Perry Fiberglass Products, Inc.

LEADERS IN FIBERGLASS REINFORCED PLASTIC DUCT PRODUCTS

33660 PIN OAK PKWY, AVON LAKE, OH 44012 PHONE 440-930-7701 FAX 440-930-7717 www.PerryFiberglass.com

GLOSSARY OF TERMS

ABS – Acrylonitrile-Butadiene-Styrene. Acrylonitrile and styrene liquids and butadiene gas are polymerized together in a variety of ratios to produce the family of ABS resins.

Accelerator – A highly active oxidizing material suspended in a liquid carrier used in conjunction with a catalyst to produce internal heat in a liquid plastic to cure it. Examples are diethylaniline, dimethylaniline, cobalt naphthanate and cobalt octoate.

Acetone – A cleaning fluid used to remove uncured plastic resin from brushes and clothing.

Activator – See *Accelerator.*

Air-inhibited Resin – A resin in which surface cure will be inhibited or stopped by the presence of air.

"B" Stage (of Resin) – The condition of a partially cured resin polymer when it is only partially soluble in monomer or acetone but still plastic and still heat fusible.

BMC – Bulk Molding Compound. A combination of resin paste and chopped glass combined under conditions of very high mechanical stress "working" with a sigma blade mixer. The compound is delivered to the press in the form of a ball, a slab or an extruded log and dropped into the bottom of a steel tool; the material is flowed outward until it assumes the shape of the tool.

Catalyst – A substance which markedly speeds up the cure of a compound. Catalyst content can vary from 0.2% to 2.0% with higher catalyst levels giving faster gel times. Examples are methyl ethyl ketone peroxide, benzoyl peroxide.

Cavity – The space between matched molds (pressure molds) in which the laminate is formed. Also a term for a female mold.

Cold Molding – An economical press molding process for manufacturing intermediate volume products (200 to 8,000), using low pressure, room temperature cure and plastic molds.

Color Pigments – Ground coloring materials supported in a thick liquid. Added to the resin, they give it color.

Comoform Cold Molded Thermoforming – An extension of the cold molding process which utilizes a thermoformed plastic skin to impart excellent surface and weatherability to a cold press laminate.

Crazing – Hairline cracks either within or on the surface of a laminate, caused by stresses generated during cure, removal from mold, impact or flexing.

Crosslinking – The setting up of chemical links between molecule chains. This occurs in all thermosetting resins. Styrene monomer is a crosslinking agent in polyester resins.

Cure – The crosslinking or total polymerization of the molecules of the resin which alters the properties of the material and changes it from a liquid into a solid.

Cure Time – The time required for the liquid resin to reach a cured or fully polymerized state after the catalyst has been added.

Delamination – Failure of internal bonding between layers of the laminate.

Dimensional Stability – Ability to retain constant shape and size.

Draft – The degree of taper tolerated on the sides of a mold to allow the piece to be removed.

Duplication Mold – A mold made by casting over or duplicating another article.

End – As applied to fibrous reinforcements, a bundle of essentially parallel (i.e., entwined) fibers (usually glass).

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Exotherm Curve – A graph of temperature plotted against time during the curing cycle. Peak exotherm is the point of highest temperature of a resin during cure.

Exothermic Heat – Heat given off during a polymerization reaction by the chemical ingredients as they react and the resin cures.

Filament – A single, hairlike particle or fiber of glass characterized by extreme length which permits its use in yarn with little or no twist and usually without the spinning operation required.

Fill or Sanding Resin – A general purpose polyester resin used to soak and fill reinforcing material in the initial lay-up of a surfacing application; usually contains wax.

Fillers – Any one of a number of inexpensive substances which are added to plastic resins to extend volume, improve properties and lower the cost of the article being produced.

Fire Retardancy – The tendancy of a resin to resist burning. Achieved by combining a resin with specific chemicals that reduce or eliminate its tendancy to burn.

Foams

Urethane – Polyurethane resins are produced by reacting diisocyanate with organic compounds containing two or more active hydrogens to form polymers having free isocyanate groups. These groups, under the influence of heat or certain catalysts, will react with each other, or with water, glycols, etc., to form thermosetting material.

Flexible – A urethane foam which is adaptable and often used for cushioning in the furniture and automotive industries.

Rigid – A urethane foam with a higher density than flexible urethane foams.

Gel – A partial cure of plastic resins; a semi-solid, jellylike state similar to gelatin in consistency.

Gelcoat – A thin surface coat either colored or clear, of non-reinforced plastic resin. It is occasionally used for decorative purposes but also provides a protective coating for the underlying laminate.

Gel Time – Time required to change a flowable liquid resin into a non-flowing gel.

HDPE – High Density Polyethylene is a thermoplastic material composed by polymers of ethylene. It has relatively high rigidity and can be modified, e.g. with isoprene, to have high impact strength.

