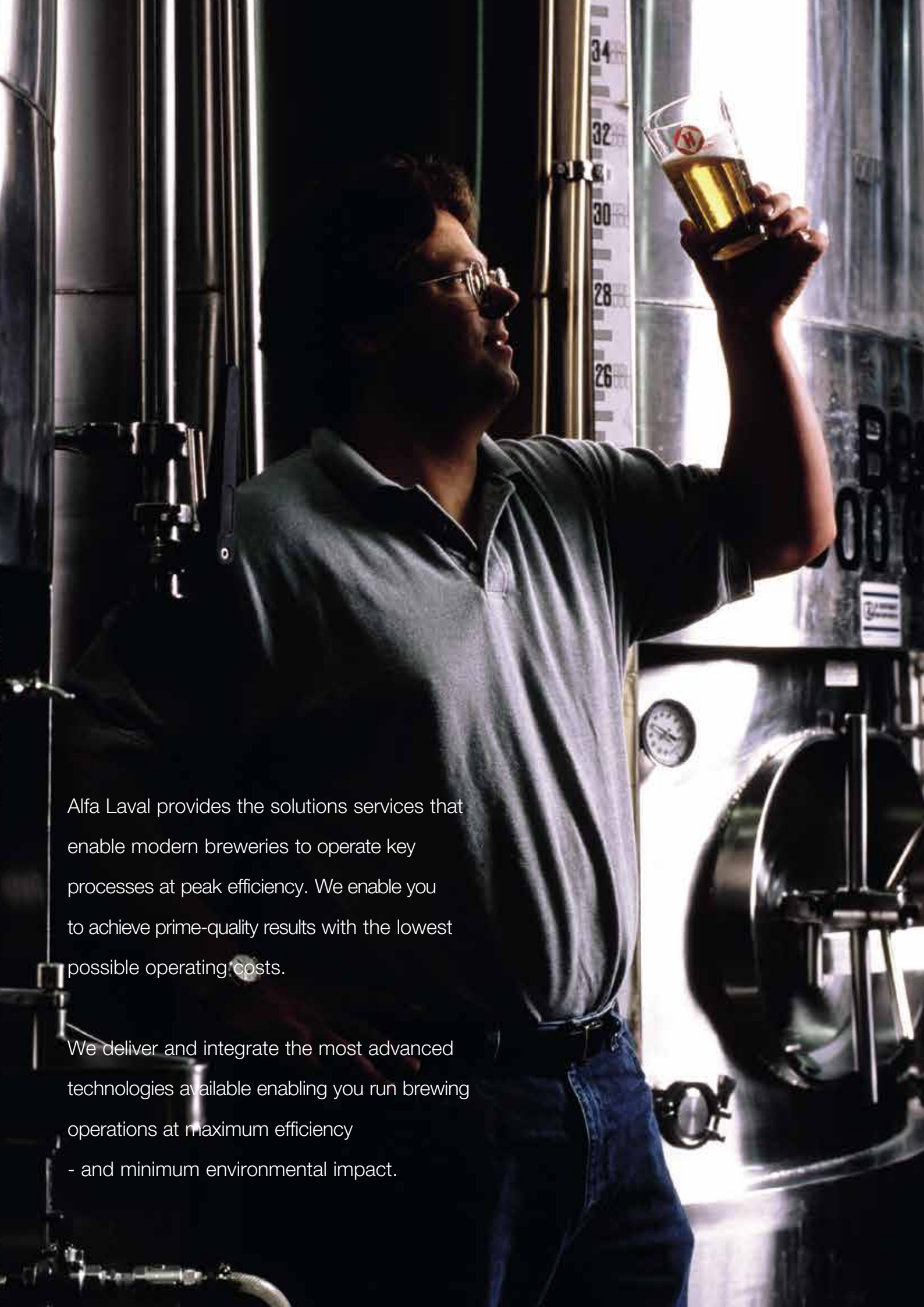




The mark of excellence

Solutions for the brewing industry





Alfa Laval provides the solutions services that enable modern breweries to operate key processes at peak efficiency. We enable you to achieve prime-quality results with the lowest possible operating costs.

We deliver and integrate the most advanced technologies available enabling you run brewing operations at maximum efficiency - and minimum environmental impact.

Excellence is expected

Complex challenges

Brewing is a complex blend of craftsmanship, technology and artistry, rooted in strong historical and cultural traditions. Yet brewers are often quick to adopt the most advanced technologies currently available, in order to keep ahead in a fiercely competitive industry and a market in constant flux.

