

Considerations in Development of Can Coatings Technologies

Importance of Can Coatings to Food Safety

Most consumers do not appreciate the critical role that canned food and beverage products play in ensuring food safety and nutrition for themselves and their families. Metal packaging enables high temperature sterilization of food products when initially packaged, which is critical in maintaining the sterility of the food product. Can coatings are applied to eliminate interactions between the metal package and the food contents, which prevents perforation defects in the can that would allow bacteria and microorganisms to enter. By maintaining the integrity of the can, the coatings protect against food poisoning caused by microbiological contamination.

Current Can Coating Technologies

Think about the wide variety of food items available in metal packaging today. For each of those food items, a variety of factors must be assessed in determining the right coating material for the metal package. The chart below illustrates how various coating technologies compare in terms of key performance and safety characteristics:

	Extent of study	Corrosion Resistance	Fabrication	Application	Environment ally Responsible	Universality	Organoleptic Properties	Compatibility with package	Total Score
Epoxy	3	3	2	3	3	3	3	3	23
Vinyl	2	2	3	3	2	2	3	1	18
Acrylic	1	3	1	3	3	1	2	2	16
Polyester	1	1	3	2	1	1	2	2	13
Oleoresin	1	2	3	1	2	2	1	1	13

Epoxy resins with bisphenol A (BPA) have been used safely in metal food packaging for decades. They have been deemed safe by regulatory agencies around the world. Epoxy resins offer superior performance in a number of critical coating performance characteristics, including corrosion resistance, application, and minimal environmental impact. They are resistant to the wide range of chemistries found in food and beverage products, so they can be used in a wide variety of applications. According to the U.S. Food and Drug Administration (FDA), there has not been an incidence of food-borne illness resulting from a failure of metal packaging in more than 30 years, which is the same amount of time that epoxy resin coatings have been used.

The North American Metal Packaging Alliance, Inc. is an organization whose objectives are to support risk-based regulations in North America; influence regulation in other geographies, provide customers with needed information regarding well-founded technologies, and advocate risk-based decision-making in technology decisions.



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There are can coatings not formulated with epoxy resin currently used in metal food and beverage packaging. These alternative coatings, however, do not share the same performance characteristics as coatings formulated with epoxy resin. As a result, they are not able to serve as functional replacements for the wide variety of products and processes for which epoxy coatings have been developed. At the present time, there is no readily available, suitable alternative to BPA-based can coatings that meets the essential safety and performance requirements for the broadest spectrum of foods now packaged in metal containers.

Among the most publicized non-BPA coatings are baked-on oleoresinous enamel and polyethylene terephthalate (PET) laminate technology. Currently used only for non-aggressive food products, such as dried beans, baked-on oleoresinous enamel is a limited use coating technology, not viable for other food or beverage items. Though often cited as the BPA alternative of choice in the media, the fact is that baked-on oleoresinous enamel represents only a small fraction of the overall canned vegetable market because of its limited performance. PET laminate technology involves the application of PET plastic inside the metal container. It is used in Japan, primarily for hot beverage containers sold in vending machines. About 40% of the food can market in Japan uses the PET laminate technology, but a significant portion of that 40% still requires the use of an epoxy coating with BPA as an adhesive to affix the laminate to the metal. In fact, most container specifications typically incorporate a combination of coatings and nearly all specifications utilize an epoxy resin material in some capacity.

Development of New Can Coating Technologies

As part of the next generation of coatings, new materials and innovative processes, including both epoxy and non-epoxy coatings, are being developed and tested. As noted above, many factors are involved in selecting the coatings used in the development of a can/end specification, including food type, sterilization process used, metal substrate, and performance characteristics. But the most important factor is the ability of that coating to protect the food content and to provide the highest level of safety available. Protection of food safety cannot be jeopardized in attempts to find alternative processes for metal packaged foods.

There currently are more than 15,000 container specifications in North America that cover the vast array of food products packaged. Developing new or modifying existing specifications is not a simple task. New specifications, even those employing existing materials and technologies, are still subject to exhaustive efficacy testing to ensure performance, safety, and product compatibility requirements are met. There is, for example, only one definitive method for testing shelf-life of a canned food product, and that is to put it in a can and store it on a shelf. If consumers want canned food products that will last for two years or more, testing for that time period is needed to ensure quality, nutritional value, and flavor are maintained.



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Based on current manufacturing processes and regulatory requirements, the average length of time needed for a new metal packaging specification, from coating development (1-3+ years), through application trials and testing (2-3 years), to commercialization (0.2-2 years), is four to seven years.

Metal packaging manufacturers are committed to providing safe, nutritious food to consumers. We will not compromise the safety of our products in any way by bringing to market an alternative material that has not been thoroughly reviewed, tested, and approved to meet all performance and federal regulatory requirements. While this process, from initiation to conclusion, may be lengthy, it is critically important to ensure the health and safety of consumers.