Hand Lay-up – The oldest and simplest molding technique in which reinforcing materials and catalyzed resin are laid into or over a mold by hand. These materials are then compressed with a roller to eliminate entrapped air.

Hardener – See *Catalyst.*

Inhibitor – A substance that retards polymerization, thus extending shelf life of a monomer. Also used to influence gel time and exotherm.

Laminate – A material composed of successive layers of resin and fiberglass bonded together.

Lamination – The laying on of layers of glass materials and resin and eventual bonding together of these layers.

Mat – A randomly distributed felt of glass fibers used in reinforced plastics.

Mold Cavity – See *Cavity.*

Mold Coat – A coat of resin over the bare mold. Used to seal the mold and make a smooth surface on which to mold parts. This is often referred to as a tooling gel coat.

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Mold Release – A substance used to coat the mold to prevent the molded laminate from sticking to the mold, thus facilitating the removal of a part from the mold. Examples: PUA, Wax, ZELAC (internal).

Molding – The forming of glass materials and resin by various means such as contact, pressure, matched die and continuous laminating into a given shape over a mold but holding that shape by the mold until the resin cures.

Monomer – The simple molecule capable of polymerizing.

Non-air-inhibited Resin – A resin in which the surface cure will not be inhibited or stopped by the presence of air. A surfacing agent has been added to exclude air from the surface of the resin.

Orthophthalic Resin – A polyester resin using phthalic anhydride as the starting point. Higher percentage of phthalic anhydride a less reactive resin.

PE – Polyethylene. A thermoplastic material composed by polymers of ethylene. It is normally a translucent, tough, waxy solid which is unaffected by water or by a large range of chemicals.

PVC – Polyvinyl Chloride. A thermoplastic material composed of copolymers of vinyl chloride. A colorless solid resistant to water, concentrated acids and alkalies.

Polyester Resin – A term generally used for unsaturated polyesters. Formed by the reaction of dibasic organic acid and polyhydric alcohol to form a series of ester linkages.

Polymer – The end product, usually a solid, produced from monomers.

Porosity – The formation of undesirable clusters of air bubbles in the surface or body of the laminate.

Pot Life – The length of time that a catalyzed resin remains workable.

Preform Fiber – Glass formed over a screen shaped like the mold in which the preform will be used, it eliminates the need for overlapping or mitering the corners in molding. Used primarily to form deep draws or complex parts.

Prepreg – Glass roving or cloth loaded with B-stage resin, catalyst, and pigment ready for placement in the mold.

Promoter – See *Accelerator.*

Release Agent – A lubricant, often wax, used to prevent the adhesion of the molded part to the mold. An internal lubricant such as zinc stearate is used in high temperature molding to obtain release where wax would melt or be absorbed.

Resin – A liquid plastic substance used as a matrix for glass fibers. It is cured by crosslinking.

Roving – Continuous strands of glass fibers which are grouped together and wound on a tube like untwisted yarn.

SMC – Sheet Molding Compound. An integrated ready-to-mold fiberglass reinforced polyester material. The compound is composed of a filled thermosetting resin and a chopped or continuous strand reinforcement. The primary use is in matched die molding.

Shelf Life – The length of time an uncatalyzed resin maintains specified working properties while stored in a tightly sealed opaque container.

Size – The treatment applied to the glass fiber to allow the plastic resins to flow freely around and adhere to them.

Spray-up – Covers a number of techniques in which a spray gun is used to simultaneously deposit fiberglass and catalyzed resin on a mold.

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Staple Fiber – A glass fiber of short length formed by blowing molten glass through holes.

Styrene Monomer – A water-thin liquid monomer used to thin polyester resins and act as the crosslinking agent.

Substrate – Any material which provides a support surface for other materials.

Tack – Stickiness of an adhesive measurable as the force required to separate an adherent from it by viscous or plastic flow of the adhesive.

Thermoplastic – A classification of resin that can be readily softened and reformed by heating and be re-hardened by cooling. Typical of the thermoplastic family are the styrene polymers and copolymers, acrylics, cellulose, polyethylenes, vinyls and the various fluorocarbon materials.

Thermoset – A material that will undergo or has undergone a chemical reaction caused by heat, catalyst, ultraviolet light, etc., leading to the formation of a solid. Once it becomes a solid, it cannot be reformed.

Thickeners – Material added to plastic resin to thicken or raise the viscosity index of the resin so that it will not flow as readily.

Thinners – Material added to plastic resin to thin or lower the viscosity index of the resin so that it will flow more readily. They may also be used as crosslinking agents.

Thixotropic – The property of becoming a gel at rest, but liquifying again on agitation.

Undercut – Negative or reverse draft on the mold. Split molds are necessary to shape pieces which are undercut.

Viscosity – A measure of the resistance of a liquid to flow.

Wet-out – The ability of a resin to quickly saturate glass reinforcement.

Yarn – A twisted strand or strands of glass fibers which can be woven, braided, served and processed on conventional textile equipment.