Hydrostatic retort for continuous in-pack thermal processing

### Identification

**Key words**

- pasteurisation
- sterilisation
- thermal processing
- continuous retort
- hydrostatic retort
- packed foods and beverages

**Latest version**

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**Completed by**

KU Leuven LFT

### How does it work?

**Primary objective**

Continuous thermal pasteurisation or sterilization of packed food products using a hydrostatic retort

**Working principle**

The essential principle of a hydrostatic retort is the use of hydrostatic columns of water of sufficient height to counter-balance the pressure of the steam used in the sterilization zone. A typical hydrostatic retort consists of a preheating leg, a steam sterilizing chamber and one or more cooling legs. However, there are many different arrangements of the legs, depending on the nature of the product being thermally processed.

The packages are transported on long horizontal carrier bars (which may or may not impart rotary motion) chained together. The carrier bars enter the preheat leg at the top and progress down until they reach the steam chamber, where they make at least one double pass before emerging upwards through the cooling leg. The chain speed of the carrier bars determines the sterilization time, and can be varied as needed. An automatic loading and unloading system brings the containers in and out of the carrier bars. An hydrostatic retort is available in either a container-dedicated or a super-flexible execution. In pure steam hydrostatic retorts, the sterilization temperature is directly related to the pressure of the saturated steam. By varying the pressure, the temperature can be controlled. Nowadays, hydrostatic retorts using superheated water cascading with air overpressure and pressure preheating and cooling are available.

**Images**

**Additional effects**

As a hydrostatic retort is a continuous retort, a high throughput can be realized, ranging from 60 to 2000 containers per minute.

As they are vertically oriented, they require relatively little floor space.

**Important process parameters**

- temperature
- chain speed of carrier bars (time)

**Important product parameters**

- thermal diffusivity
- geometry and dimensions
- viscosity
- head space
What can it be used for?

**Products**
- Food industry: packaged foods and beverages
  - An hydrostatic retort is ideal for processing products that require long cook and cool times, high throughputs and for those deriving limited benefit from agitation

**Operations**
- Thermal pasteurisation or sterilisation of packaged products

**Solutions for short comings**
- This technology solves the problem of low productivity of batch retort and provides better temperature uniformity in packed product by moving the packages in heat transfer media.

What can it NOT be used for?

**Products**
- Not suited for non-packed products

**Operations**
- No information available

**Other limitations**
- This system is not flexible for changing demands on sterilisation time of different products (the system has to be emptying first before introducing new product).

**Risks or hazards**
- No risks/hazards

Implementation

**Maturity**
- Available at industrial scale

**Modularity/Implementation**
- As an hydrostatic retort requires a dedicated loading and unloading system, it replaces the major part of a 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. No problems expected.

Facilities that might be interesting for you

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<td>Retort pilot-scale KU Leuven</td>
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Further Information

**Institutes**
- Campden BRI, KU Leuven LFT

**Companies**