



Cold Aseptic Filling

Original article by [HRS Heat Exchangers Australia New Zealand](#) on [Food Processing](#).

MQA is not affiliated with HRS Heat Exchangers Australia New Zealand; we simply think the process concept will be beneficial to some of our clients and readers.



In recent years, aseptic technology has become well established in the food and drink sector as a filling technique. Yet some businesses are still unaware of its benefits or do not believe that it can be used with their products.

As consumers have become more health conscious, the demand for food and drink products without preservatives has increased. However, traditional methods combining sterilisation with hot filling have not been suitable for products that are increasingly sold on their 'fresh' and 'natural' characteristics, due to the effect on product quality.

In most cases, **hot filling** sterilises the container as the product (which is still hot from cooking or sterilising) is filled. However, the temperatures required often have unwanted effects on the quality of the product, and the heat imposes restrictions on the type of container which can be used — for example, hot filling of lightweight plastic drinks bottles can lead to distortion of the plastic.

Consequently, **cold aseptic filling** has become a common technique with drink manufacturers for products including UHT milk, fruit juices, and sports and energy drinks. Its flexibility means that it is suitable for a wide range of products from fresh fruit dices and purees to marinades and dairy products. This diversity has also seen the development of a wide range of fillers and packaging types, from pouches and lidded trays through to bulk bags and intermediate bulk containers (IBCs).

Aseptic filling systems generally combine a number of elements into a single integrated production line. This integrated approach helps to ensure microbiological safety throughout the process from initial treatment through to

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the sealing of the finished product. The steps included in an integrated aseptic filling line (such as the HRS Asepticblock) typically include:

Thermal Treatment

Although in theory this can be any thermal treatment which reduces harmful bacteria (pasteurisation, sterilisation or cooking), in practice the types of product which are most likely to benefit from aseptic filling are those which are pasteurised or sterilised. This step usually comprises a suitable tubular heat exchanger, such as the HRS MI, DTA or AS Series.



Cooling (Where necessary)

Depending on the product, the production process and the packaging used, it may be necessary to cool the product following pasteurisation or sterilisation. In some situations (such as the production of cooked items like soups and sauces), this step may form the first part of the integrated aseptic line, receiving hot cooked product from elsewhere in the factory. In such cases another heat exchanger will be used, such as the AS Series. If cooling the product is likely to increase its viscosity, then a scraped-surface unit, such as the patented Unicus Series or R Series heat exchanger, may be used.

Sterilisation of the Packaging

Prior to filling, packaging is normally sterilised using thermal or chemical methods (such as peroxyacetic acid or hydrogen peroxide), although in many production environments the packaging is supplied pre-sterilised in aseptic packaging that can be put into the filling line without contamination. However the packaging is sterilised, it is vital that aseptic conditions are maintained between sterilisation and sealing, and this is another reason for adopting an integrated aseptic processing solution.

Filling and Sealing Under Aseptic Conditions

There are numerous systems of aseptic filler on the market, but all try to balance speed, accuracy of operation and flexibility of filling (for example, working with different products and containers), while maintaining the microbial integrity of the product and the sterility of the containers — including suitable cleaning-in-place (CIP) systems before, during and after production.

Depending on the product and how it is packaged, filling may be based on weight or volume and appropriate sensors (such as weigh cells or flow meters) and control systems will be included in the filler machinery. The AF Series of aseptic fillers meets all of these criteria and is suitable for both high- and low-acidity products.

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Once filled, there are many ways that aseptic packaging can be sealed — from screw capping bottles to heat sealing pouches or putting lids on bulk containers. These mechanisms may also include some form of tamper-evident system to alert customers or consumers if the pack has been opened since filling.

The Business Case for Aseptic Filling

There is, of course, a financial investment required to install aseptic filling technology, but when conducting a cost/benefit analysis, some of the factors to consider include:

- **Volume:** Aseptic filling lines normally operate on a continuous basis and therefore are much faster than batch cooling operations
- **Quality:** Probably the biggest driver towards aseptic filling is the improvement in product quality. Any heat treatments can be driven by product requirements, rather than the need to sterilise the container, making high temperature, short time (HTST) pasteurisation feasible in many cases. This preserves key quality characteristics such as taste, nutrient content and colour
- **Flexibility:** Most aseptic filling lines can be configured to supply a range of products and fill a range of containers including PET, HDPE, LDPE, glass, cans, foil etc. Not only does this increase flexibility, but also helps to futureproof installations
- **Packaging:** Although there may be an increase in costs associated with the need to purchase sterile packaging, many packaging types used in aseptic filling are generally lighter (and therefore cheaper) than their hotfill equivalents

When considering aseptic filling, companies need to weigh up the safety of the proposed solution with capital and operating costs, operational safety considerations and the effect on product quality. In most situations, the business case to adopt cold filling quickly becomes apparent.



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