

GLOSSARY OF TERMS

Abrasion Resistance

The ability of a material to withstand mechanical actions such as rubbing, scraping, or erosion, that tends progressively to remove material from its surface.

Accelerator

An additive which changes the rate of cure of a rubber compound.

Ageing

The process of, or the results of, exposure of rubber to natural or artificial environmental conditions, for a prolonged period of time.

Ambient Temperature

The temperature of a medium surrounding an object. The term is often used to denote prevailing room temperature.

Anti-oxidant

Additives which inhibit oxidation at normal or elevated temperatures.

Antistatic Agents

Chemicals which impart a slight to moderate degree of electrical conductivity to elastometric or plastic compounds, thus reducing the accumulation of electrostatic charges on finished articles.

Ash Content

The solid residue remaining after a substance has been incinerated or heated to a temperature sufficient to drive off all combustible or volatile substances.

Assembly

The process of joining parts by any of several methods.

ASTM

Abbreviation for American Society for Testing and Materials.

Autoclave

Vessel used for vulcanising rubber under heat and steam pressure.

Barrel

That part of an extruder inside which the feed screw is located.

Blast Finishing

The process of removing flash from moulded objects and/or dulling their surfaces, by impinging media such as crushed apricot pits, walnut shells or plastic pellets upon them with sufficient force to fracture the flash.

Blister

An imperfection on the surface of a rubber article caused by a pocket of air or gas beneath the surface.

Bloom

Cloudy effect or whitish powdery deposit on the surface of a plastic article caused by the exudation of a compounding ingredient such as a lubricant, stabiliser pigment, plasticiser, etc. often deliberately incorporated as an anti-oxidant layer to the moulded part.

Brittleness Temperature

The temperature at which plastics and elastomers rupture by impact under specified conditions.

Burned

Showing evidence of excessive heating during processing or use of a rubber, as evidenced by blistering, discolouration, distortion or destruction of the surface.

Calender

A multi-rolled machine used to form thin sheets of uncured compound for onward processing. Also used to friction or impregnate fabric with rubber compound.

Cavity

A depression, or a set of matching depressions, in a plastics-forming mould which forms the outer surfaces of the moulded articles.

CTE

Coefficient of Thermal Expansion: The change in length of a material for a unit change in temperature, per unit of length.

Co-extrusion

The process of extruding two or more materials through a single die with two or more orifices arranged so that the extrudates merge and weld together into a laminar structure before chilling.

Composite

An article or substance containing or made up of two or more different substances.

Compound

A mixture of base polymer and the ingredients necessary to modify the resin to a form suitable for processing into finished articles.

Compounding

The step of mixing base polymer with additives such as stabilisers, fillers, pigments into a form suitable for processing into finished articles.

Compression Moulding

A method of moulding in which the moulding material, generally preheated, is placed in an open heated mould cavity, the mould is closed with a top force, pressure is applied to force the material into contact with all mould areas, and heat and pressure are maintained until the moulding material has cured. This process is most often used with thermoses.

Compressive Strength

The load sustained by a test specimen in a compressive test divided by the original area of the specimen.

Conditioning

Subjecting a material to standard environmental and/or stress history prior to testing.

Copolymer

This term usually, but not always, denotes a polymer of two chemically distinct monomers.

Cross-Linking

The setting up of chemical links between the molecular chains.

Cryogenic

Pertaining to very low temperatures.

Cure time

The length of time required for a material to achieve a desired state of cure with its physical properties developed.

Custom Moulder

A firm specializing in the moulding of items or components to the specifications of another firm which handles the sale of distribution of the item, or incorporates the custom moulded components in one of its own products.

Cycle Time

In a moulding operation, cycle time is the time elapsing between a particular point in one cycle and the same point in the next cycle.

Degradation

A deleterious change in the chemical structure, physical properties or appearance of a plastic caused by exposure to heat, light, oxygen or weathering.

Delamination

Separation of two or more surfaces in a composite material.

Density

(Absolute) Mass per unit volume of a substance.

Die

Tooling through which uncured compound is forced in the extrusion process to form a profile.

Dimensional stability

The ability of a plastic part retain the precise shape in which it was moulded.

Durometer

An instrument used for measuring the hardness of a material.

Elasticity

The ability of a material to quickly recover its original dimensions after removal of a load that has caused deformation.

Elastomer

A material which at room temperature can be stretched repeatedly and, upon immediate release of the stress, will return with force to its approximate original length.

Engineering Plastics

A broad term covering all plastics, with or without fillers or reinforcements, which have mechanical, chemical and thermal properties suitable for use, in construction, machine components and chemical processing equipment.

Extrudate

The product or material delivered from an extruder, for example, profiles, tubing, squares.

Extruder

A machine for producing more or less continuous lengths of rubber sections such as rods, sheets, tubes, and profiles.

Extrusion

The process of forming continuous shapes by forcing uncured rubber compound through a die.

