ECO-FLASH™:

Beer pasteurization for highest demands.

GEA Brewery Systems
Huppmann Tuchenhagen

Risk-free quality due to flash pasteurization.

Microbiologically instable beers are “ticking time bombs” for every brewery. Because trace infections and cross contamination of microorganisms transmitted from the production process can only be detected after a considerable delay. This enormous risk can be avoided.

The best way to achieve stable beer quality and full taste is flash pasteurization. Thermal inactivation helps the brewer to define the microbiological properties of his beer. Microorganisms that could spoil the beer are destroyed fast without harming the product. The beer is gently pasteurized in-line immediately prior to filling. This process step enables breweries to ensure the sustained quality of their product.

As with all methods for the reduction of microorganisms, however, the success is dependent on the initial organism count in the beverage.

A positive side effect of flash pasteurization is the inactivation of foam-negative proteinases excreted by the yeast. If enzymes are added to the process, heat treatment is indispensable, because an uncontrolled enzymatic reaction in the filled bottle must strictly be prevented.

GEA Brewery Systems has developed a safe and cost-effective method to optimize the biological preservation by pasteurization. Thanks to the recuperative design of the ECO-FLASH™ system, as much as 96 percent of the heat input can be recovered. This makes flash pasteurization the most cost-effective of all heat treatments used today.

FACTS & FIGURES

Problem-free zone: ECO-FLASH™ from GEA Brewery Systems.

The design and function of a flash pasteurizer must be individually planned and tailored to the type of beer to be treated. GEA Brewery Systems' flexible ECO-FLASH™ systems keep control of all the relevant parameters, so that off-flavours, colour changes or product losses are reliably avoided. The ECO-FLASH™ system, as you would expect, comes with a buffer tank, the necessary valves and piping and last but not least with the measuring and control devices to manage the system. The perfect interaction of these components guarantees the precision of continuous PU control.

When selecting our components we attach great importance to top quality. Our experience has shown that high-quality investment ultimately turns out to be more profitable for companies than short-sighted decisions. The total life cycle costs are reduced. GEA Brewery Systems focuses on components and systems that are hygienically sound and ensure long-term reliable function.

Buffer tank facts

The buffer tank is vacuum-resistant. Its product contact surfaces are of high quality, ensuring full cleanability.

In the event of filling line downtime the ECO-FLASH™ can run on for up to 30 minutes thanks to the capacity of the buffer tank. The instrumentation provided allows intelligent control in several steps:

- If the level in the buffer tank exceeds a specified value, the system's output is reduced.
- If the level in the buffer tank reaches the maximum, the ECO-FLASH™ switches to internal circulation. This gives the plant operator time to decide whether the flash pasteurizer should be run empty.
- If the level in the buffer tank falls below a specified value, the system automatically changes over to the buffer tank again.

