

Sealing Ingeo™ Thermoformed Containers with Ingeo Shrink Bands and Ingeo Preforms



Shrinkable Ingeo bands and preforms have been recently developed and are now finding their way into the market place. They have a high degree of shrinkage at a relatively low shrink temperature. Ingeo shrink bands and preforms are the most desirable method for securing Ingeo containers. Only an Ingeo shrink band has the correct shrink temperature profile to work worry free with an amorphous Ingeo container. However, there are circumstances when due to band or preform availability or price, a PVC band is preferred over an Ingeo band. In these cases, it may be possible to use a PVC band provided the packer is aware of the differences in the materials. NatureWorks LLC has published a fact sheet titled Sealing Ingeo Thermoformed Containers with PVC Shrink Bands. This bulletin is available from NatureWorks LLC.

Since the band and the container are both made from Ingeo biopolymer, there is little worry that container failure will occur before the band or perform will shrink effectively over the container. The only precaution necessary is that the shrink tunnel temperatures required for processing are lower for Ingeo compared to a PVC band. Therefore, it is necessary to reduce the oven temperatures enough in advance to allow the thermal mass of the oven to cool off to the specified temperature. Failure to do so will result in excessive shrinking of the Ingeo perform and possible deformation of the thermoformed container. Specific recommendations on oven temperatures, belt speeds and oven configurations are impossible to list here due to the large number of designs used in the industry. However, the following is a list of guidelines that one should follow in order to maximize the chances of success when using an Ingeo band with an Ingeo container.

Band Selection

1. Use the thinnest gauge band possible as a thinner band will heat up faster than a thick band.
2. If your shrink band supplier offers bands with different percentages of shrink rates, choose the band with the highest shrinkage as this is an indication of higher residual stresses and the lowest possible shrink temperature.

Oven Settings

1. Use the lowest oven temperature possible to achieve shrinkage of the band. Because there are a large number of heat tunnels and designs it is difficult to set a recommended temperature setting for shrink bands and preforms. For the widely used tunnels known as Overwrap Tunnels it has been found that a tunnel setting of 280°F (138°C) and a tunnel dwell time of 3.5 to 4 second works to shrink Ingeo bands and preforms.
2. Direct any blowers or air nozzles in the oven directly at the shrink band to increase convective heat transfer to the band.
3. Minimize heat on the conveyor belt or better yet, cool the belt during its return to the oven entrance.

Container Selection

1. Use containers with the lowest possible level of residual stresses in the part.
2. Use containers that have the thinnest section at least 10 times thicker than the thickness of the shrink band.
3. If one area of a container deforms at the lowest possible oven temperature for the PVC band to shrink, identify that area and work with the container supplier to reduce the residual stresses in that area or increase the wall thickness in that area.
4. If the bottom of the container is deforming, consider cooling the belt while it travels back to the oven entrance. Alternatively, consider placing insulating pads under the container to raise them off a metal belt. Also consider replacing a metal roller or metal mesh belt with a nylon mesh or similar type belt.

While NatureWorks LLC recommends using Ingeo shrink bands for Ingeo containers, in some cases, it is possible to use a PVC shrink band if the above precautions are taken. Please review NatureWorks LLC fact sheet Sealing Ingeo Thermoformed Containers with PVC Shrink Bands.

It is recommended that care be used in storage of Ingeo shrink bands and preforms. Do not store where temperatures are over 85°F [35°C], DO NOT STORE OR EXPOSE TO SUNLIGHT. Do not stack on pallets more than three high and do not

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stack pallets more than two high. Be sure that the supplier supplies the Ingeo bands or preforms in cartons which are lined with a polybag which is tied closed. The carton should be H taped.

Request that your supplier does not be ship close to a weekend or holiday where the shipment could sit in a trailer in the sun and over heat. A refrigerated trailer is recommended. In areas where temperatures are moderate, an insulated trail or a refrigerated trailer without the cooler running could be used. It is recommended that a refrigerated unit which has had meat shipped in it not be used as the odor from the meat can be picked up in the carton and product.

