



GEA ASEPTIC BLOW FILL SYSTEM ABF 2.0

Fully aseptic blowing, filling and capping system featuring H₂O₂-based preforms sterilization.



ASEPTIC BLOW FILL TECHNOLOGY

The growing need from the market for more sustainable and user-friendly packaging solutions for sensitive products is leading all major specialists to continue and develop aseptic technologies across their range of products.

The ABF 2.0 is the latest evolution of GEA Aseptic Blow Fill system, the dry platform that combines an aseptic blow molding module with the aseptic module for filler and capper. The system is based on hydrogen peroxide (H₂O₂) decontamination technology for preform and cap sterilization. It is cost-effective, energy efficient, environmentally friendly and sustainable.

The ABF 2.0 is aimed primarily at food safety through best practices in all phases of the process. Being the evolution of a consolidated, FDA validated platform, the ABF 2.0 is ready to meet the most stringent protocols, including FDA validation, required for

shelf-stable low acid beverages produced and/or distributed in the USA.

A full range of sensitive beverages and liquid dairy products can be filled such as still, clear drinks with or without particles, and carbonated drinks - high or low acid. When the filling of sensitive beverages demands a high level of hygiene and safety, the ABF filling module is the best solution in terms of process control, paying special attention to crucial environmental control, filling speed, accuracy and flexibility - ensured across the whole machine lifecycle.

THE ASEPTIC BLOW FILL PROCESS

When it comes to food and product safety assurance throughout the entire lifecycle of a machine, the ABF 2.0 represents the state of the art in the aseptic technology market, especially for the highest sensitive products.

Preform VHP treatment

Preforms are treated with ionized air to remove fine dust before entering the oven where they are heated to achieve the appropriate thermal profile. These are then transferred to the sterilizing wheel.

Preforms are decontaminated both internally and externally using a robust and controlled Vaporized Hydrogen Peroxide (VHP) treatment. This controls the microbiological isolator bioburden during the entire process. Performance is at the highest level for the category.

While it is possible to reach up to log 6 decontamination inside the preforms, the system achieves peroxide residuals compliant with the requirements of the most stringent food safety protocols.



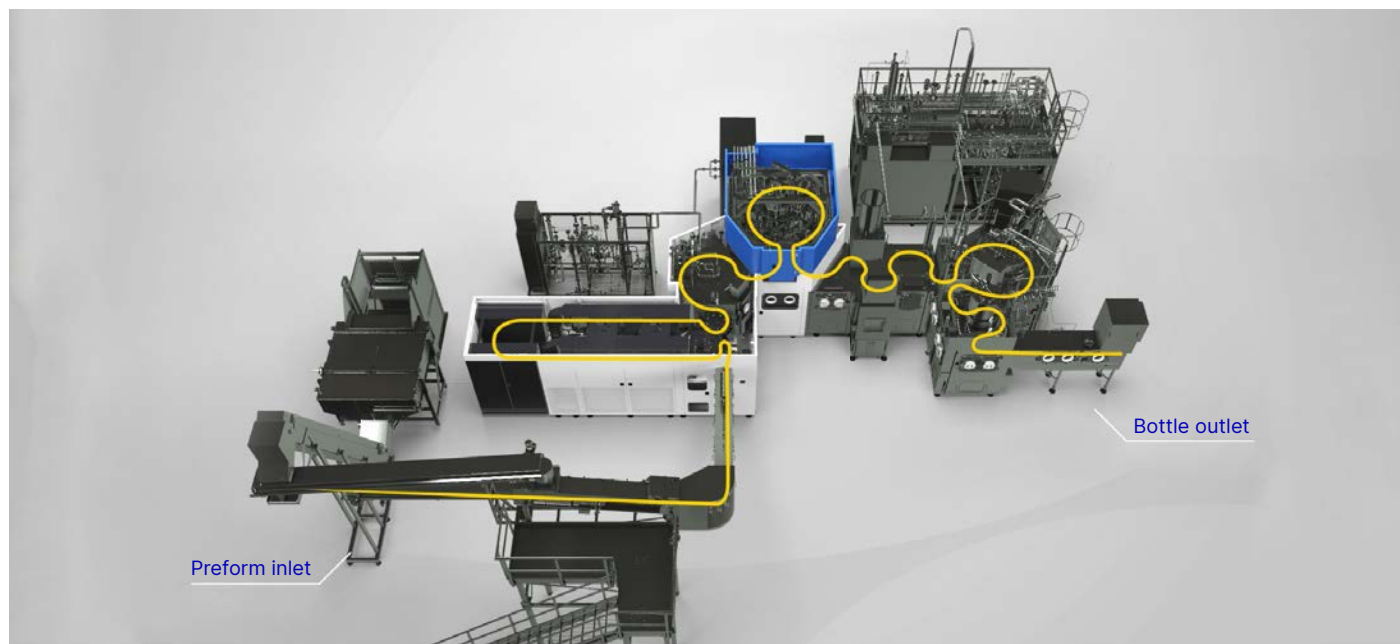
Preform VHP treatment.

