Sartoflow® Compact Proven Technology for Wine Filtration

Simplifying Progress

SARTORIUS

High-Tech Worldwide

Sartorius Stedim Biotech GmbH is a leading global provider of separation and filtration technologies. We are committed to engineering high-performance systems that are tailored to the specific needs of our clients throughout the world.

In addition to the planning, engineering and manufacturing of filtration systems, we supply:

- Systems for the static and dynamic filtration of beer, wine, sparkling wine, juice and cider
- Systems for the particulate filtration of water
- Systems for product recovery, concentration and purification
- Process validation
- Application expertise and technical support
- Training courses and seminars

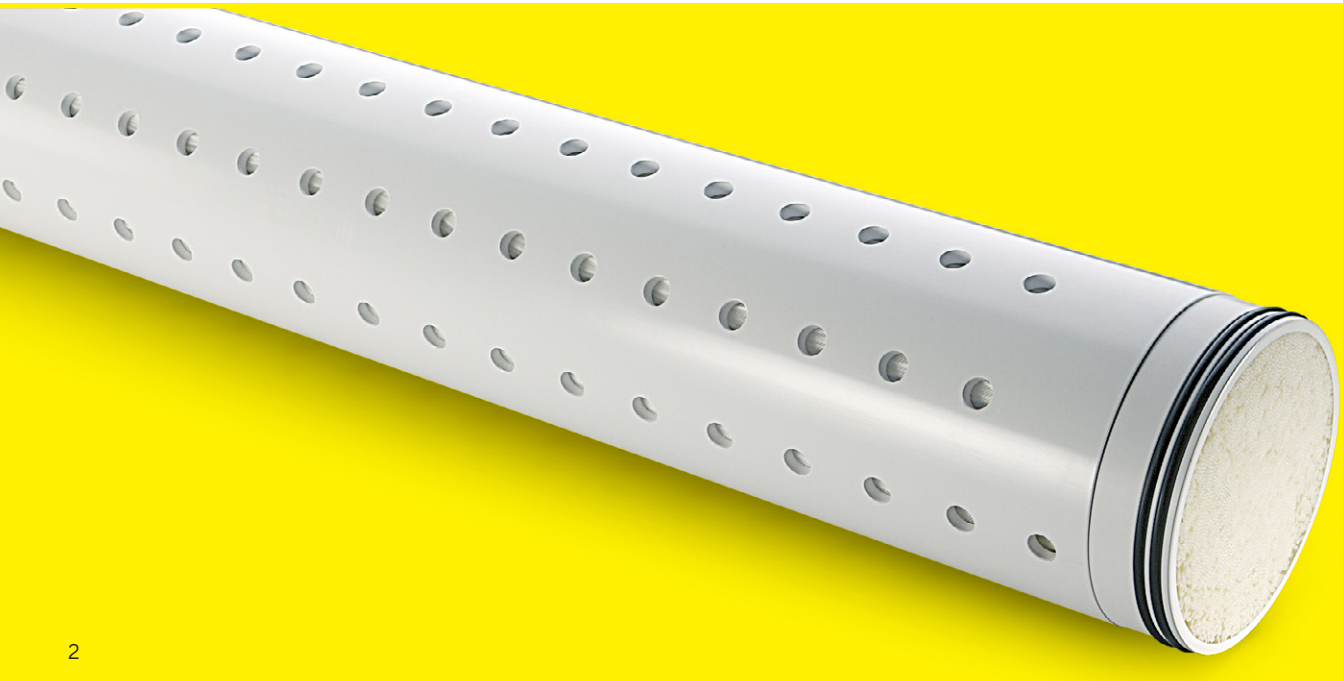
Your Partner for Making Perfect Wines

Making wine is an art. It requires dedication, passion, and precision. The wine itself must have aroma, intensity of color, and flavor. Winemaking – from cultivation of the grapes to final bottling – is a balancing act.

Every oenologist at some point will ask: "Which technology and media should I use to filter my wine? How do I ensure the highest level of quality in my bottled wine?"

Sartorius Stedim Biotech GmbH has all the answers. Every filtration system their viniculture specialists develop not only help oenologists produce high-quality wines, but also provide optimum process safety. The Sartorius Stedim Biotech team provides support for every step in the manufacturing process – from clarification through membrane filtration to checkweighing.

Sartorius Stedim Biotech GmbH is the right partner for small wineries and large-scale wine producers alike.



Always First-in-Class in Quality
For years, the GMP authorities in Germany and experts worldwide have been testing our manufacturing and quality control technologies and proven our strict adherence to the highest quality standards.

This is a fact we are very proud of. All our R&D, manufacturing and quality assurance departments in Germany are ISO 9001-certified.

We at Sartorius Stedim Biotech GmbH turn the science of viniculture into complete solutions for your clarification, sterile filtration and bottling processes.