At the same time, brewing operations have to comply with increasingly stringent legislative requirements and to deal with continually rising energy costs. Brewing processes also have to be able to respond to changing patterns of demand and consumer preferences.

Supreme solutions

Alfa Laval is one of the world's leading manufacturers of experts process equipment. Our specialists are at the forefront of virtually all the technologies normally used in brewing. The solutions we provide are based on the most advanced technology and the best operating practices currently available. And they are designed to achieve new levels of cost-effectiveness as well as premium product quality.

Our advanced brewery solutions are available for large breweries as well as craft brewers.

Alfa Laval perspectives are wider than most, our resources more extensive than most and the standards of excellence that we provide are higher than most – by a long shot.

Shifting the benchmarks

The broad spectrum of technologies that Alfa Laval provides together with our expertise in engineering and supply enable breweries to make critical tweaks and improvements in operating costs, process consistency and product quality.

These solutions enable any brewery operation to make significant progress against a whole series of benchmarks relating to operations as well as sustainability.



The entire palette

Alfa Laval provides you with virtually all the key process technologies and systems used in brewing. You harvest the benefit of well-integrated solutions from one single supplier with a concentrated focus.

Alfa Laval provides companies in the brewing industry with an extensive range of technologies, systems and services designed to optimise quality, boost reliability and reduce costs.

You can benefit from Alfa Laval solutions and integrated, modular process units for

- separation
- heat transfer
- fluid handling
- tank cleaning
- exploiting utilities to the full
- complete turnkey projects that extend from brewhouse to packaging
- filtration
- production of low-alcoholic beer (LAB) and non-alcoholic beer (NAB)
- yeast management systems
- beer-in-box fillers
- service agreements.

Centrifugal separation benefits

In brewing, there are numerous processes that involve separating different solid and liquid components and phases from each other.

Alfa Laval is the world's leading supplier of centrifugal separation equipment, with over 130 years of experience in this field. We provide a uniquely comprehensive range of decanter centrifuges and high-speed separators, with configurations specifically developed to meet the operating requirements encountered in brewing.

Our centrifugal separation equipment ensures you maximum uptime, minimum product losses and the best centrifuges on the market with a minimum of oxygen pick-up.

Alfa Laval separation solutions are widely used in

- hot wort separation
- green beer separation
- beer pre-clarification
- recovering beer from surplus yeast
- dewatering spent grains and spent yeast
- wort recovery from whirlpools
- dewatering wastewater sludge
- kieselguhr slurry dewatering.



BREW 701 eDrive bottom-fed polisher



FrontLine plate heat exchanger



Foodec decanter centrifuge



Energy-efficient heat transfer

Brewing quality beer depends heavily on rapid, efficient heating and cooling processes that can be controlled with pin point accuracy.

Our comprehensive range of compact plate heat exchangers – gasketed, semi-welded, all-welded and brazed – puts you firmly in control of temperature set points at every stage. And with the added bonus of deriving major savings on energy costs, thanks to efficient recovery of heat already used and paid for.

Alfa Laval heat transfer solutions are widely used in single-phase brewing applications such as

- pre-heating, boiling and cooling of wort
- beer cooling
- beer pasteurization
- yeast cooling

and in two-phase applications such as

- wort kettle vapour condensing – to recover thermal energy for subsequent process heating and hot water generation
- thermal vapour compression – to reduce wort boiling heat loads by feeding back wort vapour recompressed with a high-pressure system.



Valve cluster

Hygienic fluid handling

Special Alfa Laval pumps and valves enable you to handle liquids with maximum efficiency and reliability, while at the same time maintaining exceptional levels of hygiene. Our range currently features

- centrifugal pumps
- self-priming pumps
- positive displacement pumps
- sanitary standard valves and customized valve clusters
- tank and tank cleaning components
- mix-proof valves
- valve control and indication units
- installation material.



FLEXITHERM pasteurizer with plate heat exchanger



LKH Prime centrifugal pump

Tank equipment and utilities



SCANDI BREW® tank top system

Tank top systems

For decades Scandi Brew tank top systems have protected brewery tanks worldwide.

We provide integrated tank top systems for all kinds of brewery vessels with a standardized valve configuration. These include overpressure and anti-vacuum valves for air supply, CO₂ control and CIP as well as tank pressure control including constant pressure regulators (CPR), PE-valves or remote controlled PE/PS systems for automatic tank pressure control.

Sampling systems

Alfa Laval provides a wide range of equipment for physiochemical and microbiological sampling, including

- membrane sample valves
- micro sample ports
- automatic and semi-automatic centralized sampling systems.