Fatigue Strength

The maximum cyclic stress a material can withstand for a given number of cycles before failure occurs.

FDA

Abbreviation for Food and Drug Administration, the U.S. agency under the Department of Health, Education and Welfare which is concerned with the safety of products marketed for consumer use.

Filler

A relatively inert substance added to a rubber compound to reduce its cost and/or to improve physical properties, particularly hardness, stiffness and tensile properties.

Finish

The surface texture of a finished article.

Flame Retardant

Having the ability to resist combustion (A flame retardant plastic is considered to be one that will not continue to burn or glow after the source of ignition has been removed.)

Flame Retardants

Additives that reduce the tendency of rubbers to burn.

Flash

The thin, surplus of material which if forced into crevices between mating mould surfaces during a moulding operation remains attached to the moulded article.

Flex Life

The time during which a material can be expected to resist cyclical bending.

Forming

A general term encompassing processes in which the shape of rubber extrusions is changed to a desired configuration.

Fracture

The separation of a body, usually characterised as either brittle or ductile.

Gasket

A deformable material clamped between two surfaces so as to prevent loss of material or pressure and to create a seal.

Gauge

Thickness.

Hardness

Ability of a material to resist indentation. Measured using a prescribed hardness tester and expressed in International Rubber Hardness Degrees (IRHD)

Impact Resistance

The resistance of plastic articles to fracture under stresses applied at high speeds.

Impact Strength

The ability of a material to withstand shock loading.

Injection Moulding

The method of forming objects from granular or powdered plastics, most often of the thermoplastic type, in which the materials is fed from a hopper to a heated chamber in which it is softened, after which a ram or screw forces the material into a mould. Pressure is maintained until the mass has hardened sufficiently for removal from the mould.

Insert

An article of metal or other material which is incorporated into a rubber moulded part either by pressing the insert into the finished moulded part or by placing the insert in the cavity so that it becomes an integral part of the moulding.

ISO

Abbreviation for the International Standards Organisation.

K-Factor

A term sometimes used for thermal insulation value or coefficient of thermal conductivity.

Kink

Deformation caused by bending or twisting a tube or profile so that it returns upon itself.

Low Temperature Flexibility

The ability of a plastic or rubber to be bent without fracture at reduced temperatures.

Material Safety Data Sheets

Documentation regarding the toxicity or hazards associated with contact with some substances. These are prepared by the manufacturer of the substance.

Mechanical Property

Properties of rubber and plastics which are classified as mechanical include abrasion resistance, creep, ductility, friction resistance, elasticity hardness, impact resistance, stiffness and tensile properties.

Memory

The tendency of a plastic article to revert in dimension to a size previously existing at some stage in its manufacture.

Mineral Reinforcements

Inorganic substances used as filler for rubber and plastics. Some common examples are: clay, mica, talc.

Minimum Specifications

The minimum values, usually of mechanical properties, that a compound must meet by Quality Assurance prior to shipment.

Modulus

Derived from the Latin word meaning "small measure", modulus is the ratio of stress to strain in the linear region of the s-e curve.

Modulus in Compression

The ratio of compressive stress to strain within elastic limits of the material.

Modulus in Flexure

The ratio of the flexure stress to strain, within elastic limits of the material.

Modulus in Shear

The ratio of shear stress to strain within elastic limits of the material.

Modulus of Elasticity

The ratio of stress to corresponding strain below the proportional limit of a material in tensile testing.

Modulus of Resilience

The energy that can be absorbed per unit volume without creating a permanent distortion.

Moisture Absorption

The pick-up of moisture from the environment by a material.

Mould (n)

A hollow form or matrix into which a plastic or rubber compound is placed and which imparts to the material its final shape as a finished article.

Mould (v)

To impart shape to a plastic mass by means of a confining cavity or matrix.

Mould Release

In injection moulding, a lubricant used to coat the surface of the mould to enhance ejection of the moulded article or prevent it from sticking to the tool.

Moulding Cycle

The period of time occupied by the complete sequence of operations on a moulding press requisite for the production of one set of moulded articles.

Moulding Pressure

The pressure applied to the ram of an injection machine or press to force the softened plastic completely to fill the mould cavities.

Molecular Weight

The sum of the atomic weights of all atoms in a molecule.

Molecule

The smallest unit quantity of matter which can exist by itself and retain all of the properties of the original substance.

Monomer

A relatively simple compound, usually containing carbon and of low molecular weight, which can react to form a polymer by combination with itself or with other similar molecules or compounds.

Opaque

Not able to transmit light.

Open Steam Cure

Vulcanisation process during which the material to be cured is directly exposed to steam. On many compounds this leaves a distinctive surface signature.

Optimum Cure

The point at which the rubber compound has achieved its best possible physical properties.

Oxygen Index

A flammability test based on the principle that a certain volumetric concentration of oxygen is necessary to maintain combustion of a specimen after it has been ignited.

