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Technical Bulletin: Hot Melt Vinyl Processing

General Information

Hot melt plastisols are used for a variety of products which would include soft bodied fish lures, molds, and novelty/craft items such as figurines. Hot melt plastisols can be manufactured at many different hardnesses (generally in the range of 30-70 S00) and with several different properties, including mar resistance, FDA, clarity and dry feel. Also, plasticizer can be added by the customer to soften the plastisol to achieve a desired hardness. All hot melts will require a minimal amount of stirring prior to use to ensure their uniformity.

All products will require testing to meet your processing requirements. See Product Bulletin PB-1 for products available.

Processing Hot Melts:

Hot melts can be processed with a variety of different equipment. Most common are the melt pot, microwave and convection oven. Also available is injection type equipment which is usually hand made or available through sources listed in the TB-6 supplemental.

When processing, ventilation is very important due to the amount of smoke generally created in the processing procedure. Avoid breathing in this smoke; it is irritating to the eyes, lungs and mucous membranes. The smoke may contain some Hydrogen Chloride gas which is corrosive, especially if some of the vinyl has thermally decomposed (burned).

General:

Hot melts should be heated uniformly with a gentle, even heat preferably in the 350°F range. Also a slow speed stirrer that scrapes the sides and bottom of the container as the hot melt is melting is desirable. At full melt the hot melt material will appear clear and colorless. As it is heated higher in temperature the viscosity (flow) will go from a thick syrup to a very fluid pourable liquid. Caution should be taken not to get too high in temperature (greater than 360°F) because the material could begin to scorch and discolor. After it is brought to full melt the temperature can usually be decreased to 315°-325°F and held for hours before discoloration will begin.

Melt Pots:

Processing in a melt pot is relatively easy. Pour the plastisol into the melt pot and turn on the heater. If a mechanical stir mechanism is attached it should be turned on at the same time. A temperature control is desirable to have on the melt pot; if not available a pyrometer can be used to make sure the temperature doesn't get too high. If no stir mechanism is in the pot stir the material every so often as it is heating. Molds can be poured or injected after the material reaches the low viscosity state. Make sure your molds are warm or the material will not flow into the mold before hardening and you may get voids in your product. Also these materials tend to shrink when cooling so you may see an indented area on the surface where the air hits it. Let the plastisol cool and remove it from the mold.

Microwaves:

Microwaves can be used for processing hot melt plastisols. You must test your microwave for how much power and time is needed, since microwaves vary quite a bit in how they will melt this material. Put a measured amount in a Pyrex measuring cup and heat for about 3 minutes (2/3 Cup in Loes microwave) on high. Take out and stir (some of the liquid should have turned clear). Heat for another 2 minutes, if not clear or low enough in viscosity continue to heat slowly until a clear, low viscosity liquid is achieved. You can then mold product.

** Caution: with the use of microwaves heat transfer takes place rapidly on High/Full power.

Convection Ovens:

Convection ovens can be used to melt the hot melt lure or simply to cure it out in the mold. If melting the product into the hot melt stage it again must be stirred to make sure there will not be any 'hot spots' where the product may burn. If molding product be careful when taking them from the oven because they will be a very tacky liquid which can cause severe burns if you get it poured on to yourself.

Injection Equipment:

Generally, specially modified equipment is necessary to injection mold. These modifications require a tight positive return screw or piston, a liquid tight magazine, and an adequate barrel length for complete fusion. Since fusion occurs along the barrel wall, a long thin diameter barrel heated its entire length is necessary. A pressure of only 25 to 50 pounds is needed to inject a mold. Melt pots can also be attached when barrel length is limited.

Adding colorants, softeners and scents

Colorants:

Colorants can be added to the plastisol at the time of manufacture or at your facility. Adding them at your facility allows you to vary colors and carry many colors if desired. Adding colors is easy and can be done during the hot melt process or before melting. Usually 0.05-2% by weight is sufficient. Some colorants can be transparent, others only opaque. The less colorant you put into the plastisol the more transparent they can be. Dyes can be used in some cases although caution should be taken because most dyes tend to bleed. Make sure you know if bleeding is important before using a dye. A colorant price list is available through Loes Enterprises, Inc. and we can also supply a list of colorant manufactures. Glow powder is also available.

Softeners:

Plasticizers are used in the plastisol to soften the product and can be used to soften the product even more. Adding 1-10% by weight at a time to the mixture to find the softness desired is recommended. Caution should be taken in adding too much plasticizer due to hot melts becoming very tacky when too much plasticizer is added. Refer to the Softening Chart IIB-07 for reference

Scents:

Scents can be added, but with caution. Most scents will be volatile and need to be added at the lowest possible temperature. Scents are available through a variety of sources and if you are interested we can help you find sources.