Tank cleaning

Being able to maintain exceptional levels of hygiene – while at the same time reducing operating costs and preventing production interruptions – also depends heavily on the speed, effectiveness and reliability of your cleaning equipment and procedures.



Alfa Laval TJ40G Rotary Jet Head

Alfa Laval is one of the world's leading companies in the field of advanced CIP tank cleaning, providing a complete range of such equipment. Rotary cleaning sprays and jets ensure you effective cleaning because the cleaning liquid systematically impacts every point on the tank surface.

Using Alfa Laval tank cleaning equipment lets you benefit from

- considerable savings in use of water, energy and chemicals
- significant reduction in waste disposal challenges
- full feedback on how your cleaning procedures perform.

Making the most of utilities

As well as cutting back on the quantities of utilities used, compact, highly efficient Alfa Laval heat exchangers ensure you reliable control of the temperature of these utilities. This in turn paves the way to significant savings on heating and cooling costs.

Typical duties for which breweries use Alfa Laval heat exchangers include

- heating water and CIP cleaning liquids, using plate heat exchangers
- cooling glycol for refrigeration duties, using ammonia evaporators
- condensing and evaporating liquid CO₂ for use in beer carbonation and water deaeration
- controlled-temperature storage using unit and liquid coolers
- vapour condensing.



More than the sum of the parts – brewery modules



Alfa Laval process modules

Alfa Laval masters many of the technologies needed in high-quality brewing. We can therefore integrate individual systems into specialist modules that are even more effective.

These specialized modules range from basic to extremely sophisticated configurations, with a wide range of different capacities. Such units are always factory-tested and ready to operate as soon as they are in place.

Standardized or customized

We can offer you our excellent pre-engineered standard Core systems that are designed to work at peak efficiency under specific mainstream site conditions. Or we can provide you with special equipment packages customized with features and options that meet your company's specific brewing requirements, no matter how complex or specialized these may be.

In the brewing industry, Alfa Laval modular units are widely used in applications that include

- wort heating and cooling
- wort aeration and yeast pitching
- yeast and beer cooling
- water deaeration and carbonation
- additive dosing and mixing
- beer blending and carbonation
- beer pasteurization
- buffer tank and routing systems
- beer nitrogenation
- cleaning-in-place systems.

Removing oxygen from water

ALDOX systems eliminate any worries about the presence of oxygen in the water you use as cutting liquor for high-gravity brewing. Also in the chasing water for flushing pipes, tanks and filters, as well as in water used for producing low-alcohol beer.

ALDOX systems enable you to keep water oxygen levels down to as little as 0.01 ppm. We have already installed more than 800 of these systems worldwide, with capacities ranging from 10 hl/h to more than 1600 hl/h.



ALDOX water deaeration system

The whole picture

Our engineering expertise, systems and unique components mean we can always deliver on brewers' needs and requirements.

Wort clarification and cooling

Alfa Laval provides complete wort handling facilities. These feature disc stack centrifuges and decanter centrifuges – used alone or in combination with whirlpools – to boost wort quality while keeping extract losses to a minimum.

Alfa Laval compact heat exchangers provide controllability throughout the wort cooling process, as well as ensuring that as much energy as possible is recovered.

Fermentation and maturation

Alfa Laval supplies complete fermentation and maturation cellars that combine numerous different technologies, fully integrated for maximum efficiency. The objective is to provide controlled, fully repeatable fermentation and maturation, so that you can brew beer of a consistently high quality, with minimal product and energy loss.

