

Cold Filtration of Beer with CFS NEO Systems



CFS NEO Technology — Cold Filtration of Beer

The Application

Brewers seek maximum microbial safety while preserving taste and freshness of their beer. Cold filtration offers brewers the optimal solution by removing yeast, bacteria and particles that can negatively impact beer flavor and quality throughout its shelf life. More and more breweries apply cold sterile filtration to achieve maximum shelf life and satisfy consumer expectations. Cold filtered beers achieve higher market growth and consumers are prepared to pay a premium for a better product.

The Solution

Successful membrane filtration of beer has two opposing requirements:

- Low and gentle flux during filtration
- High and intensive flow during rinsing and cleaning

Single filter housing installations are always a compromise between these two requirements. Pall CFS NEO technology offers brewers a solution that optimizes both in a single system design. CFS NEO Systems group filter membranes into clusters with each cluster having its own housing and outlet valve. During filtration all clusters are open to minimize the flow rate per filter element. Flushing, regeneration and integrity testing is done cluster by cluster.

The Advantage

The unique NEO cluster principle offers significant advantages:

- Individual cluster integrity diagnosis for high biological safety
- Individual cluster venting to reduce oxygen pick up to a negligible level
- Constant and controlled flow distribution to all cartridges

Gentle flow during beer filtration to preserve taste and freshness

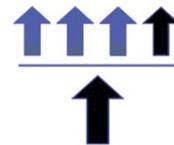
- High specific flow during rinsing and cleaning for prolonged service life
- Minimized water and energy consumption
- Controlled backflush for pre-filters
- Permanent system availability
- Fast and easy filter change out
- Low investment and operation costs



Normal Filtration with Multiround Housing



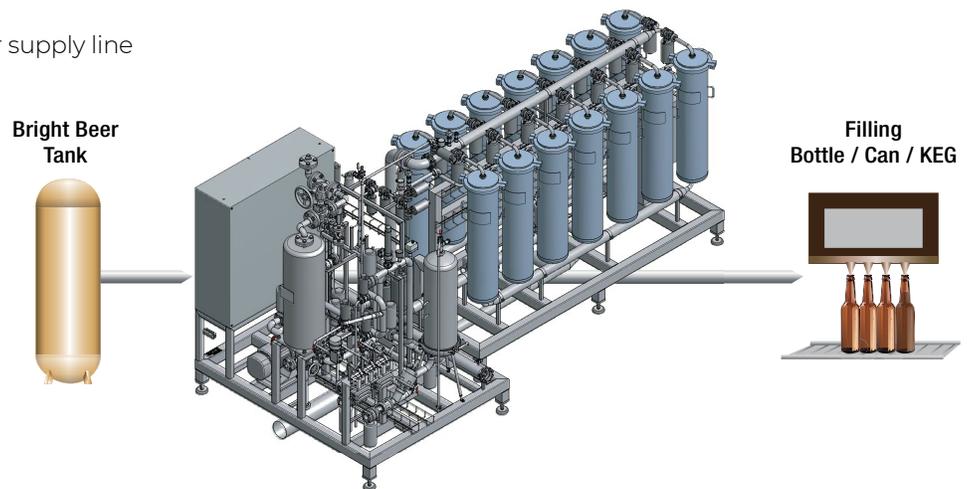
Pall Cluster Technology



Design

Pall CFS NEO Systems are designed as stand-alone units to be installed directly upstream of the filling line without any requirement for a buffer tank. It is fully automated and typically operated by the filling machine operator. CFS NEO Systems are comprised of the following:

- The filter module with cluster housings which holds the filter cartridges
- Piping and connections to filler supply line
- Membrane cleaning module
- Integrity test device
- Control panel



Beer IoT

To gain maximum advantage from the data generated by a PLC or Scada control system, Pall implemented IoT based digital information and process management to beer systems. With this IOT-based extension of data management in real time, different levels and hierarchies in the brewery have constant access to defined data in a user edited format.

Typical examples for digital data analytics are:

- Specific consumption data e.g., water, cleaning agents, electricity, membranes
- Performance data e.g., degree of utilization, efficiency, and downtimes
- Quality data e.g., oxygen uptake, color, original extract, haze
- Push notifications e.g., alarms and messages
- Documentation and service data

By splitting the classic CFS filter module into individual cluster housings, the CFS NEO System volume is further reduced, resulting in faster brand changes, less water and cleaner consumption, lower beer losses and lower investment cost.

In addition to actual real time data, trends, historical reviews, brand related influences, and raw material impact, other key influencing factors can be analyzed with the IoT tool. Benchmarking with other installations within a brewery group and against the industry average is also possible and can be switched on and off.

