< Back to Articles

Common Plastic Terminology

A

Abrasion Resistance - The ability to withstand the effects of repeated wearing, rubbing, scraping, etc., that tend to remove material from its surface.

Acids - One of a class of substances compounds of hydrogen and one of more other element, capable of uniting with a base to form a salt, and in aqueous solution, turning blue litmus paper red.

Acrylate resins - A class of thermoplastic resins produced by polymerization of acrylic acids derivatives.

Actuation - To put into mechanical action or motion.

Additives - A diverse group of specialty chemicals incorporated into plastic formulations before or during processing, or to the surface of finished products after processing. their primary purpose is to modify the behavior of plastic during processing or to impart useful properties to fabricate plastic articles.

Adhesive - A substance capable of holding two or more materials or objects together by surface attachment.

Aesthetics - The sum total of the visual response to the beauty of an object. Elements of aesthetics may include color, shape, or other particular features of the object.

Aging - The effect of exposing plastic to a specific environment for an extended period of time.

Alkalies - Compounds capable of neutralizing acids and usually characterized by an acrid taste. Can be mild like baking soda or highly caustic like lye.

Aliphatic - Derived from or related to fats and other derivatives of the paraffin hydrocarbons, including unsaturated compounds of the ethylene and acetylene series.

Alkyd resins - A class of resins produced by condensation of a polybasic acid or anhydride and a polyhydric alcohol.

Allyl resins - A class of resins produced from an ester or other derivative of allyl alcohol by polymerization.

Amine - Any of A class of organic compounds derived from ammonia by replacement of hydrogen with one or more alkyl groups.

Amorphous - Latin meaning without form. Non-crystalline structure.

Anneal - A procedure for preventing or removing stresses within a material through the use of controlled heating and subsequent cooling of the material.

Antioxidant - Substance which prevents or slows down oxidation of material exposed to air.

Antistatic agent - A chemical substance applied to the surface of a plastic article or incorporated in the plastic from which the article is made. The antistatic agent renders the surface of the plastic article less susceptible to the accumulation of electrostatic charges which attract and hold fine dirt or dust on the surface of the plastic article.

Aromatic - A large class of cyclic organic compounds derived from, or characterized by the presence of the benzene ring and its homologs.

B

Base - The material woven (such as paper, woven cotton, fabric, or glass fiber mat, felted asbestos, aramid fibers, graphite, and nylon fabrics) in the form of sheets or rolls which can be impregnated with resin to form laminated plastics.

Baffle - A device used to restrict or divert the passage of fluid through a pipe line or in a tank.

Benzene ring - The basic structure of benzene, the most important aromatic chemical. It is an unsaturated, resonant 6- carbon ring having three double bonds. One or more of the hydrogen atoms of benzene may be replaced by other atoms or groups.

Bisphenol-A (4,4'-isopropylidenediphenol) - An intermediate used in the production of epoxy, polycarbonate and phenolic resins. The name was coined after the condensation reaction by which it may be formed - two(bis) molecules of phenol with one of acetone (A).

Blisters - Undesirable rounded elevation of the surface of a plastic, whose boundaries may be either more or less sharply defined, somewhat resembling in shape a blister on the human skin. A blister may burst and become flat.

Blow molding - A process for the production of hollow thermoplastic shapes. This method of fabricating involves a plastic parison (hollow tube) placed between two halves of a mold (cavity) and by using air pressure the parison is forced to take the shape of the cavity. The air pressure is introduced through the inside of the parison. The air pressure forces the plastic against the surface of the mold that defines the shape of the container.

means of an adhesive.

British thermal unit (BTU) - The quantity of heat required to raise the temperature of one pound of water 1°F from 58.5°F to 59.5°F (its point of maximum density).

Burst strength - The hydraulic pressure required to cause a pipe, fitting, or vessel to fail. This value is typically dependent on the rate at which the pressure is applied as well as the pressure duration.

Buttress Thread - A type of threading in which the thread sides terminate abruptly in threading gradually tapering down to the neck finish. Designed to withstand maximum force in one direction only. Cross section of thread is triangular.