FACTS & FIGURES

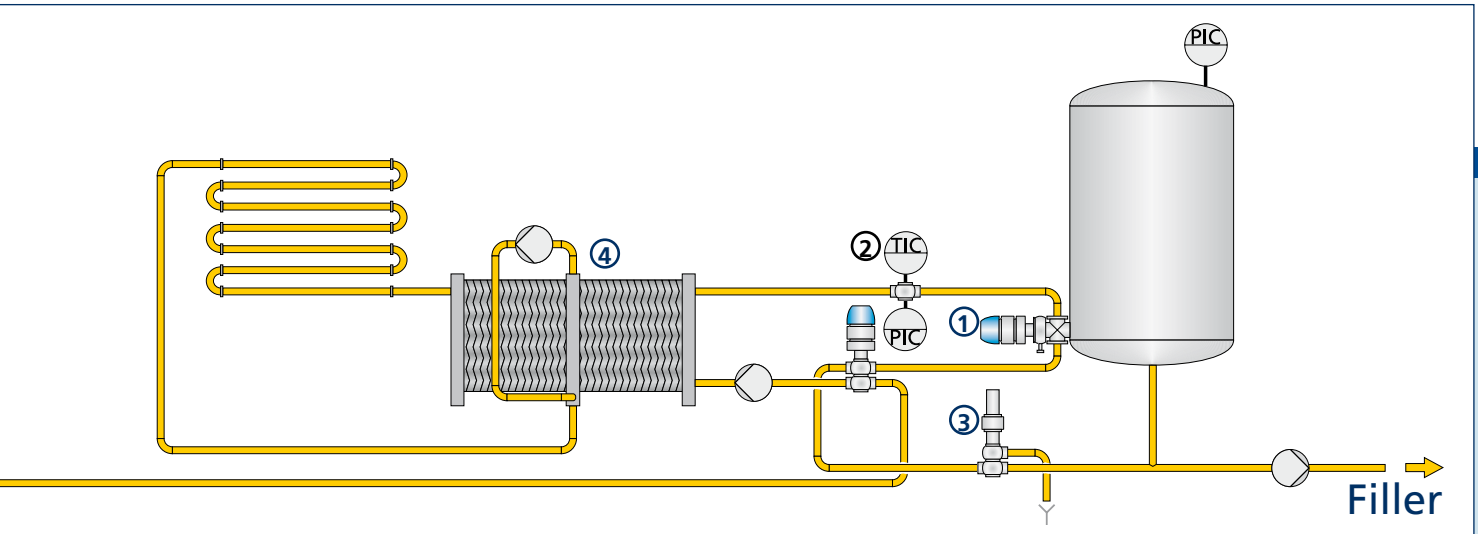
Quality factor hygiene.

Control engineering and process hygiene play an important role.

When designing ECO-FLASH™ systems, GEA Brewery Systems takes advantage of proven characteristics and principles such as the ECO-MATRIX™ technology. We use in-line technology for all measuring points and strictly avoid dead pockets throughout the system. This ensures a maximum of hygiene within the piping.

When changing over from 'drain' to the buffer tank, for instance: This causes a water hammer, which is prevented by a pressure holding valve. A shut-off valve is usually connected either upstream or downstream of this pressure holding valve, so that product is entrapped between the two valves. With this design, bacteriological problems are inevitable.

But not with the GEA Tuchenhagen special valve type D-FORCE: It fulfils two functions: pressure holding and shut-off. This innovative technical solution reliably prevents water hammers when changing over and rules out the risk of bacteriological contamination.



FACTS & FIGURES

Quality factor temperature.

The exact adjustment of the ECO-FLASH™'s temperature control system is also indispensable for operational safety. The pasteurization effect and the beer quality will only be reliably guaranteed if the temperature is adjusted within a specified range.

The control system of a flash pasteurizer system therefore has two essential functions:

- Temperature control must be highly accurate in order to achieve the required pasteurization units.
- The filling level in the buffer tank must be controlled in accordance with the amount drawn off. This ensures uninterrupted operation and keeps the number of flush-outs as low as possible.

GEA Brewery Systems offers a technologically mature solution, which is an integral part of the process software. This solution ensures the perfect interaction between the different control loops and achieves a PU control accuracy of +/- 1 PU!

To achieve this precision and consistent performance, the ECO-FLASH™ system must be exactly tailored to the beer/product to be treated. Our engineers will therefore ask the brewery owner for the exact thermal data of his products.

FACTS & FIGURES

Temperature and retention time – key pasteurization parameters

The destructive effect on micro-organisms of pasteurization in a flash pasteurizer is determined by the retention time and the temperature applied. It is calculated in terms of pasteurization units (PU) and is a measure for the microbiological effect of the heat treatment. It is calculated as follows:

PU = time · 1.393 $^{(t - 60°C)}$

PU = pasteurization units
time = temperature holding time at pasteurization temperature [min]
t = pasteurization temperature [°C]