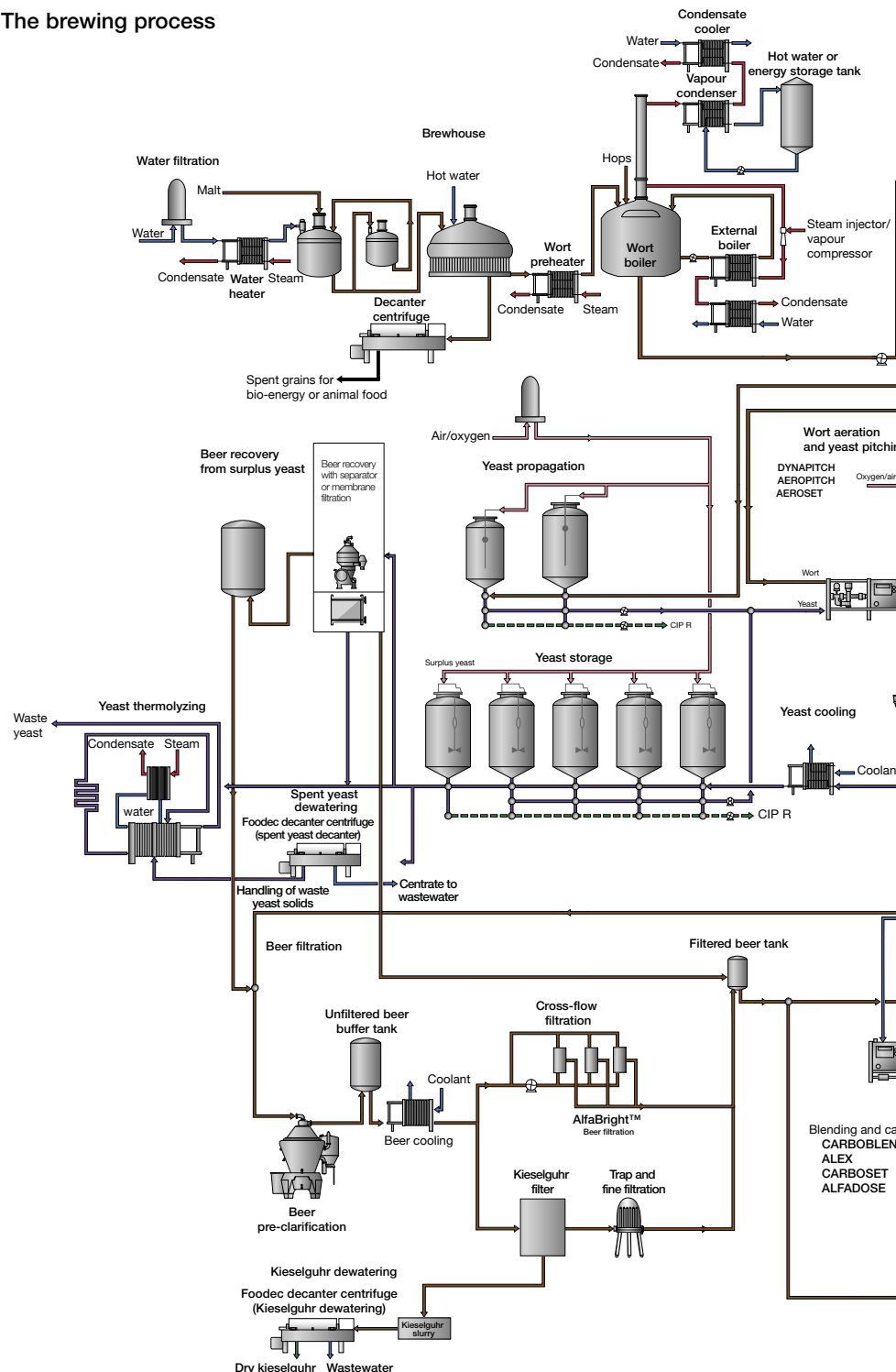
Yeast management

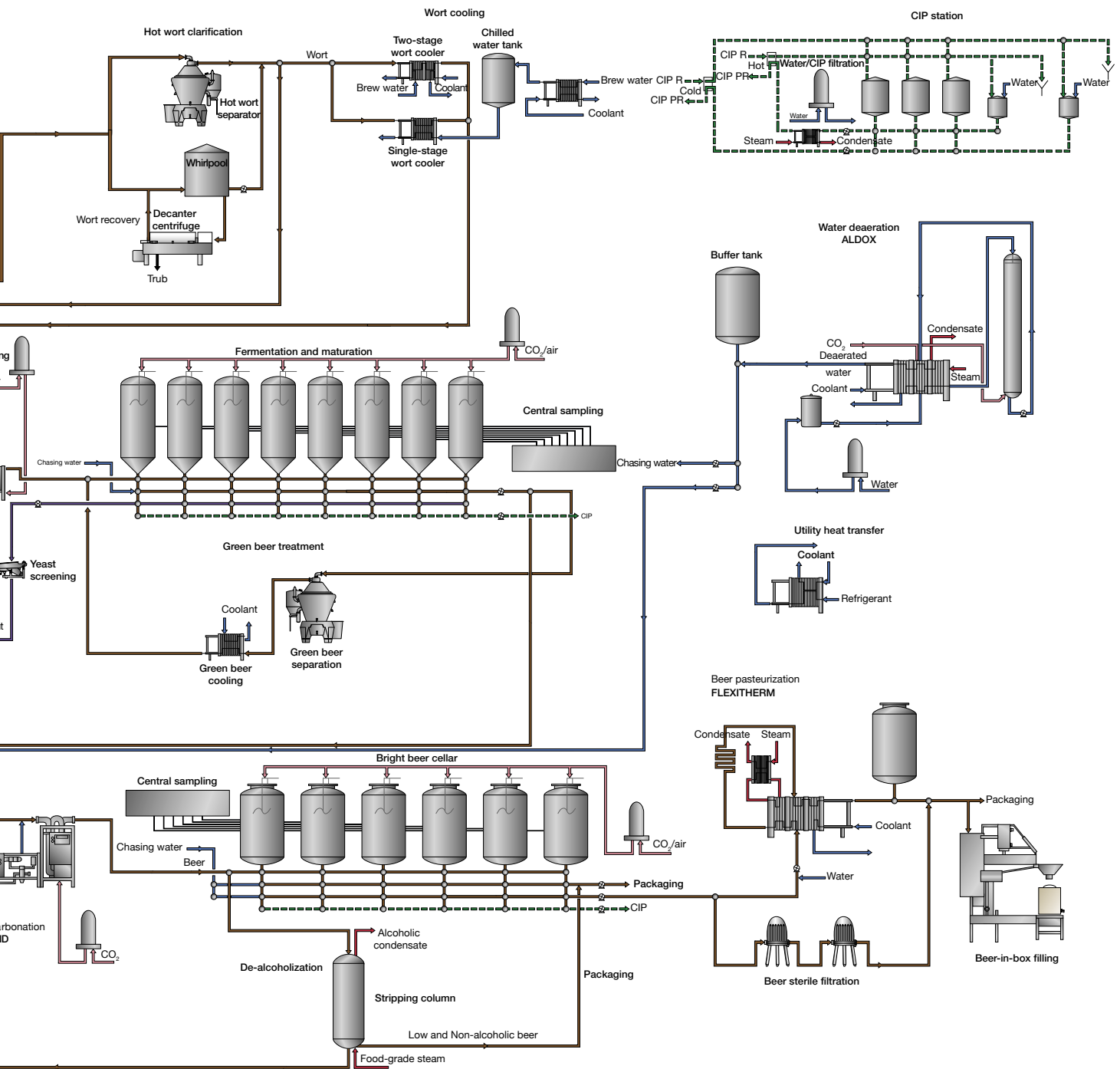
Scandi Brew yeast handling systems ensure the greatest possible vitality and hygienic microbiological integrity at every stage of the yeast management cycle, from laboratory and propagation to harvesting and pitching.

Bright beer storage

For the crucial job of moving the beer between filtration and bottling lines, you can choose fully automatic, semi-automatic or manual routing systems. These provide you with the gentlest possible treatment of your product and keep oxygen pick-up and CO₂ losses to a minimum.

The brewing process





Masters in yeast

In any brewery, it is of utmost importance to ensure the best possible handling of the yeast. Only first-class yeast management provides the consistency essential for the best possible utilization of the beer production plant – in terms of both quality and capacity. Alfa Laval yeast management systems are renowned for such capabilities, and are installed in hundreds of plants throughout the world.

Yeast management systems

- Semi- and fully automatic yeast propagation plants in single and multi-vessel configurations
- Yeast storage systems
- Yeast mixing (based on traditional agitators or rotary jet mixers)
- Carlsberg flasks
- Beer recovery from surplus yeast using separators



SCANDI BREW® tank top system



3-in-1 Yeast module

Tank process control systems

These include