C

Calendaring - A process by which a heated rubber plastic product is squeezed between heavy rollers into thin sheet or film.

Capacity - 1) The amount of space provided inside a container far a given amount of product. 2) The total amount of volume inside the container. The latter is more correctly called the overflow capacity.

Cast - 1) To form a "plastic" object by pouring a fluid monomer-polymer solution into an open mold where it finishes polymerizing. 2) Forming plastic film and sheet by pouring the liquid resin onto a moving belt or by precipitation in a chemical bath.

Cast resin - A resinous product prepared by pouring liquid resins into a mold and heat treating the mass to harden it.

Catalysis - The acceleration (or retardation) of a chemical reaction by the presence of a comparatively small amount of a foreign substance called a catalyst.

Cellulose - Inert substance, chemically a carbohydrate, which is the chief component of the solid structure of plants, wood, cotton, linen, etc.

Cellulose Acetate - A class of resins made from a cellulose base, either cotton linters or purified wood pulp, by the action of acetic anhydride and acetic acid.

Cement - A dispersion of "solution" of unvulcanized rubber or a plastic in a volatile solvent. This meaning is peculiar to the plastic and rubber industries and may or may not be an adhesive composition.

Chemical Resistance - The degree to which a given plastic will resist degradation due to contact with certain chemicals. This characteristic will usually vary with chemical concentration and temperature.

Clarity - Freedom from haze or cloudiness in a plastic material.

Closure - A devise used to seal off the opening of the bottle to prevent the loss of its contents.

Coefficient of Friction - Static: the ration of the limiting friction developed to the corresponding normal pressure, if two surfaces move relative to each other.

Coefficient of Thermal Expansion - The unit of change in dimensions of a material for a unit change

Co-extrusion - Involves the extrusion process where two or more layers of different material are extruded together to form the wall of the tubing or item being formed.

Cold Flow - Change in dimensions or shape of some materials when subjected to external weight or pressure at room temperature.

Composite - 1) A structure or an entity made up of distinct components. 2) A complex material, such as fiberglass, in which two or more distinct, structurally complementary substances, especially glasses and polymers, combine to produce structural or functional properties not present in any individual components. 3) Reinforced laminates (i.e., canvas phenolic, glass epoxy, etc.).

Compound - A combination of ingredients before being processed or made not a finished product. Sometimes used as a synonym for material, formulation.

Compression Set - Unrecoverable deformation (strain) that remains in a material after compressive loading has been removed.

Compressive Strength - Crushing a load at failure divided by the original sectional area of the specimen.

Conductivity - The reciprocal of volume resistivity. It is the conductance of a unit cube of any material.

Copolymer - The product of simultaneous polymerization of two or more polymerizeable chemicals, commonly known as monomers.

Corrosion - Chemical action which causes destruction of the surface of a material by oxidation or chemical combination. Also, caused by reduction of the electrical efficiency between metal and the continuous substance or to the disintegrating effects of strong electrical currents or ground return currents in electrical systems. The latter is known as electrolytic corrosion.

Crazing - Fine cracks at or under the surface of a plastic.

Creep - The unit elongation of a particular dimension under load for a specific time following the initial elastic elongation caused by load application. It is expressed usually in inches per inch per unit of time.

Cross-linking - The setting up of chemical valence links between molecular chains of polymer molecules, leading to the formation of a three-dimensional network of polymer chains which is infusible and insoluble. This usually reduces the thermoplasticity of the material.

Crystallinity - A molecular structure resulting from the formation of solid crystals with a geometric pattern.

Cure - To change the physical, chemical, or electrical properties of a material by chemical reaction, by the action of heat and catalysts alone or in combination, with or without pressure. Specifically to convert low molecular weight polymer or resin to an insoluble infusible state.

D

ıture - The temperature at which a plastic structure will deflect a specific distance

Delamination - The separation of a laminate along the planes of its layers. Also, the separation of banded insulation within the adhesive layer or at the adhesive interface.

Deflashing - Any technique or method of removing excess unwanted from a molded article. Specifically, the excess material is removed from places on the article where parting lines of the mold that formed the article may have caused the excess material to be formed.