Products to streamline your manufacturing process:

- Sartoflow® systems for wine clarification and final cellar filtration
- Standard and jumbo filter cartridges for particle removal and polishing filtration
- Membrane filter cartridges for sterile filtration
- Filter sheets and filter modules for depth filtration
- Automatic cartridge systems for sterile filtration during bottling
- Equipment for microbiological testing and analytical laboratory balances
- Filter cartridges for air, gas and steam filtration
- Online weighing systems for quality control of packaging

Sartoflow® Compact – Compact, Yet Powerful.

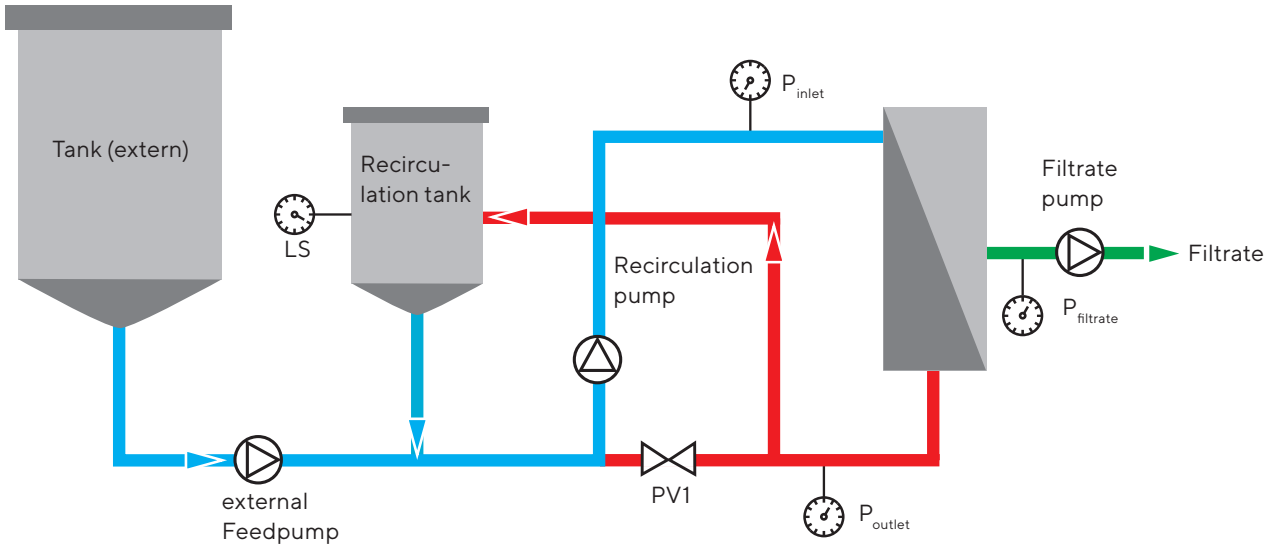
By automating every step in the wine filtration process, Sartoflow® Compact reduces costs. Crossflow filtration processes rely on hollow fiber membranes. This filter type prevents early clogging on the membrane surface, while maintaining constant filtration performance without increasing the pressure. Crossflow filtration does not require any filter aids that incur added disposal costs.

Applications
Sartoflow® Compact systems are suitable for all wine filtration steps – from fermentation to pre-bottling sterile filtration. That means it replaces conventional methods that rely on the likes of centrifuges, diatomaceous earth filters and sheet filters.

First Racking
After fermentation, the Sartoflow Compact system can be used to conduct first racking.

Second Racking
Sartoflow® Compact can also conduct the second racking that follows the standard treatment of the pre-clarified, young wine performed after contact with fining agents and sediment of the lees.

Last Cellar filtration
Depending on the method, Sartoflow® Compact can also be used to blend different parcels of wine after the fining process before the ready-for-bottling wine is sent to the aging tanks.



The Design Concept

Sartoflow® Compact is the logical extension of the Sartorius Stedim Biotech Crossflow family. In close cooperation with our clients, we designed these systems to exceed the demands of the viniculture market.

Modular Design

Process-scale Sartoflow® Compact systems can be designed modularly. The basic unit and the full-extension racks each are equipped with a total of 6 filter modules. This modularity allows the size and filtration capacity of each system to be custom-adapted to the changing needs of the winery.

Equipment Options

- Fully automated CIP (Clean in Place) station
- Turbidity monitoring
- External feed pump
- Data logging (time, pressure, temperature, flow rate history)
- Conductivity measurement

System Sizes and Performance Ranges

Model	Modules	Performance range [l/h]*
Sartoflow® Compact 6	6	1,800 - 6,000
Sartoflow® Compact 12	12	3,600 - 12,000
Sartoflow® Compact 18	18	5,400 - 18,000
Sartoflow® Compact 24	24	7,200 - 24,000
Sartoflow® Compact 30	30	9,000 - 30,000
Sartoflow® Compact 36	36	10,800 - 36,000

* Depends on the product's composition and pretreatment

For more information or immediate support, please contact your local Sartorius Stedim Biotech service representative.