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Safety and Handling Considerations

Material Safety Data (MSD) sheets for Ingeo biopolymers are available from NatureWorks LLC. MSD sheets are provided to help customers satisfy their own handling, safety, and disposal needs, and those that may be required by locally applicable health and safety regulations, such as OSHA (U.S.A.), MAK (Germany), or WHMIS (Canada). MSD sheets are updated regularly; therefore, please request and review the most current MSD sheets before handling or using any product.

The following comments apply only to Ingeo biopolymers; additives and processing aids used in fabrication and other materials used in finishing steps have their own safe-use profile and must be investigated separately.

Hazards and Handling Precautions

Ingeo biopolymers have a very low degree of toxicity and, under normal conditions of use, should pose no unusual problems from incidental ingestion, or eye and skin contact. However, caution is advised when handling, storing, using, or disposing of these resins, and good housekeeping and controlling of dusts are necessary for safe handling of product. Workers should be protected from the possibility of contact with molten resin during fabrication. Handling and fabrication of resins can result in the generation of vapors and dusts that may cause irritation to eyes and the upper respiratory tract. In dusty atmospheres, use an approved dust respirator. Pellets or beads may present a slipping hazard. Good general ventilation of the polymer processing area is recommended. At temperatures exceeding the polymer melt temperature (typically 170°C), polymer can release fumes, which may contain fragments of the polymer, creating a potential to irritate eyes and mucous membranes. Good general ventilation should be sufficient for most conditions.

Local exhaust ventilation is recommended for melt operations. Use safety glasses if there is a potential for exposure to particles which could cause mechanical injury to the eye. If vapor exposure causes eye discomfort, use a full-face respirator. No other precautions other than clean, body-covering clothing should be needed for handling Ingeo biopolymers. Use gloves with insulation for thermal protection when exposure to the melt is localized.

Combustibility

Ingeo biopolymers will burn. Clear to white smoke is produced when product burns. Toxic fumes are released under conditions of incomplete combustion. Do not permit dust to accumulate. Dust layers can be ignited by spontaneous combustion or other ignition sources. When suspended in air, dust can pose an explosion hazard. Firefighters should wear positive-pressure, self-contained breathing apparatuses and full protective equipment. Water or water fog is the preferred extinguishing medium. Foam, alcohol-resistant foam, carbon dioxide or dry chemicals may also be used. Soak thoroughly with water to cool and prevent re-ignition.

Disposal

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. For unused or uncontaminated material, the preferred options include recycling into the process or sending to an industrial composting facility, if available; otherwise, send to an incinerator or other thermal destruction device. For used or contaminated material, the disposal options remain the same, although additional evaluation is required. (For example, in the U.S.A., see 40 CFR, Part 261, "Identification and Listing of Hazardous Waste.") All disposal methods must be in compliance with Federal, State/Provincial, and local laws and regulations.

Environmental Concerns

Generally speaking, lost pellets are not a problem in the environment except under unusual circumstances when they enter the marine environment. They are benign in terms of their physical environmental impact, but if ingested by waterfowl or aquatic life, they may mechanically cause adverse effects. Spills should be minimized, and they should be cleaned up when they happen. Plastics should not be discarded into the ocean or any other body of water.

Product Stewardship

NatureWorks LLC has a fundamental duty to all those that make and use our products, and for the environment in which we live. This duty is the basis for our Product Stewardship philosophy, by which we assess the health and environmental information on our products and their intended use, then take appropriate steps to protect the environment and the health of our employees and the public.

Customer Notice

NatureWorks LLC encourages its customers and potential users of its products to review their applications for such products from the standpoint of human health and environmental quality. To help ensure our products are not used in ways for which they were not intended or tested, our personnel will assist customers in dealing with ecological and product safety considerations. Your sales representative can arrange the proper contacts. NatureWorks LLC literature, including Material Safety Data sheets, should be consulted prior to the use of the company's products. These are available from your NatureWorks LLC representative.

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15305 Minnetonka Blvd., Minnetonka, MN 55345