Degradation - A deleterious change in the chemical composition, appearance, physical or mechanical properties of a plastic.

Density - The mass per unit volume of a substance. For solids and liquids, typically, temperature would also be provided with density. For gasses, both temperature and pressure should be given with the density.

Dimensional Stability - The ability of a part to retain its size and proportion over time.

Durometer - A numerical scale for measuring the hardness of rubber or plastic based on the depth of penetration of an indenter point on the surface of a test specimen.

Dielectric - 1) Any insulating medium which intervenes between two conduits and permits electrostatic attraction or repulsion to take place across it. 2) A material having the property that energy required to establish an electric field is recoverable in whole or in part, as electric energy.

Dielectric Constant (permittivity of specific Inductive Capacity) - The specific conductive capacity of a dielectric. That property of a dielectric which determines the electrostatic energy stored per unit volume for unit potential gradient.

Dielectric Strength - The voltage which an insulating material can withstand before breakdown occurs, usually expressed as a voltage gradient (such as volts per mil).

Dimensional Stability - Ability to retain precise shape and size.

Dissipation - Unusable or lost energy, as the production and size.

Dissipation Factor (loss tangent, tans, approximate) - The tangent of the loss angle of the insulating material.

Drop Test - Any method in which the article being tested is dropped in a specific manner for a specific number or times or until the article fails from impact.

Discoloration - Any change from the original color. Discoloration is often caused by overheating, light exposure, irradiation, or chemical attack.

E

Elasticity - The property that describes the tendency of a plastic material to return to its original dimensions after undergoing a deformation.

Elastomer - A material that exhibits almost complete recovery to its original size after undergoing dramatic strain levels (as high as 100% and sometimes more).

actional increase in length of a material stressed in tension.

Electrical properties - Primarily the resistance of a plastic to the passage of electricity e.g. dielectric strength.

Embossing - Techniques used to create depressions of a specific pattern in plastic film and sheeting.

Emulsion - A dispersion of one liquid in another possible only when they are mutually insoluble.

Environmental stress cracking - The tendency of a material to craze or crack due to the combination of residual or applied stress in the material, and chemical, thermal, or electromagnetic environments.

Epoxy resin - Straight-chain thermosetting resins containing at least one three-membered ring consisting of two carbon atoms and one oxygen atom.

Ester - A compound formed by the elimination of waste during the reaction between an alcohol and an acid; many esters are liquids. They are frequently used as plasticizer in rubber and plastic compounds.

Extrusion - The method of processing plastic by forcing heat softened plastic through an opening of the desired shape of the cross-section of the finished product.

Extender - A material added to a plastic composition to reduce its cost.

F

Fabricate - Method of forming a plastic into a finished article by machining, drawing, and similar operations.

Fiber - A thread or threadlike structure such as cellulose, wool, silk, or glass yarn.

Filler - A material added to a plastic composition to impart certain qualities in the finished article.

Fill point - The level to which a container must be filled to furnish a designated quantity of the contents.

Finish - The plastic forming the opening of a container and shaped to accommodate a specific closure.

Fitment - A device used as part of a closure assembly to accomplish a certain purpose such as, dropper, sprinkler, powder shakers, etc.

Flame treating - A method of rendering inert thermoplastic objects receptive to inks, lacquers, paints, adhesives, etc. The object is bathed in an open flame to promote oxidation of the surface of the article.

Flange - A rib or rim for strength, for guiding, or for attachment to pipe.

Flash - The extra plastic attached to a molding along the parting line. The flash must be removed before the parts can be considered literally finished.

Flash Point - The lowest temperature at which a flammable liquid will produce a combustible vapor that will burn in the presence of a flame, under certain prescribed conditions of test.

A measure of the strain imposed in the outermost fibers of a bent specimen.

Flexural Strength - The outer fiber stress, which must be attained in order to produce a given deformation under a beam load.