The VHP treated preforms are transferred from the sterilizing wheel to the Aseptic Blow Molder.



Aseptic blow molder.

The sterilized preforms are blown with sterile air in an aseptic environment.



Aseptic blow molder

The sterilized preforms are blown with sterile air in an aseptic environment, then transferred to the GEA Fillstar. During SIP and SOP operations the internal surfaces of the aseptic blow molder isolator, the air circuits and the stretching rod are sterilized with VHP.

Fillstar: the aseptic filler

The Fillstar provides a flexible approach for a variety of applications. The filling valves have the last section inside the microbiological isolator and are equipped with flow meters to guarantee high filling accuracy and performance. The GEA patented automatic dummy bottles create a closed loop for the CIP and allow the use of steam to sterilize inside the product pipes: this is a sustainable solution that avoids the use of over pressurized water for the SIP (sterilization process).

Aseptic capper and cap sterilization system

The ABF 2.0 offers maximum flexibility when treating both sport and flat caps as well as aluminum foil closures. Both closure sterilization modules use a VHP-based technology and offer quick changeover without loss of sterility.

The capper module is specifically designed for aseptic applications and completely embedded in the microbiological isolator. GEA provides a patented electrical barrier that effectively separates the sterile zone from mechanical components that require lubrication; a hygienic design with no bellows that's easy to clean; and full traceability of the capping process to achieve maximum product safety.



Aseptic filling.

The GEA aseptic fillers offer a flexible approach to a variety of applications.



Focus on improvements.

The ABF 2.0 mechanical developments increase the efficiency of the line, minimizing consumptions and environmental impact, while offering customers outstanding safety and quality on the final product.

SYSTEM EVOLUTION FOR SUSTAINABILITY.

The evolution of Aseptic Blow Fill technology, including layout reduction and mechanical simplification, can increase sustainability and line efficiency.

The ABF 2.0 is the natural evolution of GEA Aseptic Blow Fill technology: its development has been focused on mechanical improvements to increase the efficiency of the line, minimize consumption and environmental impact, while aiming to offer customers its characteristic outstanding safety and quality of the final product.

- The optimization of the heating modules reduces the electrical energy and air consumption while guaranteeing the proper preform temperature profile. This also results in a significantly smaller oven footprint compared with the previous generation.
- The ABF 2.0 uses very little chemicals and no water during production. The system features a completely dry decontamination technology for preform and cap sterilization which leaves the minimum of chemical residuals in the containers.
- The preforms are transferred in the system without tilting to achieve a smoother performance, reduced footprint and number of transfer star wheels, results in reduced maintenance time and costs.
- The air used for the bottle blow molding process is sterilized by a redundant filtering system and conveyed through a fully aseptic circuit. It is recovered and reused, reducing Total Cost of Ownership (TCO).
- The cap sterilization module offers a gentle treatment performed at reduced temperatures that avoids overheating the caps and optimizes the energy consumption; this is a buffer solution that enhances the Overall Equipment Efficiency (OEE) of the line.