The Application

Our optimization of your wine manufacturing concept with Sartoflow® Compact is based on our extensive expertise in separation technology, our years of knowledge exchange with our customers in the wine industry and our competence in membrane technology.

Consistently High Filtrate Output
All Sartoflow® Compact systems are designed for fully automated operation. When the flow rate stored in the control unit drop too low, the system automatically removes the sediment and performs an intermediate cleaning cycle. This ensures that the filtrate output stays consistently high and means that larger batches can be run on Sartoflow® Compact systems overnight without operator attendance.

Hygiene Maintenance
A program can be set to automatically activate an intermediate cleaning cycle after filtration is finished. As a result, the system is fully cleaned and ready to filter new batches at any time. On Sartoflow® Compact systems that are additionally equipped with a CIP station. Even after a manual start, chemical cleaning cycles can be run automatically.

Successful Cleaning
At the end of each chemical cleaning cycle, the flux rate for water is logged to measure the efficiency of the chemical cleaning cycle and the degree to which the filtration capacity has been reinstated. This method ensures that the modules are always cleaned in the most effective and efficient way and that the system delivers the required filtration capacity.

Operational Safety
Another key aspect associated with fully automated systems control is that of operational safety. All valve settings are monitored during each program step. This feature rules out operator error almost entirely.

Turbidity Measurements
Another option Sartoflow® Compact systems offer is the continuous monitoring of filtrate quality by means of turbidity measurements. By measuring the turbidity, the system immediately detects whenever the modules become damaged and then stops filtration. In last cellar filtration, this prevents heavy overloading and premature blocking of the sterile filter cartridges in the subsequent filtration step before bottling.

A Re-Review of All Advantages

What you can expect from Sartoflow® Compact systems

- Fully automated, computer-controlled functions: 24|7 operation possible without operator attendance
- Low energy and water consumption
- Variable transmembrane pressure
- Automatic intermediate cleaning cycles
- Freely programmable filtration cycles
- Touch panel operation
- Water flux rates logging
- All process-critical valves equipped reset switches
- Continuously monitors pressure, temperature, filtrate flux and compressed air
- Lowest residual volumes thanks to automatic and freely selectable sediment reduction
- Filtrate backflush
- No other system is more gentle on the product thanks to a low filtrate flux to crossflow ratio
- No wine pretreatment required
- Preserves all sensory properties of the wine most effectively
- Sartoflow® is a closed, filtrate-side filtration system with minimal CO_2 release
- Reproducible results with an absolute membrane area of 0.2 µm
- Saves on clarification media

Your Personal Benefits

- Simple handling
- Gentle filtration assures product quality
- Modular construction – perfectly tailored to your needs
- Save money by eliminating initial investment and disposal costs for conventional filter media
- Protects the employees' health
- Sartoflow® lets you achieve exceptionally high filtrate output and throughput rates

Everybody Looks to the Wine – Not the Technology Our Service

Support Sees to Your Needs

Our global service organization and customer service network is always available to see to your needs.

Our applications specialists apply their extensive experience to streamlining your processes and support you in setting up operations, including cleaning optimization and module replacement.

We are happy to advise you on the benefits of our long-term service agreements.

The Crossflow Technology

Dynamic Filtration: The Crossflow Principle
Unlike static filtration, where the direction of filtration and product feed are the same, the direction of filtrate flow in dynamic filtration is perpendicular to the feed direction (crossflow principle). The medium to be filtered, or feed, flows tangentially and dynamically across the membrane. This is represented by the equation below, where the transmembrane pressure (TMP) is directed perpendicular to the inlet flow rate:

$$TMP = \frac{P_{inlet} + P_{outlet}}{2} - P_{filtrate}$$

Depending on the pore size of the membrane, smaller molecules and colloids pass through the membrane – creating the filtrate, while larger colloids and particles are retained on the membrane surface, forming the retentate.

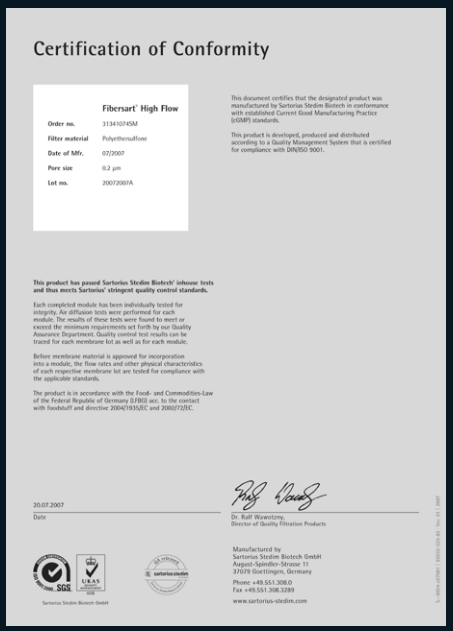
As filtration progresses, a cake layer, known as fouling, builds up on the membrane, impeding the filtrate flow. In static filtration, fouling continues to build, ultimately causing complete blockage of the membrane.