Fluorination - Is an extra process in which a thermoplastic article (container or closure) is exposed to fluorine gas. The fluorine substitutes with some hydrogen atoms in the polymer chain creating a barrier and surface enhancement. Benefits include improved barrier properties and reduced solvent absorption and permeation.

Forming Temperature - The temperature to which a plastic must be heated in order for it to be able to be formed.

Full Port Valve - A valve in which the resistance to flow, in the fully open position, is comparable to the equivalent length of pipe.

Fuse - To join two plastic parts by softening the material by heat or solvents.

G

Gasket - A device installed within the gap of a joint for the purpose of retaining fluid.

Gloss - The shine or luster of the surface of a material.

Gusset - A tuck placed in each side of a tube of blown tubing as produced to provide a convenient square or rectangular package, similar to that of the familiar brown paper bag or sack, in subsequent packaging.

H

Haze - The degree of cloudiness in a plastic material.

Head - A unit of measure representing the relative energy of a flowing fluid. Commonly recorded in feet of fluid, it provides a convenient means of combining the pressure, velocity, and elevation energy portions of a flowing fluid.

Head Loss - Energy loss in a fluid as it passes through a flow passage. The loss is due to friction between fluid particles and can be expressed as a linear change in the height of a column of fluid.

Heat Deflection Temperature (HDT) - Indicates how loaded material deforms at higher temperature. Test bars are placed in a heating bath, resting horizontally on two supports. A constant load is applied in the center of the specimen and the bath temperature is raised at a constant rate. The temperature of the bath at which the flexural deflection of the loading point has reached a predefined level is the heat deflection temperature of the material.

Heat Loss - Power dissipated as heat.

Heat sealing - A method of joining plastic films by simultaneous application of heat and pressure to areas in contact. Heat may be supplied conductively or dielectrically.

Homopolymers - A polymer that consists of only one monomer unit; their properties can be regulated ribution and the degree of isotacticity (stereoregular structure).

Hoop Stress - The circumferential stress imposed on a cylindrical wall by internal pressure loading.

Hot Gas Welding - A technique for joining thermoplastic materials (usually sheet) whereby the materials are softened by a jet of hot air from a welding torch, and joining together at the softened points. Generally thin rod if the same material is used to fill and consolidate the gap.

Hot Stamp - Process for marking plastic by applying a leaf to the surface through the use of hot metal dies.

Hydrocarbon - An organic compound that consists exclusively of the elements carbon and hydrogen. Generally, the term hydrocarbon is used for the chemicals that are derived from natural gas, oil, and coal.

Hygroscopic - Tending to absorb moisture.

I

Impact Strength - The degree to which a plastic will withstand the sudden application of a load.

Impact Resistance - Relative susceptibility of material to fracture by stress at high speeds.

Impregnate - 1) To fill the voids and interstices of material with a compound (this does not imply complete fill or complete coating of the surfaces by a hole free film. 2) The process of thoroughly soaking a material of an open or porous nature with a resin.

Impermeable - Describes a material that prevents the passage of a substance into or through it.

Impulse Sealing - A heat sealing technique in which a pulse of intense thermal energy is applied to the sealing area for a very short time, followed immediately by cooling. It is usually accomplished using a RF heated metal bar which is cored for water cooling or is of such a mass that it will cool rapidly at ambient temperatures.

Inhibitor - A substance that slows down chemical reactions. Inhibitors are sometimes used in certain types of monomers and resins to prolong storage life.

Injection Molding - Method of forming a plastic to the desired shape by forcing heat softening plastic into a relatively cool cavity where it rapidly solidifies.

Izod Impact Test - A test designed to determine the resistance of a plastic material to shock loading. It involves the notching of a specimen, which is then placed in the jaws of the machine and struck with a weighted pendulum.

L

Laminate - Object composed of two or more sheets or shells of material utilized by means of a bonding agent.

Light Resistance - The ability of a plastic material to withstand exposure to light, usually sunlight to the ultraviolet part of the light spectrum, without change of color or loss of physical and/or chemical

Light Stability - Ability of a plastic to retain its original color and physical properties upon exposure to sun or artificial light.

Light Transmission - The amount of light that a plastic will pass.