THE ASEPTIC BLOWER CONCEPT.

A more compact system respect to traditional aseptic technology, requiring fewer operators.

In the 1990s, when aseptic filling systems were enclosed in large white rooms in a sterile environment, GEA launched an innovative way to confine and minimize the air volume to be kept under aseptic conditions around the filler and so protect the product: the microbiological isolator.

With ABF technology, GEA has also located the stretch blow molder within the microbiological isolator with the filler and capper modules, creating a state-of-the-art system for product protection with no compromises.

The aseptic blower features a fully sealed, washable and VHP sterilizable microbiological isolator and three VHP sterilizable circuits:

- sterile air blowing,
- a sterile stretching rod,
- sterile pneumatic compensation.





Microbiological isolator.

With the ABF technology the aseptic stretch blow molder is located within the microbiological isolator.



Aseptic blow molder.

The internal surfaces of the blower can be cleaned by foaming and sterilized with VHP before starting the production cycle.

Microbiological isolator

A clearly identified sterile zone with minimum surfaces allows the sterile area to be easily cleaned and sterilized before starting a new production cycle or after a format changeover.

All the components inside the isolator are resistant to the chemicals for COP/SIP/SOP: on a periodical basis a foaming cycle can be performed.

The over-pressurized isolator system, with sterile air in the sterile zone, continuously preserves sterility and guarantees a safe environment for the preform/bottle during production.

The sterile air blowing

Sterile air to blow the sterile preforms is provided through a circuit with double-redundant filtration; a dedicated system sterilizes the air piping with VHP from the filters to the blow

molding stations. For this reason, GEA developed a specific patented air blowing valve block that can be sterilized while maintaining reactivity, reliability, 'reduced pressure drop' and 'reduced dead volume' for TCO optimization.

Sterile stretching rod [patented]

All the parts that touch the sterilized preform and/or the bottle must be sterile before starting production, so it's mandatory to have a sterile stretching rod. The GEA system (patented) allows the stretching rod to be kept inside a sterile housing, that can be sterilized with VHP during SOP cycles.

The movement is achieved by a magnetic joint between two magnets: an internal magnet connected with the stretching rod inside the housing and an external one moved by a brushless motor.

This also provides the benefit of allowing the automatic disengaging of the magnets if a preform jams during the stretching phase.

The sterile pneumatic compensation

A single-side opening mold system featuring patented pneumatic compensation ensures a perfect mold closure and avoids 'parting lines' on the blown bottle.

The pneumatic compensation circuit is fed with sterile air during production and managed with a dedicated aseptic valve block.

Energy recovery for smarter blowing



The ABF system integrates an innovative air recovery solution designed to enhance energy efficiency throughout the blowing and sterilization process.

