

Application note



Consumables & Supplies

Thermochromic inks and code durability for commercial sterilization of food



Food sterilization processes, such as retort, have long been used as reliable methods for making food both safe and shelf stable. Retort is a heating process (similar to pressure cooking) used to extend the shelf life of foods prone to microbial spoilage. This process reliably kills commonly occurring microorganisms present at the time of processing, helping to prevent spoilage.

The Challenge:

Code readability and consistency are especially important for foods processed using the commercial sterilization process. Easily readable and identifiable codes are required for internal quality control measures as food moves through the heating, cooling and staging processes. Moreover, clear, durable codes are also very important to consumers who rely on them for expiry detail when storing and consuming long shelf life products. Code quality is jeopardized by moisture present during the commercial sterilization process, which frequently causes blurred and degraded codes. Poor quality codes not only affect the manufacturer's quality assurance process and consumer confidence at the point of sale, but also can create food safety concerns for consumers long after their purchase.

Videojet advantage:

From the food sterilization process to the point of purchase and beyond, code quality matters. That is why Videojet formulates specialised and highly stable thermochromic inks for processed food applications. Delivering high-contrast codes, Videojet thermochromic inks are formulated to withstand moisture and the high temperatures present in sterilization processes. Innovations in Videojet ink technology also offer improved:

- Contrast for better code visibility
- Colour change for confirmation of successful sterilization
- Readability with less moisture-related code bleed

Food and the sterilization process

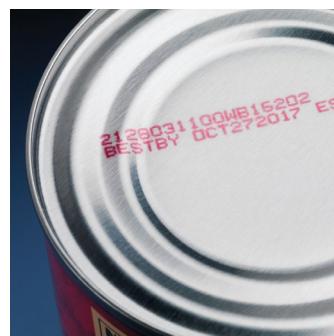


Varying elements of food processing

The commercial sterilization of food is done through various methods including retort, pasteurization, cooking, canning and preserving, to name a few. Foods commonly processed in this manner include seafood, meat and poultry products, fruit, vegetables and beans, soups, sauces and ready-to-eat meals as well as baby and pet foods. Placed in hermetically sealed containers including packages, pouches, small plastic tubs, glass jars and metal cans, food is heated to obtain commercial sterilization at temperatures ranging from 240-270° F (116-132° C). The sterilization process requires a thoughtful balance of different elements. Things to consider include the type of sterilization process used (e.g. dynamic or steam) as well as the requirements for optimal cooking temperatures and duration. Too much heat can decrease the time required for sterilization (and speed up production), but higher temperatures can negatively impact the quality of the final product.

Typical food processing conditions

| Products | Examples | Cook Time | Temperature |
|--------------------------------|------------------------|------------|---------------|
| Liquids | Soup | 20 minutes | 240°F / 116°C |
| Veggies | Corn | 30 minutes | 250°F / 121°C |
| Meat and poultry | Tuna | 40 minutes | 260°F / 127°C |
| Foods intended for hot storage | Highly processed meats | 90 minutes | 270°F / 132°C |





Code durability and thermochromic inks

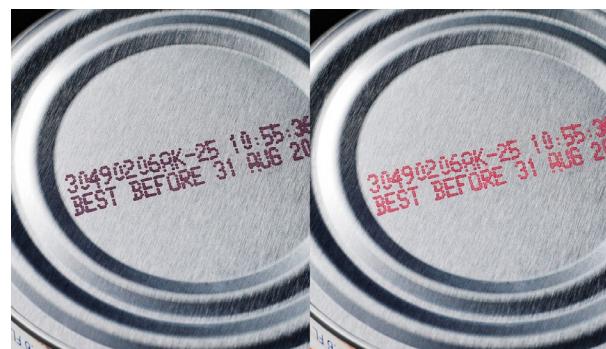
Producers commonly use Continuous Inkjet (CIJ) printers to print date, lot and batch code information onto packaging after food is packaged, but before it enters the sterilization process. It is for this reason that foods processed with high temperatures require durable inks that can endure heat and product movement during processing.

Key for thermochromic inks is water resistance. Water present in many commercial sterilization processes can affect adhesion, as well as smear, blur, distort or make codes illegible. And, because coded products have multiple points of contact with other materials and surfaces – including conveyors and separator sheets between stacked products – thermochromic inks require durability to resist transfer or offsetting.

Colour-changing codes and the importance of code quality

By design, thermochromic inks change colour during heat-based processes. This evident colour change is used as an indicator that the sterilization process was completed successfully.

While only a small contributor to the process, thermochromic inks play an important role in helping to ensure food safety and consumer confidence. At the conclusion of sterilization, these inks alert quality control personnel that the food has been processed per manufacturing specifications and that the food should be safe for sale and consumption. Likewise, consumers use product codes at the point of sale and beyond to determine shelf life for safe storage and timely use of products. It is for these reasons that the selection of an optimal ink for each application is paramount to securing durable, quality codes that producers and consumers alike can trust.



Videojet specialty inks for food sterilization applications

Food producers have come to depend on thermochromic inks as one means of confirming and ensuring product quality. Videojet has performed extensive testing on its thermochromic inks across a range of sterilization parameters to help ensure outstanding performance, durability, and maximised uptime. With high-contrast and colour-changing capabilities, Videojet thermochromic inks not only deliver clean, consistent codes, but they also help make the quality control process easier with improved code visibility and readability. Providing a variety of thermochromic ink options for our continuous inkjet (CIJ) printers, including black-to-blue and black-to-red inks, as well as MEK-free versions, Videojet has a solution for virtually every food sterilization application. For customers requiring non color-changing formulations, we also offer black inks with outstanding transfer resistance and improved heat and moisture performance.

Choosing the right ink

Since there is a multitude of different materials available, Videojet offers a number of different ink formulations in order to achieve excellent performance on a wide variety of material types. Our thermochromic ink offerings include the following:

V4237 – Black, non-colour changing

Ideal for printing onto cans and flexible films. Used when the ink needs to survive the retort process, but no colour change is required.

V4271 – Black to red

Great for printing onto pouches and flexible films. After retort, the ink colour changes from black to red.

V4274 – Black to blue

Well-suited for coding onto cans, glass bottles, and hard plastics. The ink changes colour from black to blue post retort.

V4275 – Black to blue

Designed for can manufacturers, this is the most durable thermochromic ink Videojet offers. The colour changes from black to blue after retort.

V4278 – Black to red

Offers the most discernible colour change after retort. This ink is ideal for printing onto cans and bottles, and changes colour from black to red after retort.



The Bottom Line

Much is at stake for food producers when it comes to code quality and durability. With over 40 years of industry experience, Videojet is a trusted partner that understands variability in food packaging and production. Offering a range of thermochromic and other specialty inks to address your specific application and coding needs, we are ideally suited to help you select and implement an ideal solution for your line. Our commitment to innovation also provides our customers with outstanding code quality and readability to help protect their product and consumers.

Ask your Videojet representative for more guidance, a production line audit, or sample testing on your packaging.

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