filtration

FIBRAFIX® TX-R

Special filter sheet for the removal of tribromoanisole (TBA) and trichloroanisole (TCA)



For more detailed information, please refer to the technical data sheets as well as the validation guides.

Application examples



- FIBRAFIX® TS**
- paint, ink and glue
 - processing water
 - biodiesel
 - highly viscous liquids
 - ...



- PURAFIX® PF-P**
- plasma fractionation
 - ...



- FIBRAFIX® AF**
- beverages (beer, wine, juice, spirits, ...)
 - fine chemicals
 - cosmetics
 - herbal & natural extracts
 - paint, ink and glue
 - solvents
 - ...



- FILTRODUR®**
- special sheet for alluvial filtration (e.g. beer)



- PURAFIX® CH P & CH ZP**
- API (active pharmaceutical ingredients)
 - cell removal
 - enzymes
 - herbal & natural extracts
 - pharmaceutical intermediates
 - plasma fractionation
 - ...



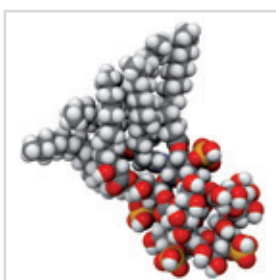
- CARBOFIL™**
- decolorization
 - deodorization
 - API (active pharmaceutical ingredients)
 - for further applications refer to brochure CARBOFIL™



- SYNTHAFIX™ SY**
- enzyme solutions (cellulase)
 - chemical solutions
 - ...



- FIBRAFIX® TX-R**
- removal of tribromoanisole (TBA) and trichloroanisole (TCA)



- PURAFIX® ET-R**
- API (active pharmaceutical ingredients)
 - cell removal
 - enzymes
 - herbal & natural extracts
 - pharmaceutical intermediates
 - plasma fractionation
 - ...

NOVOX® sheet filter

The NOVOX® is a high precision stainless steel plate & frame filter, designed and built for heavy duty use 24/7. It is used as a functional and flexible filtration system for various industrial filtration applications.

The unique design of the NOVOX® allows for an easy and efficient handling. Drip loss is minimized by the system's highly precise construction with the hydraulic closing mechanism combined with FILTROX high capacity filter sheets.

Depending on the application, three general types of NOVOX® systems are available:

1. NOVOX® ST: For industrial as well as food and beverage applications
2. NOVOX® OD: For applications with many product changes and a high risk of cross-contamination, e.g. in the cosmetics and pharmaceutical industries
3. NOVOX® CP: With or without gaskets, developed for the possibility of CIP cleaning without filter sheets installed

Custom-built options are possible with all NOVOX® systems.

NOVOX® ST



- traditional sheet filter system
- available in following sizes: 200, 400, 600, 800 and 1200
- closing mechanism: manual, pneumatic or electro hydraulic
- filter plates are available in stainless steel 316L or Noryl™
- cake frames are available in stainless steel 304 and 316L
- available cake frames: 25 mm and 40 mm
- conversion plate and chamber available
- variable chassis length, depending on number of plates / frames

NOVOX® OD



- filter system without gaskets in the filter package
- available in following sizes: 200, 400, 600 and 800
- closing mechanism: pneumatic or electro hydraulic
- filter plates and cake frames are available in stainless steel 316L
- available cake frames: 25 mm and 40 mm
- conversion plate and chamber available
- variable chassis length, depending on number of plates / frames

NOVOX® CP



- completely enclosed filter system for CIP without filter sheets
- available in following sizes: 400, 600, 800, 1000 and 1200
- closing mechanism: pneumatic or electro hydraulic
- filter plates and cake frames are available in stainless steel 316L, polypropylene (PP) and PVDF
- available PP cake frames: 20 mm, 25 mm, 30 mm, 40 mm, 50 mm and 60 mm
- variable chassis length, depending on number of plates / frames

NOVOX® custom-built systems



Higher XL-chassis for large filter areas



Completely automated filtration lines; e.g. NOVOX® 400 ST incl. dosing unit for filter aid dosing and corresponding controls

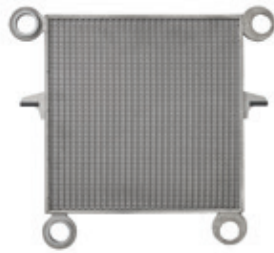


ATEX-compliant NOVOX® 400 CP

For detailed information about the different systems, refer to the corresponding technical data sheet.

NOVOX® filter plates and cake frames

NOVOX® ST
Stainless steel



Filter plate
316L only



Cake frame
304 or 316L

NOVOX® ST
Noryl™

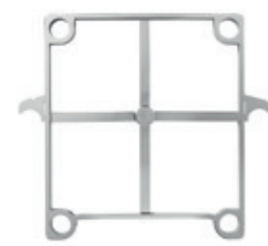


Filter plate

NOVOX® OD
Stainless steel 316L



Filter plate



Cake frame

NOVOX® CP
Stainless steel 316L



Filter plate



Cake frame

NOVOX® CP
PP



Filter plate



Cake frame

NOVOX® CP
PVDF



Filter plate



Cake frame



FILTROX. DEPTH FILTRATION FOR VALUABLE LIQUIDS.

As a global market leader in depth filtration, FILTROX offers complete solutions for filtration of high value liquids.

We are experts in development, manufacturing and supply of Swiss top quality products for a wide range of applications in pharmaceuticals, biotechnology, chemicals and cosmetics as well as in food and beverage. Since 1938, we have been developing and manufacturing both filter

media as well as filtration equipment in-house. Based on this experience, we can offer our customers a complete range of products.

FILTROX's worldwide distribution network and comprehensive technical support will help you optimize your filtration process.

Visit us online at www.filtrox.com for more information.

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