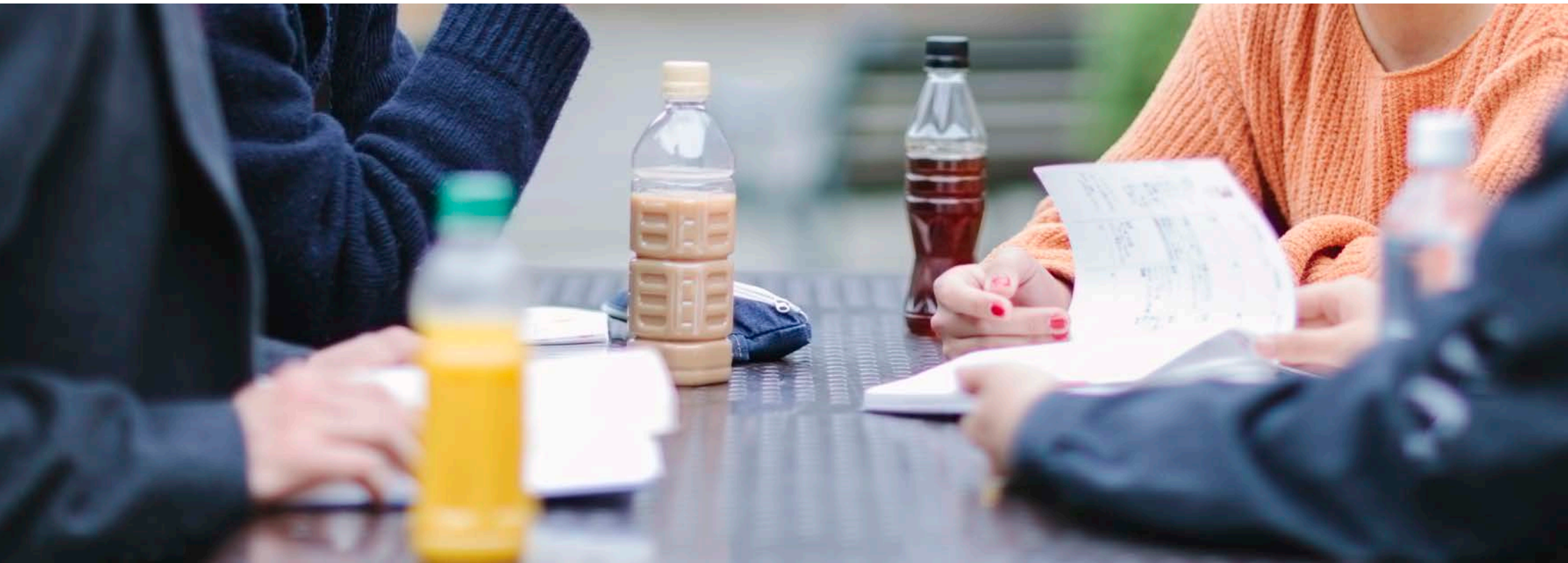
Traditionally, the high-pressure air used to blow PET bottles is released into the environment after use, resulting in significant energy loss. With this new system, a portion of that compressed air is recovered directly from the blown bottle and reused in two key stages: the pre-blowing phase and the VHP-based cap sterilization process.

This intelligent reuse not only reduces the need for additional compressed air but also ensures a stable and efficient supply to critical machine functions. Thanks to this innovation, the system achieves a substantial reduction in compressed air

consumption – by approximately 30% – contributing to lower energy usage, reduced operational costs, and improved sustainability performance.

The air recovery system in aseptic blower is one of our most resource-efficient solutions and carries the Add Better label.

With a strong focus on resource efficiency, the Add Better label highlights high-performance engineering solutions that meet the ISO 14021:2016 ecolabel requirements and are validated by TÜV Rheinland. These certified innovations support you in reducing environmental impact while making a measurable contribution toward your sustainability and performance goals.





SAFETY FIRST.

Designed with safety as a priority.

When it comes to food and product safety assurance throughout the entire lifecycle of a machine, the ABF 2.0 represents the state of the art in the aseptic technology market, especially for the highest sensitive products.

In order to guarantee a fully reliable and aseptic process it is of the utmost importance to have a fully automated monitoring of the entire running operations leaving no space at all to semi-automatic or manual procedures. This is exactly the concept behind the GEA ABF 2.0.

All critical points are automatically managed and controlled to ensure the maximum decontamination efficacy. Continuous careful analysis and monitoring of these parameters allows H₂O₂ treatment to be automatically controlled for high efficiency, reliability and perfect system management. This not only minimizes the time needed to achieve optimal filling line performance – which is a key ingredient in increased productivity and cost savings – but also allows operators to identify and intervene on parameter fluctuations to prevent any process deviation.