Longitudinal Stress - The stress imposed on the long axis of any shape. It can be wither a compressive or tensile stress.

M

Mil - A unit of measurement equal to .001 inch minimum wall - a term designating the minimum thickness of the wall of a bottle.

Modulus of Elasticity - The ratio of applied stress to the associated strain developed within a material that has been elastically deformed.

Moisture Resistance - Ability to resist moisture.

Mold - The cavity or matrix into which the plastic composition is placed and from which it takes it form.

Mold Seam - A vertical line formed at the point of contact of the mold halves. The prominence of the line depends on the accuracy with which the mating mold halves are matched.

Monomer - The simplest repeating structural unit of a polymer; for addition polymers this represents the original unpolymerized compound.

N

Narrow Mouth - A finish of a plastic container in which the diameter is small relative to the diameter of the body.

Neck - The part of a container where the shoulders cross section area decreases to form the finish.

Neck Bead - A protruding circle on a container at the point where the neck meets the finish, the diameter of which usually equals the outside diameter of the closure.

Nonpolar - Having no concentration of electrical charge on a molecular scale, thus, incapable of significant dielectric loss. Examples among resins are polystyrene and polyethylene.

Nontoxic - Not poisonous.

Notch Sensitivity - The extent to which the sensitivity of a material to fracture is increased by the presence of a surface in homogeneity such as a face notch, a sudden change in section, a crack, or a scratch. Low notch sensitivity is usually associated with ductile materials, and high notch sensitivity with brittle materials.

O

Olefin - And unsaturated simple hydrocarbon with one double bond per molecule, such as ethylene or butylene. Olefins are chained into polymers such as polyethylene.

Opaque - A term describing a material or substance which will not transmit light.

Operating Pressure Range - The range of pressures for which the component will perform normally.

Organic Chemical - Originally applied to chemicals derived from living organisms, as distinguished from "inorganic" chemicals found in minerals and inanimate substances; modern chemist define organic chemicals more exactly as those, which contain the element carbon.

O-ring - A ring used as a gasket.

Outgassing - To remove occluded gases by heating.

Overflow capacity - The capacity of a container to the top of the finish of to the point of overflow.

Oxidation - The addition of oxygen to a compound or the reduction of hydrogen.

P

Permeability - The passage of diffusion (or rate of passage) of a gas, vapor, liquid, or solid through a barrier without physically or chemically affecting it.

Phenolic Resin - Resins made by reaction of a phenol compound or tar acid with an aldehyde; more commonly applied to thermosetting resins made from pure phenol.

Plasticizer - A liquid or solid incorporated in natural and synthetic resins and related substances to develop such properties as resiliency, elasticity, and flexibility.

Pneumatic - Moved or worked by air pressure.

Polymer - A product resulting from a chemical change involving the successive addition of a large number of relatively small molecules (monomer) to form the polymer, and whose molecular weight is usually a multiple of that of the original substance.

Polymerization - Chemical change resulting in the formation of a new compound whose molecular weight is usually a multiple of that of the original substance.

Porosity - Presence of numerous visible voids.

Pressure Drop - Energy loss in a fluid as it passes through a flow passage. The loss is due to friction between fluid particles and can be measured as a decrease in pressure in the direction of flow.

R

Regrind - A thermoplastic from a processor's own production that have been cleaned and reground.

Release agent - A lubricant, often wax, used to coat a mold cavity to prevent the molded piece from [illegible] us to facilitate its removal from the mold.

Resin - An organic substance, generally synthetic, which is used as a base material for the manufacture of some plastics.

Rockwell Hardness - A test for hardness (resistance to indentation) in which a hardened steel ball or diamond point is pressed into the material under test.

Rotational Molding - A process also known as rotomolding or rotational casting is used for the manufacture of hollow plastics including large storage tanks. It involves placing a thermoplastic powder into a mold, heating the mold in an oven while rotating the mold into perpendicular axes simultaneously.

S

Schedule - A system of pipe sizes that provides for standardized outside diameters and wall thicknesses.

