

Efficient cooling of hot filled pouches and bottles

Identification

Key words	cooling, pouches, bottles
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How does it work?

Primary objective	Cooling of hot filled packages to assure complete pasteurization.
Working principle	<p>The technology is related to the production of shelf stable drinks. These drinks are filled into bottles or pouches at pasteurization temperatures. Packaging material is closed and the whole product is cooled down down to storage temperature. Complete pasteurization effect is computed from temperature increase, holding time and temperature decrease. Mathematical models are developed for this time temperature history and the whole pasteurization effect is calculated [1]. To keep sufficient consumer quality it is important to cool down the content of filled packages effectively and relatively quickly. The cooling can be done by spraying of packed products with cooling water, or by dipping packed products into a cooled water bath or blown by cold air. There are different applications of these basic principles. There are other techniques available based on the principle of self-heating and self-cooling cans. Apart from pasteurization, package heating or cooling can be activated by the consumer in order to get a hot coffee or a cold drink, respectively. The package is constituted of double walls containing convenient components inbetween. Cooling or heating is reached by a mixing of these components.</p>
Images	
Additional effects	Due to cooling the systems generate energy as heat.
Important process parameters	intensity of the cooling fluid flow, cooling rate
Important product parameters	heat capacity of the product, start and final temperature, time temperature history important for pasteurization calculation, pH of the food product, product geometry, product composition, possible microorganism contamination (for pasteurization calculations)

What can it be used for?

Products	Liquid products like drinks, semisolid products like sauces
Operations	Packaging
Solutions for short comings	The industrial need is focused on proper pasteurization or sterilization. In this context, overheating can lead to undesired changes in the food quality.

What can it NOT be used for?

Products	Solid foods involve poor heat transfer, which delays the cooling process.
Operations	Low cooling efficiency due to complicated geometry of the products.
Other limitations	Low flow rates of cooling media around products.
Risks or hazards	Unsufficient cooling of the food products that enable the germination of spore forming microorganisms. Microbial contamination of packed product surface due to contact with contaminated cooling media.

Implementation

Maturity	Cooling of hot filled food products in bottles or pouches is applied on pilot scale. In large scale, the aseptic filling of cooled products is more common.
Modularity /Implementation	The described process can be applied in current filling process by introducing special section for cooling of hot filled products.
Consumer aspects	Consumers accept products with pro-longed shelf life due to hot filling into the package. Products stored at cold temperatures are accepted more as fresh products.
Legal aspects	Food legislation for heat stable products.
Environmental aspects	Consumption of energy for cooling of hot filled products.

Facilities that might be interesting for you

Further Information

Institutes	University College Dublin, Technological Education Institute of West Macedonia, TU Sofia, Universitair Centrum voor Farmacie
Companies	PerkinElmer Corporation, Universal Can Corporation, Consumer Testing Services, Mitsubishi Heavy Industries
References	[1] Augusto, P.E.D., Cristianini, M., Numerical simulation of packed liquid food thermal process using computational fluid dynamics (CFD), (2011) International Journal of Food Engineering, 7 (4), art. no. 16,

Source:

<http://www.foodtech-portal.eu/index.php?title=Special:PdfPrint&page=Efficient+cooling+of+hot+filled+pouches+and+bottles>