Batch-type overpressure water cascading/spray retort for in-pack thermal processing

Batch overpressure water cascading or spray retort

Identification

Key words: pasteurisation, sterilisation, thermal processing, batch retort, water cascading, water spray, packed foods and beverages, overpressure

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How does it work?

Primary objective: An overpressure water cascading/spray retort can be used for thermal pasteurisation or sterilisation of packed foods.

Working principle: A water cascading/spray retort is one of the different types of retorts that are designed to provide overpressure (i.e. the pressure supplied to a retort in excess of that exerted by the heating medium at a given process temperature) during processing which is often required to maintain the package integrity. As temperature and pressure are controlled independently, they are especially suited for packages with limited resistance to internal pressure (such as semi-rigid plastic containers, flexible pouches or trays, glass jars etc...). The heating medium is pressurised hot water, which is cascading over a perforated top plate or sprayed by several spray bars respectively in a water cascading or a water spray retort. Cooling is achieved by cascading/spraying cold water. A water cascading/spray retort can be operated in a static or in an agitated mode. Product agitation can be realized by end-over-end rotation or by a pendular movement of the baskets holding the packaged foods (hence, not all containers undergo exactly the same degree of agitation), for example in a Steriflow retort. Agitation can also be realized through a horizontal movement of the baskets. A reciprocating actuator shakes the baskets and their contents back and forth during processing (up to 150 shakes/min in the Shaka (c) retort). The vigorous agitation causes thorough mixing of the food in the container and hence, enhances the heat penetration in the food product. In this case, all containers undergo exactly the same degree of agitation.

Images

Additional effects: The enhanced heat penetration due to product agitation permits the use of higher processing temperatures and consequently shorter process times, which on its turn results in improved product quality.

On the other hand, in agitational processes, products must be secured within the baskets while allowing the free passage of the heating medium. For this, special spacers and container retaining systems are to be used.

Important process parameters: temperature, time, rotational/agitational speed
Important product parameters
thermal diffusivity, geometry and dimensions, viscosity, head space

What can it be used for?

Products
Food industry: packaged foods and beverages
Pharmaceutical industry: packaged products that need to be decontaminated

Operations
Thermal pasteurisation or sterilisation of packaged products

Solutions for shortcomings
Poor heat penetration rate in conventional batch type autoclaves.

What can it NOT be used for?

Products
Not suited for non-packed products
For solid products, product rotation/agitation is not beneficial

Operations
No information available

Other limitations
damage to sensitive products like soft fruit particles that consumer like to see compact

Risks or hazards
No risks/hazards

Implementation

Maturity
Available at lab-scale and industrial scale

Modularity/Implementation
A batch-type overpressure water cascading/spray retort can easily be inserted in an existing production line

Consumer aspects
No information available. No problems expected.

Legal aspects
No information available, but no regulatory hurdles are anticipated.

Environmental aspects
No information available

Facilities that might be interesting for you

Title
Microwave heating lab-scale KU Leuven
Retort pilot-scale KU Leuven

Institute/company
KU Leuven LFT
KU Leuven LFT

Further Information

Institutes
Campden BRI, CTCPA, KU Leuven LFT

Companies

References