- Integrated tank top systems, safety units and multiple units, with standardized valve configurations for gas supply, tank pressure control and CIP.
- pressure regulator, Type PE to provide automatic control and adjustment of tank pressure at each phase of the process (e.g. harvest, de-gassing, pitching and CIP)
- sanitary yeast mixers with integral aeration, CIP and acid washing facilities.

Cost-effective fermentation with Iso-Mix technology

The Iso-Mix system

Breweries have to deal with a constant focus on improving plant efficiency, process consistency and product reproducibility. The Iso-Mix system is an ideal way for breweries to achieve these goals, as well as making it possible to expand plant capacity with a minimum of investment, construction work and operational disruption.

Iso-Mix systems are now widely used in

- fermentation
- production of deaerated water
- yeast management
- blending in e.g. bright beer tanks.



Iso-Mix rotary jet mixer head

An Alfa Laval rotary jet mixer features two or four rotating jet nozzles and is positioned under the surface of the liquid.

A pump withdraws liquid from the tank outlet to the mixer in a closed loop system. The resulting flow drives a gearing system in the head of the rotary jet mixer, which causes the nozzles to rotate on both the horizontal and vertical axes. This double rotation produces a mixing action that makes sure the liquid, gas or powder from the mixer head reaches throughout the tank, ensuring exceptionally efficient, consistent mixing.

