



Best Practices in Glass Recycling

Container Coatings and Glass Recycling

Material: Recycled Glass

Issue: *One of the marketing advantages the glass container industry uses to sell its product is the perception by consumers that glass is a higher quality package than plastic. With glass's perceived quality and beauty, however, come several characteristics that are viewed as negatives by bottlers, retailers, and the public: weight, breakability, and limited colors. Over the past two decades, glass container coatings have been under development to address these limitations. The coatings are only now reaching the point of economic and technical viability.*

Best Practice: Several projects have been conducted by the glass industry to develop practical ways to use thin coatings to enhance the characteristics of glass containers. Today's polymer coatings are photocurable and do not require solvents. Cured coatings are clear, thin, and durable. The process is simple, reliable, low in cost, and has high deposition efficiency. The strength enhancement mechanism is efficient in film thickness from 3 to 15 μ m, with a uniform 5 μ m film being targeted as the standard by an international collaboration of glass industry stakeholders. Coatings are available in an increasing number of colors, with chemistries ranging from alkyd to epoxy to solvent base. Container glass coatings offer the following potential advantages:

Weight With the extra cushioning of a thin polymer coating, glass containers retain their aesthetics but the glass wall can be made thinner, making the container lighter in weight. The lighter weight means that food producers ship more product and less package per ton.

Breakability All facilities that process food into glass containers, ship glass containers, or retail food in glass containers, experience breakage regularly that is both a mess and a safety hazard. Glass containers that bang into each other during filling, shipment, or in retail stores have greater resilience with coatings. Glass always fractures at a defect or scratch. Coatings inhibit the formation of stress concentrators that would normally result from handling wear and tear. Coated bottles may withstand internal pressure loads 30% to 100% greater than uncoated bottles.

Processability Uncoated glass containers have been sprayed for years by container manufacturers with a final wash that improves the surface lubricity and allows glass containers to move more easily through high-speed bottling equipment. With coated bottles the lubricity can be "tuned" to the specific bottling equipment. Results of work performed at American Glass Research (AGR International) have shown that coatings reduce the stress of containers sliding against each other. The coatings reduce the coefficient of friction sufficiently to protect the containers without reaching the point where the bottle is too slippery for handling or label application is inhibited. The lower mass, and therefore lower inertia, of the containers means the containers move more easily and with less energy through material handling systems.

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Color The container industry has standardized on three colors of glass: clear, amber, and green, with some blue and variations among the colors. Coated containers can all be made with clear glass and coated to any color with no loss of glass's aesthetics. This means less process changeovers for container manufacturers and only one base color for recyclers.

Recycling Recyclers would welcome having only clear glass to sort from the recycling stream. The coatings are designed for single trip containers, which are recyclable from container to cullet to container. The coatings are environmentally friendly (they are organic and contain no solvents) and can be reprocessed in any glass tank because organic burn-off occurs before reaching glass melting temperatures.

Implementation: The application system to apply the coating is modular, designed to be integrated into existing glass plants. In the coating process, which is sometimes similar to the printing process, the coating is deposited from a transfer substrate on to the container. Coatings may also be applied using spray and waterfall techniques. Technologies for coating glass containers are being marketed to container manufacturers in both the United States and Europe. As with most new technologies, the most difficult decision is whether and when to make the capital investment in the new process. Some early adopters have already modified their plants to apply coatings on an as-needed basis.

Benefits: The physical performance benefits of coatings are clear in allowing glass containers to flow through production lines with reduced friction, limiting abrasions and scratches which reduce container strength. Container coatings may be important in maintaining or increasing the market share of glass containers, thereby making recycled glass a consistent recyclable stream.

Application Sites Glass container manufacturing plants

Contact: For more information about this Best Practice, contact CWC, (206) 443-7746, e-mail info@cw.org.

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