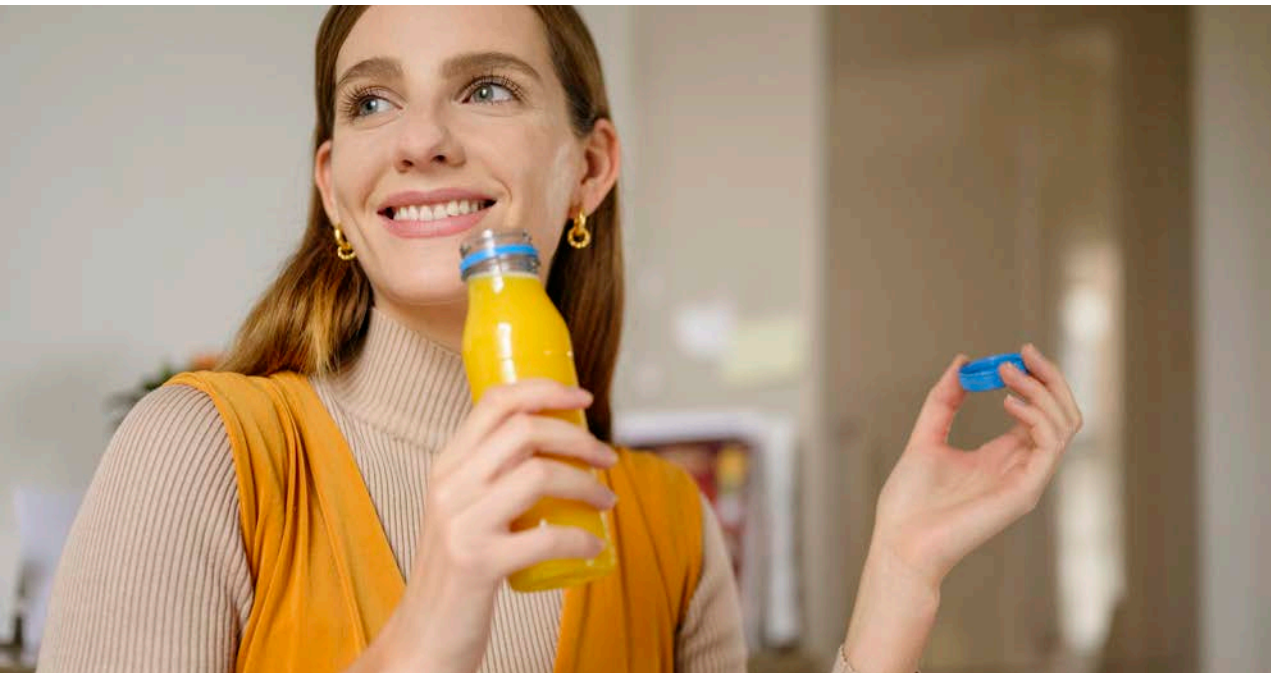
GEA Smart Sensor.

The GEA Smart Sensor is a patented technology that ensures maximum food safety.

As an additional guarantee of a reliable and efficient sterilization treatment, a Smart Sensor monitors the spraying performance of each sterilization nozzle.

The force of the sterilant jet exiting the nozzles is measured at a time just prior to the bottle sterilization: the result is compared to a pre-calibrated, stored value to confirm that the preforms are receiving the proper sterilization treatment

A control software monitors the sterilization process and parameters and activates a 'just-in-time' warning in case a nozzle should malfunction.



The environmental cleaning and sterilization processes are completely automated and effectively repeatable over time: they are performed via a control panel without any manual manipulation from operators that might be a potential risk of re-contamination.

A full aseptic synchronized configuration guarantees the complete control of food safety and integrity for every production batch.

GEA Procomac S.p.A.

Via Fedolfi, 29
43038 Sala Baganza (PR) Italy

Tel ++39 0521 839411
gea.com/filling
gea.com/contact