The same rotary jet mixer can also be used for effective cleaning of every surface and fixture inside the tank.

Illustration of Iso-Mix fermentation system

Iso-Mix fermentation

When installed in fermentation vessels, the Iso-Mix system keeps the yeast in suspension. This makes it possible to tackle the problem of sedimentation in the cone – which increases process time and creates stress on the yeast.

The convection provided by the mixing also leads to faster cooling than in a traditional unmixed system.

The benefits of the Iso-Mix system in fermentation include

- shorter process time that helps increase capacity
- more beer product and process time, which is crucial for effective planning
- better utilization of extract
- greater production flexibility



The Hybrid Powder Mixer combines pump and powder dissolving in a single unit. When used in combination with Iso-Mix, it reduces energy consumption for the complete system.

Supreme separation



BREW 2000 (left) and 2001 eDrive

The modular BREW range of separators is designed to provide breweries with a unique combination of exceptional hygiene, low power consumption and high separation performance.

Cost-conscious breweries throughout the world use BREW separators for duties that include

- polishing
- pre-filtration
- green beer separation
- hot wort separation.

BREW separators perform with equal efficiency in the different conditions in each of these processes, because they are designed to be supremely versatile.

Ahead via technology

BREW separators feature multiple technical advantages when compared with traditional alternatives. BREW centrifuges are all equipped with sensors for monitoring bowl speed, vibration level and bearing temperature, for best possible control and monitoring of the processing efficiency.

The hermetically sealed bottom-fed inlet ensures a gentle, low-shear acceleration of the incoming fluid up to full bowl speed and makes separation more effective.

At the outlet, the hydro-hermetic Oxy-stop seal minimizes oxygen pick-up in the clarified liquid. It is also equipped with a built-in paring disc for the separated product.

BREW separators are also fitted with the SmartEject triggering system, based on turbidity of the separated liquid, to provide automatic intermittent discharge of solids with high dry matter content, thereby reducing product losses.

eDrive advantage

Most of the large BREW separators can be delivered with eDrive.

This unique direct drive system is powered by a permanent magnet electric motor that is more efficient than conventional induction motors. This patented Alfa Laval drive solution transfers power directly through the drive shaft to the separator bowl.

In addition to effectively eliminating the transmission system, thus increasing reliability, this greatly reduces energy losses, and results in big savings on electricity costs.

eMotion benefits

Further power savings are achieved by reducing the air pressure in the hermetic bowl. This technology, known as eMotion, significantly reduces frictional losses in BREW separators during all operational modes.

Less energy – lower costs

The combination of an eDrive system, eMotion and the unique bottomfeed inlet design normally results in power savings of as much as 60% for same duty and same capacity.

For a large brewery running separators for 8,000 hours annually, the reduction in energy costs made possible with separators fitted with eDrive and eMotion technology means significant reductions in energy consumption, operational costs and CO₂ emissions.

Longer service intervals

With BREW separators, the intervals between major services are substantially longer than with any other separator on the market.

And because there are fewer wearing parts – such as couplings, bearings and seals – that need checking or replacing, any required service work can be done faster and with less practical disruption.

This results in lower operating costs and greater processing uptime.



Don't waste a drop with beer and wort recovery



Beer recovery using a BRUX 510 nozzle separator

BRUX beer recovery system

Alfa Laval supplies all the equipment required for an proven beer recovery process, delivered skid-mounted as one complete unit for rapid installation and easy system integration.

This beer recovery system consists of a special BRUX 510 nozzle separator, complete with automated control of inlet flow concentration (based on turbidity measurement) and all the requisite interface systems.

The advantages and benefits of the BRUX beer recovery system, validated by the VLB Institute in Berlin, include

- recovered beer of excellent quality, due to gentle yeast treatment
- drier waste yeast
- a continuous process
- uncomplicated design with only limited space requirements
- low power consumption
- rapid return on investment.

Beer recovered using BRUX systems can be added to same beer types in unitanks or transferred to maturation vessels, keeping full traceability of the beer production.

Combining the BRUX system with Iso-Mix can further enhance beer extraction from fermenters.

In addition, the high-vitality yeast recovered by the BRUX system can be collected, stored and subsequently re-pitched, further improving overall process yields.

The compact BRUX beer recovery systems are well-suited for breweries with capacities of up to 5 million hectoliters per year.



Wort recovery using Foodec decanter centrifuge

Intelligent Whirlpool System (IWS)

Hygienic Foodec decanter centrifuges can be used to recover wort otherwise lost as trub from the whirlpool.

