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GENERAL INSTRUCTIONS FOR "SLUSH" MOLDING PLASTISOLS

DESCRIPTION In "Slush" molding, the top of the mold is open and the mold is filled with plastisol. The mold with plastisol is heated for a pre-determined amount of time and temperature, either in the air oven or a hot liquid bath to "gel" a quantity of plastisol on the mold surface. Excess plastisol is drained and the mold is re-used. Such items as vinyl doll parts, seamless vinyl boots, chopper mitts, etc., are made using this process.

INSTRUCTIONS FOR SLUSH MOLDING PLASTISOL

1. The mold cavity should be coated with a layer of Mold Release such as MRV-1000 IPA for the greatest ease in release. Follow instructions for MRV-1000 IPA.

2. The mold cavity is filled with plastisol. Usually the mold has a 1" - 2" additional space above the actual finished part to avoid spillage during processing of the plastisol. The excess coating or flash is trimmed from the part at a later time.

3. The filled mold is then heated using an oven or liquid bath of hot oil. Thin wall molds are desirable for good heat transfer. The thickness of the coating depends on the temperature at which the mold is heated, the specific heat of the heating media, the duration of time heated, and the type of plastisol. In an oven the top of the mold is covered to stop top gelation.

Temperatures are lower in a liquid gelling bath than when using an oven because the amount of heat that can be transferred is greater. Liquid baths generally use a temperature of 150º F to 250º F; whereas, oven gelling use a temperature of 300º F to 450º F. The time to gel in a liquid bath can vary from an immersion time from one minute to several, again depending on the desired thickness and type of plastisol. One advantage of an oven is that often the same temperature can be used to cure as to gel with only a variation in the time.

A number of heat transfer liquids are commercially available and sometimes a plasticizer is used in the gel bath. Don't use water as a gelling heat medium or the plastisol to be recycled must be evacuated each cycle because of the moisture absorbed from the humidity and chance dripping of water in the plastisol which also requires extensive evacuation for removal.

4. After gelling a coating on the mold, the excess plastisol is emptied and the mold allowed to drain until the dripping stops (3 to 5 minutes). Plastisol drained from the mold is recycled. Straining is usually necessary to break up soft masses of plastisol. The vinyl buildup produces a surface of evenness, otherwise obtainable only by hot dipping. Upon further analysis, slush molding can be considered to be a form of hot dipping only you gel inside the mandrel instead of outside.

5. The mold, previously with its plastisol coating, is heated to cure as outlined previously. In a liquid cure system, a temperature of 340º F to 380º F is most often used, depending on the part size and time available. The cure time required is in the range of three to eight minutes.

6. The cured plastisol and mold may be air or water cooled. The heat transfer fluid should be water soluble if water cooling is used. Cool until the mold is yet very warm to touch and then the residual heat and air circulation will dry the mold. It is usually desirable to have the mold and part warm, especially if the part is harder than 60 Shore A and/or undercuts are present. Even quite rigid vinyls can have rather large undercuts when the "soft-when-warm" thermo plastic parts are removed warm (about 150º F). Examples of this would be head and bust where the head is extracted through the neck area of a one piece mold. Extraction is accomplished by a combination of pulling and twisting. The collapsed part snaps into shape after extraction. Molds of this type are almost always electroformed (electroplated) copper over a thin layer of chrome or nickel. The master is conveniently sculptured from beeswax of similar material.

Silicone rubber masters can also be made from a rigid sculpturing and rigid vinyl shells cast in them. These vinyl shells can also be electroformed over to make production molds. Electroforming is a favorite method because of the strong, smooth, thin, highly detailed, rapidly produced and durable molds that can be produced. Silicone rubber has poor heat transfer and is useful only in producing a master or protype part. In the auto industry molds for head rests, bucket seats, dashboards, arm rests, etc. are engineered with great detail and expense with exacting precision using electroforming.

7. A second method of slush molding is to fill the mold with a "Cold Dip" type Organisol which will not require an initial gelling of the plastisol on the surface of the mold. The mold is filled with the organisol, allowed to stand 15 seconds to remove any air entrapment and poured back out of the mold and allowed to drain. Cold slushed parts are limited to a range of hardnesses, and are limited to the thickness of coating left on the surface of the mold.

Heating requirements generally are the same as for a slush mold that is pre gelled except that the temperature has to be lowered to prevent blistering, usually a cure temperature of 340º F to 375º F is desirable. Cured parts may be air or water cooled.

Both methods of slushing plastisols are applicable for permanently coating metal container when used with PA 3011 A Primer Adhesive. The primer is applied to the container and allowed to dry (air or heat, see PA 3011 A instructions). The plastisol or organisol is then poured into the container as directed. The plastisol gives a good scuff resistant water and chemically resistant coating.

8. Another coating method, similar to the cold slush, where the mold is filled and dumped, is when the cold dip type material is measured in to yield a given weight part. This plastisol is then dispersed by hand shaking and and rotocasting by hand in a "jerky" manner until all surfaces are covered. Such a method has been referred to as "jerk" molding, and is applicable primarily to hand processing.