By contrast, dynamic filtration is selfcleaning. This feature significantly accelerates filtrate flow, while maintaining a gentle and consistently high flux. The service life of the membrane is thus exponentially extended.

The parameters critical to crossflow filtration performance include:
- The composition of the medium to be filtered
- The operating parameters, such as tangential flow, transmembrane pressure (TMP) and temperature
- The membrane's properties and structure

Membranes
At the heart of every crossflow system lies the membrane filter. Sartorius Stedim Biotech GmbH supplies optimally designed membrane systems that can be customized and optimized to every application and every specification. High flow rates and minimal adsorption are just a few of the requirements solved by these systems.

Sartorius Stedim Biotech Fibersart hollow- fiber modules were specifically developed for applications in the food and beverage industry. Fibersart is used to remove and|or reduce the amount of bacteria, yeast, clouding agents and colloids from liquid media. The hollow-fiber module is suited for clarification and last cellar filtration of all types of wine.



Certification of Conformity

Fibersart® High Flow

Order no.	3134107-5M
Filter material	Polyethersulfone
Date of Mfr.	07/2007
Pore size	0.2 µm
Lot no.	2007200/A

This document certifies that the designated product was manufactured by Sartorius Stedim Biotech in conformance with established Current Good Manufacturing Practice (cGMP) standards.

This product is developed, produced and distributed according to a Quality Management System that is certified for compliance with DIN/ISO 9001.

This product has passed Sartorius Stedim Biotech' inhouse tests and thus meets Sartorius' stringent quality control standards.

Each completed module has been individually tested for integrity. Air diffusion tests were performed for each module. The results of these tests were found to meet or exceed the minimum requirements set forth by our Quality Assurance Department. Quality control test results can be traced for each membrane lot as well as for each module.

Before membrane material is approved for incorporation into a module, the flow rates and other physical characteristics of each respective membrane lot are tested for compliance with the applicable standards.

The product is in accordance with the Food- and Commodities-Law of the Federal Republic of Germany (LFBG) acc. to the contact with foodstuff and directive 2004/1935/EC and 2002/72/EC.

20.07.2007
Date

Dr. Rolf Wawrzyny,
Director of Quality Filtration Products

Manufactured by
Sartorius Stedim Biotech GmbH
August-Spindler-Strasse 11
37079 Goettingen, Germany
Phone +49.551.308.0
Fax +49.551.308.3289
www.sartorius-stedim.com

The Fibersart-Hollow-Fiber Module

Fibersart
Fibersart hollow-fiber modules are designed, developed and constructed specifically for Sartoflow® Compact systems.

Technical Data
Pore size: 0.2 µm
Membrane material: PESU
Filter Area: 12.5 m²
Hollow-fiber inner diameter: 1.2 mm

Customer Support – FACTS® Program

The Sartorius Stedim Biotech FACTS® program creates value for your business. We provide dedicated experts for process optimization, validation and regulatory support, as well as profound training courses – rapidly, deployable and globally available.

DISCOVER®
Our audit and survey services:
- Compliance audits
- Regulatory inspection readiness
- Plant | Process surveys
- Validation surveys
- Quality system surveys
- Technical studies

Confidence®
Our validation services:
- Validation designs
- Pre-approval inspection preparation
- Post-approval change support
- CFR 21 Part 11 | GAMP compliance
- Regulatory liaison
- Equipment qualification
- Filter | Cleaning | Process validation
- Extractables | Leachables testing

INCREASE®
Our optimization services:
- Corrective actions guidance
- Process optimization and development support
- Design review and technology transfer
- Documentation and submittal optimization
- Regulatory guidance

EXPAND®
Our training services:
- FDA risk-based approach
- Regulatory inspection
- CFR 21 Part 11 | GAMP
- Aseptic processing
- Upstream | Downstream processing
- Process validation
- Cell culture | Fermentation
- Integrity testing
- Quality control and quality assurance

These services are provided by experienced experts in collaboration with our BioPharm-Alliance partner.

Germany
Sartorius Stedim Biotech GmbH
August-Spindler-Strasse 11
37079 Goettingen
Phone +49 551 308 0

USA
Sartorius Stedim North America Inc.
565 Johnson Avenue
Bohemia, NY 11716
Toll-Free +1 800 368 7178

For further contacts, visit
www.sartorius.com

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