Combining the whirlpool tank with an IWS decanter enables high yield wort extraction that maintains, even improves, wort quality. The extracted wort returns to the whirlpool, ensuring traceability of each brew, prior to cooling on its way to the fermenters.

The separated trub, which has a high dry matter, can then be mixed with spent grains, further enhancing its value as a by-product for animal feed.

The benefits of the IWS, validated by the VLB Institute in Berlin, include:

- recovering up to 10% of the wort otherwise lost as trub from the whirlpool, depending on the amount and type of adjuncts used in the brewing process
- full traceability of the recovered wort
- increased wort clarity
- reduced water consumption between brews
- separate high content trub and hops from the whirlpool
- reduce whirlpool process times by speeding up trub separation.

Foodec decanter centrifuges in breweries

Getting profits from losses

By using Foodec decanter centrifuges, breweries can benefit from the very latest separation technology to achieve more economical and reliable recovery and separation, providing an extra competitive advantage in your brewery operations.

Foodec centrifuges in breweries

Foodec decanter centrifuges are ideal for boosting efficiency in the many different separation processes encountered in breweries. In general, the aims are to reduce the extract losses and ensure that valuable ingredients can be recovered, increase the value of by-products and minimize costs for waste handling and disposal.

This means using Foodec decanter centrifuges can provide an important boost to operating margins in a wide range of your brewery operations.

The benefits of using Foodec decanter centrifuges include

- greater separation efficiency, which means faster processing and high-dryness solids
- excellent hygiene standards, which mean better product quality
- effective seals and CO₂/N₂ purge systems, which together minimize oxidation
- meticulous control, which means greater process efficiency and better quality
- same equipment can be used for dewatering spent yeast and kieselguhr slurry.

Spent grain dewatering

Decanter centrifuges can be used to remove the water from the wet, spent grains of malt in the lauter tun or mash filter, so these dry products (up to 50% dryness) can be sold as cattle feed or to biomass boilers and power plants.

Wort recovery

The trub at the bottom of the whirlpool still contains substantial amounts of wort (70% v/v). Over 99% of the wort can be recovered from the same brew with great efficiency by passing it through an Intelligent Whirlpool system (IWS) based on a Foodec decanter centrifuge. This saves wort, water, time and CIP resources.

Spent yeast dewatering

Waste yeast often contains liquids in large quantities, which makes both handling and disposal difficult. Because of their efficiency, Foodec decanter centrifuges are ideal for removing alcohol and water from the spent yeast to ensure cost-effective logistics or to provide new, added-value by-products for protein and dietetics companies.

Kieselguhr slurry dewatering

Kieselguhr slurry normally contains large quantities of liquid, making handling and disposal difficult. Because of their design and special wear protection, Foodec decanters are ideal for ensuring drier kieselguhr, with up to 40% dryness, reducing volume by up to 80%, making disposal easier and reducing transport costs.



Dewatering kieselguhr using a Foodec decanter centrifuge

Full range of filtration solutions

F I L T E R E D

The unique combination of Alfa Laval systems and Sartorius Stedim Biotech® membrane filtration know-how means we can supply you with a comprehensive range of solutions for filtering both the fluids and the gases used in your brewery operations. These solutions range from complete filtration systems to supplying individual Sartorius filtration cartridges.

Sterile filtration

Sterile filtration processes play a key role in many of the final stages of modern brewing. Many breweries now choose sterile filtration as an alternative to pasteurization, because this makes it possible to remove undesirable micro-organisms before the beer is filled into bottles, cans or kegs.

This enables you to achieve the highest levels of microbiological safety for your beer – and for consumers – while still maintaining the fresh, natural taste that is essential for sales success.

In the highly specialized field of sterile filtration for breweries, Alfa Laval provides state-of-the-art solutions that



Sterile filtration unit for beer



Sartorius filter cartridges

feature the unique membrane filtration technology available as part of our global alliance with the renowned Sartorius brand. We also provide complete systems based on the best possible combination of Alfa Laval technologies and equipment, fitted with Sartorius filtration cartridges and integrated into supremely effective filtration units and systems.

The exceptional levels of filtration efficiency, a stringent focus on hygiene as an integral part of the design and the best possible process security together make sure your cold filtered beer is always at its best.

The key benefits of Alfa Laval sterile filtration for beer include:

- a fresh, natural beer taste
- maximum process security
- reliable performance
- complete removal of micro-organisms that can affect beer quality and taste
- easy to operate and low on maintenance
- easy to integrate into existing production lines.

Beer trap and polishing filtration

Most breweries use additional filtration steps after the main steps of kieselguhr filtration and polyvinyl polypyrrolidone stabilization.