Shear Strength - 1) Ability of a material to withstand shear stress or stress at which a material fails in shear. 2) The maximum shear strength stress that a material is capable of sustaining.

Shore Hardness - Resistance of a (polymer) surface to deformation. The different hardness measure applied for characterizing polymers are:
a) shore hardness (two scales: A for softer and D for harder materials)
b) ball indentation hardness (also useable on profiled surfaces because of bigger measuring devices).

Solvent - The medium within which a substance is dissolved; most commonly applied to liquids used to bring particular solids into solution, e.g. acetone is a solvent for PVC.

Slurry - A watery mixture of insoluble matter.

Specific Gravity - Ratio of the mass of a body to the mass of an equal volume of water at 4°C, or some other specified temperature.

Spin welding - A process of fusing two objects together by forcing them together while one of the pair is spinning, until frictional heat melts the interface. Spinning is then stopped and pressure held until they are frozen together.

Stabilizer - A chemical substance, which is frequently added to plastic compounds to inhibit undesirable changes in the material, such as discoloration due to heat or light.

Stress Crack - External or internal cracks in a plastic cause by tensile stresses less than that of its short time mechanical strength.

Surface Resistivity - The resistance of a material between two opposite sides of a unit square of its surface.

Surface Treating - Any method of treating a polyolefin so as to alter the surface and render it receptive to inks, paints, lacquers, and adhesives such as chemical, flame, and electronic treating.

Surfactant - A compound that affects interfacial tensions between two liquids. It usually reduces surface tension.

T

Tear strength - 1) Force required to initiate or continue a tear in a material under specified conditions. 2) The force acting substantially parallel to the major axis of the test specimen.

Tensile Strength - The longitudinal stress required to break a prescribed specimen divided by the original cross-sectional area at the point of rupture 9 usually expressed in lbs per square inch), within the gauge boundaries sustained by the specimen during the test.

Thermal Conductivity - The ability of a material to conduct heat; physical constant for quantity of heat that passes through volume of a substance in unit of time for unit difference in temperature.

Thermoforming - The process of heating a thermoplastic sheet to a working temperature and then forming it into a finished shape by means of heat or pressure.

Thermoplastic - Plastic capable of being repeatedly softened by increases in temperature and hardened by decreases in temperature. These changes are physical rather than chemical.

Thermoset - A classification of plastic resin that cures by chemical reaction when heated and, once cured, cannot be resoftened by heating.

Tolerance - A specified allowance for deviations in weighing, measuring, etc., or for deviations from the standard dimensions or weights.

Translucent - Permitting the passage of light, but diffusing it so that object beyond cannot be clearly distinguished.

Transparent - Capable of transmitting light so that objects or images can be seen as if there were no intervening material.

U

UV Stabilizer - Any chemical compound which, when admixed with a thermoplastic resin, selectively absorbs UV rays and minimizes chemical and/or physical changes that may be engendered by UV.

V

Vacuum forming - Method of sheet forming in which the plastic sheet is clamped in a stationary frame, heated, and drawn down by a vacuum into a mold.

Virgin Grade Material - Plastic material that has not undergone any processing other than that required to prepare it for manufacturing parts.

Viscosity - Internal friction of a liquid because of its resistance to shear, agitation, or flow.

Volatile - Property of liquids to pass away by evaporation.

Warpage - Dimensions distortion in a plastic object after molding.

Water Absorption - The percentage by weight of water absorbed by a sample immersed in water. Dependent upon area exposed.

Water Hammer - A phenomenon whereby a pressure shock wave is generated, due to a sudden change in fluid velocity within a piping system. The resulting pressure pulses can be significantly higher than the nominal working pressure of the system.

Weather Resistance - Ability of plastic to retain its original physical properties and appearance upon prolonged exposure to outdoor weather.

Weir - A dam to divert water flow.

Welding - The joining of two or more pieces of plastic by fusion of the material in the pieces at adjoining or nearby areas either with or without the addition of plastic from another source.

Y

Yield point - The point at which a material will continue to elongate at no substantial increase in load during a short test period.

Yield Stress - The force which must be applied to a plastic to initiate flow.

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