Pall IoT provides direct online availability of all system specific documentation and training documents, spare parts lists, service reports, operating instructions, safety instructions and acceptance reports.

Alarm messages can be displayed directly on multiple display devices, reducing response time in the event of a production problem. This function can be switched activated by each individual user, selectively.

In summary, Pall IoT solutions contribute to improve plant KPI's, process optimization and product assurance.

Operation cost

A new cleaning process for filter cartridge regeneration was specifically developed for CFS NEO Systems. The cleaning process utilizes low media and cleaning chemical consumption to further reduce operating cost. Service life of the membranes is significantly improved, thus filtration costs outperform pasteurization even with beers with a more demanding filterability.

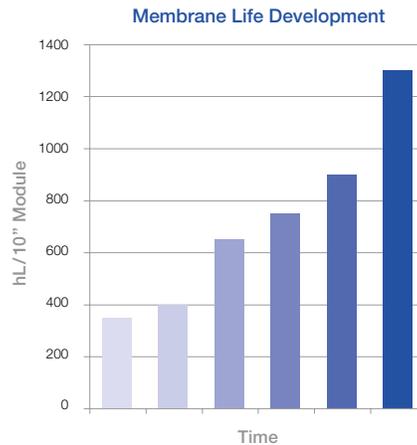
Taste and Quality

By eliminating exposure to high temperature, maintaining lower flux during beer filtration and utilizing a design with minimal oxygen pick up, CFS NEO Systems enable production of beer that remains fresh for the consumer for a long time.

By comparing endogenous antioxidative potential (EAP) values as an index for oxidative flavor stability, cold filtered beers show better values than thermally pasteurized beers directly after treatment. With cold filtration, taste remains unchanged long after bottling, while pasteurization can have a negative impact on beer freshness right after heat treatment.

Microbial Safety

Membranes remove beer spoiling microorganisms, while inactive cells remain in the beer after thermal treatment. Membrane functionality can be measured (direct) while pasteurizers control only temperature and time (indirect). Traceability and documentation is more reliable with membranes. Integrity testing with CFS NEO Systems is performed one cluster at a time on a small number of cartridge filters to achieve maximum sensitivity and safety compared to large multi-cartridge vessel systems.



Sustainability

The individual cluster rinsing combined with small system volumes achieve significantly lower water, thermal energy and electrical energy consumption as compared to pasteurization of most beer types.



Membranes

Pall has developed the Pasteurizer Replacement family of filter cartridges specifically for beer cold sterile filtration. The filters utilize robust materials for high safety and quality. Each cartridge type has beer specific microbiological claims based on titer reductions. These are expressed as log reduction values (LRV) defined for *Lactobacillus* and *Pediococcus* type bacteria. The various cartridge types cover a wide range of LRV values to ensure best fit for brewery demands. All membrane cartridges are integrity tested prior to release.



System Data

The CFS NEO family supports a performance range from 75 hL/h to 600 hL/h (65 bbl/h to 400 bbl/h) and fulfills relevant regulations and directions including hygienic design aspects.

The different filter system sizes are available with or without a pre-filtration module. The pre-filter module follows the cluster design principle without integrity test option.

CFS NEO System Technical Data

System Sizes

CFS NEO 4	75 – 150 hL /h (65 – 135 bbl/h)
CFS NEO 8	150 – 250 hL /h (135 – 220 bbl/h)
CFS NEO 14	250 – 450 hL/h (220 – 400 bbl/h)
CFS NEO 18	450 – 600 hL/h (400 – 530 bbl/h)

Technical Data

Pressure	-1 / 10 bar g (-14.5 / 150 psi g)
Temperature	-10 / 150 °C (14 / 300 °F)

Dimensions, Weight and Volumes

	Length	Width	Height
CFS NEO 4	3,500 mm (11.6 ft)	2,000 mm (6.7 ft)	2,265 mm (7.4 ft)
CFS NEO 8	3,500 mm (11.6 ft)	2,000 mm (6.7 ft)	2,265 mm (7.4 ft)
CFS NEO 14	4,491 mm (15 ft)	2,000 mm (6.7 ft)	2,265 mm (7.4 ft)
CFS NEO 18	5,200 mm (16.6 ft)	2,000 mm (6.7 ft)	2,265 mm (7.4 ft)

Pall in Brewing

Pall is the leading solutions provider for beer filtration and stabilization, beer recovery operation, service filtration and rapid micro identification. The product range covers the needs and requirements from the small microbrewery to the multinational brewer. The ability to provide system solutions, consumables and services from one source allows brewers to have a well combined filtration and stabilization concept on hand. With a global presence, Pall Food & Beverage provides first class services to customers around the world.



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