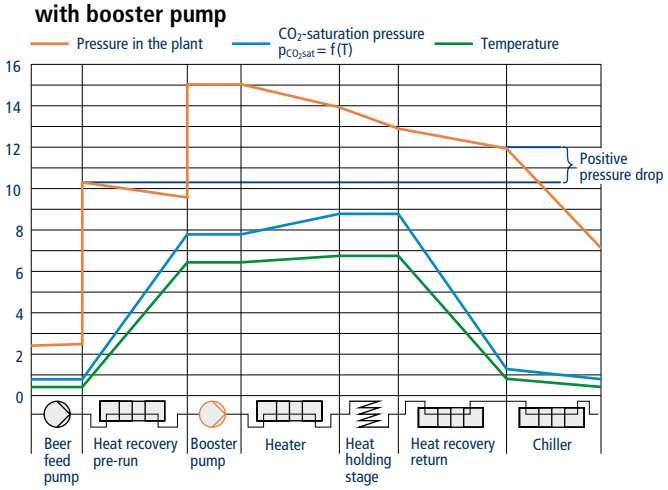
Quality factor pressure.

GEA Brewery Systems plans with foresight and always with safety in mind: The ECO-FLASH™ system design allows for a positive pressure drop, so that contamination is reliably ruled out at all times. Even if a plate in the plate heat exchanger breaks, there will be no recontamination.

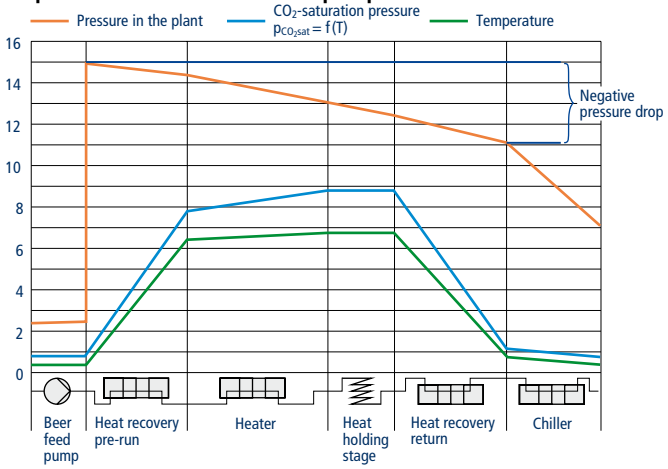
A suitable booster pump upstream of the heat exchanger ensures a constant pressure. This booster pump reliably keeps the pressure above the saturation pressure of the dissolved CO_2 anywhere in the system (see chart). Degassing is thus ruled out. The comparative graphs show the effect of the booster pump and the positive pressure drop.

FACTS & FIGURES

Course of temperature and pressure in an ECO-FLASH™ with booster pump



Course of temperature and pressure in other flash pasteurizer without booster pump



Good to know: Automation.

The ECO-FLASH™'s control system is based on well-proven GEA Brewery Systems control technology modules. The two variants mainly differ in the way they are integrated into the peripherals. PU control is fully automated in both variants and guarantees the highest precision.

a) Semiautomatic

The ECO-FLASH™ system is equipped with a control system that works independently of the process plant's master control system. Functions such as cleaning and sterilization or starting up and shutting down are activated manually. A touch panel facilitates user-friendly operation of valves and pumps.

b) Fully automatic

The control system for the ECO-FLASH™ is connected to the plant's master control system via a data bus line. This allows the fully automatic control of all functions of the ECO-FLASH™ system.

ECO-FLASH™ product information

The ECO-FLASH™ system is available in four sizes and with two levels of automation – and, on request, in modular design for future extension.

Size	Capacity range
DN 50	50 hl/h to 150 hl/h
DN 65	> 150 hl/h to 250 hl/h
DN 80	> 250 hl/h to 370 hl/h
DN 100	> 370 hl/h to 600 hl/h

FACTS & FIGURES

Beer pasteurization with ECO-FLASH™

Quality and shelf life cannot be separated in the brewing process. With our flexible, modular ECO-FLASH™ systems, GEA Brewery Systems is the ideal partner for breweries.

The ECO-FLASH™ systems inspire confidence with their reliability and the following advantages:

- **Low investment and operational costs**
- **Precise PU control, online monitoring is possible**
- **Minimum product losses**

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