Trap filtration makes it possible to eliminate any remaining particles of kieselguhr and PVPP present in the beer. Polishing filtration enables you to remove a high proportion of any micro-organisms (such as yeast cells) that may still be present.

Alfa Laval supplies our brewery customers with Sartorius Sartopure® and JumboStar cartridges that are ideal for use in trap and polishing filtration.

Sartorius filtration cartridges are made entirely of polypropylene. This means they have an exceptionally long service life because they can be regenerated using caustic chemicals as well as backflushing.

Filtration of process fluids

Alfa Laval provides a complete range of Sartorius process filtration cartridges for use in filtering virtually all of the flows used in brewing processes, including filter water, gases and CIP liquids. Special types of Sartorius cartridges are available for pre-filtration processes as well as for sterile filtration.

Alfa Laval provides the systems, filtration consumables and technical expertise essential for trouble-free filtration processes.

LAB or NAB

Alfa Laval beer de-alcoholization systems are based on more than 20 years of experience with reference installations throughout the world.

We provide breweries with practical, cost-effective standardized solutions for making low-alcohol and non-alcohol beer.

The technologies available include two solutions: De-alcoholization module (non-alcohol beer) and Lowal module (for small capacities and low-alcohol beer production).

De-alcoholization module

The Alfa Laval De-alcoholization module is a cost- and energy efficient concept that enables breweries to produce chilled low-alcohol and non-alcohol beer. This is achieved by an innovative combination of Alfa Laval technologies, from beer degassing and culinary steam generation to vacuum stripping and alcohol condensing.

The energy-efficient module provides reliable single-pass alcohol removal, using an effective stripping principle operating with

- low temperature and pressure
- a high degree of energy recovery
- minimal thermal energy with no risk of freezing the de-alcoholized beer
- fully automated functionality, including built-in steam-based sterilization-in-place (SIP) and cleaning-in-place (CIP)
- minimal operating costs relative to other de-alcoholization methods.

The De-alcoholization module is an efficient and versatile stripping column solution.

Benefits of the De-alcoholization module compared with other ways of removing alcohol from beer include

- higher beer quality due to reduced thermal impact on the product

- reduced alcohol levels below 0.05% alcohol by volume (abv) in one single pass
- significantly lower energy consumption due to effective mass transfer.

A De-alcoholization test pool unit is available for short-term rentals to make non- and low-alcohol beer, enabling producers to validate the market potential of new products and recipes.

Lowal module

The Alfa Laval Lowal is a modular solution, based on reverse osmosis and nanofiltration technology (RO/NF), for the following applications

- de-colorization and alcohol removal from a primary or base beer
- small-capacity low-alcohol beer production, ideal for craft beer production



Lowal module

Removing the alcohol

Lowal modules can be delivered to handle beer capacities over 1 hl/h.

An M20 Labstak unit is available on a rental basis for small capacity trials to define the appropriate membrane setup prior to piloting or scale up.

Expand your product portfolio

The versatility of the De-alcoholization and Lowal modules makes them ideal tools for new product development, such as

- high-gravity primary beers tailored for LAB and NAB production
 - ready-to-drink beer-based products fortified with re-covered alcohol.
- the high-strength aromatic alcohol condensate (35–40% abv) can be re-dosed for aroma recovery or used in producing mixed alcohol products.
 - process unfiltered beers, enabling upstream integration into the process line to make specialty beers with reduced alcohol content.



De-alcoholization module

Services that add value

Alfa Laval devotes substantial resources to providing special services that add significant value to your brewing processes

Optimization

Drawing on our skill and experience in the field of brewing as well as on our core technologies and established service routines, Alfa Laval provides a range of special services designed to help control your production cost as well as enhancing the quality of your beer. These include

- beer and wort recovery technologies
- yeast management audits
- energy audits
- performance agreements
- training
- upgrading of process modules.

We are continually extending this range of services to accommodate customer requirements. Just let us know what challenges you are facing, and we will work with you to address them.

Uptime

We help you avoid unscheduled stoppages and downtime and keep your production flowing via tailored Performance Agreements, and by responding quickly and decisively if and when there are any glitches.

We have dedicated facilities and skilled personnel based at key locations around the world, whose sole job is to provide maintenance and service for your Alfa Laval brewery equipment.



Availability

By understanding the specifics of beer production and the many complex processes associated with it, we provide Performance Agreements tailored to tackle the special service demands in brewery environments.

The Alfa Laval Performance Agreement approach covers everything - from the efficient supply of the smallest spare part to acting as a long-term performance partner. Within this spectrum, we can tailor an individual service package that fits your specific requirements perfectly.



Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered solutions. Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

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