Ozone Resistance

The ability of a material to withstand exposure to natural or machine produced ozone without crazing or cracking.

Parting Line

The mark on a moulded article caused by flow of material into the crevices between mould parts.

Plastic

A material that contains as an essential ingredient one or more organic polymeric substances of large molecular weight, is solid in its finished state, and, at some stage in its manufacture or processing into finished articles, can be shaped by flow.

Plastic Deformation

A change in dimensions of an object under load that is not recovered when the load is removed.

Plasticity

The ability of a material to withstand continuous and permanent deformation by stresses exceeding the yield value of the material without rupture.

Plasticize

To render a material softer, more flexible and/or more mouldable by the addition of a plasticiser.

Plasticizer

A substance or material incorporated in a material (usually a plastic or an elastomer) to increase its flexibility, workability or extensibility.

Poisson's Ratio

The constant relating the changes in dimensions which occur when a material is stretched. It is obtained by dividing the change in width per unit length by the change in length per unit length.

Polymer

(Synthetic) The product of a polymerisation reaction. The product of polymerisation of one monomer is called a homopolymer, monopolymer or simply a polymer. When two monomers are polymerised simultaneously the product is called a copolymer. The term terpolymer is sometimes used for polymerisation products of three monomers.

Polymerization

A chemical reaction in which the molecules of a simple substance (monomer) are linked together to form large molecules whose molecular weight is a multiple of that of the monomer.

Polymer Structure

A general term referring to the relative positions, arrangement in space, and freedom of motion of atoms in a polymer molecule.

Proportional Limit

The greatest stress which a material is capable of sustaining without deviation from proportionality of stress and strain. (Hooke's Law).

Prototype Tool

A preliminary mould built upon which the final mould will be based.

Purging

In extrusion or injection moulding, the cleaning of one colour or type of material from the machine by forcing it out with the new colour or material to be used in subsequent production, or with another compatible purging material.

Pure Gum

Natural Rubber compound devoid of fillers, containing only curing agents. Also known as Para Rubber.

Recovery

The degree to which a material will resume its shape after deformation under stress.

Regrind

Waste material such as sprues, runners, excess parison material and reject parts from injection moulding, blow moulding and extrusion, which have been reclaimed by shredding or granulating. Regrind is usually mixed with virgin compound at a predetermined percentage for remoulding.

Reinforced Plastic

A plastic composition in which fibrous reinforcements are imbedded, with strength properties greatly superior to those of the base resin.

Reinforcement

A strong, inert fibrous material incorporated in a plastic or rubber mass to improve its physical properties.

Reversion

Degradation of a rubber compound characterised by tackiness due to overcure in manufacture or excessive heat in service.

Screw

In extrusion, the shaft provided with helical grooves which conveys the material from the hopper outlet through the barrel and forces it out through the die.

Shear Strength

The maximum load required to shear the specimen in such a manner that the moving portion has completely cleared the stationary portion. Sheets are distinguished from films in the plastics industry only according to their thickness. In general, sheets have thicknesses greater than .040".

Shot

One complete cycle of a moulding machine.

Shot Capacity

The maximum weight of material that can be delivered to an injection mould by one stroke of the ram.

SI

Abbreviation for Le Systeme International d'Unites.

Solvents

Substances with the ability to dissolve other substances.

Specific Gravity

The ratio of the density of a material as compared to the density of water at standard atmospheric pressure (1 ATM) and room temperature (73F).

Specific Volume

The volume of a unit of weight of a material; the reciprocal of density.

Stiffness

The capacity of a material to resist elastic displacement under stress.

Stock

Uncured rubber compound with given composition from which a specific item is to be manufactured.

Strain

In tensile testing, the ratio of the elongation to the gauge length of the test specimen, that is, the change in length per unit of original length.

Stress

The force producing or tending to produce deformation in a body measured by the force applied per unit area.

Stress-Strain Curve

The curve plotting the applied stress on a test specimen versus the corresponding strain. Stress can be applied through shear, compression, flexure, or tension.

Tack

Stickiness.

Tensile Strength

The maximum tensile stress sustained by the specimen during a tension test

Thermoforming

The process of forming a thermoplastic sheet into a three-dimensional shape by clamping the sheet in a frame, heating it to tender it soft and flowable. Then applying differential pressure to make the sheet conform to the shape of a mould or die positioned below the frame.

Thermoplastics

Materials that become soft when heated and solid when cooled to room temperature. This softening and setting may be repeated many times.

Thermoplastic Elastomers

The family of polymers that resemble elastomers in that they can be repeatedly stretched without distortion of the unstressed part shape, but are true thermoplastics and thus do not require curing.

Thermosets

Materials that may not be reheated and softened again. Once the structural framework is set, these plastics cannot be reformed.

Tool

The term used to describe an extrusion die or mould.

Ultimate Elongation

In a tensile test the elongation at rupture.

Ultimate Strength

Term used to describe the maximum unit stress a material will withstand when subjected to an applied load in a compression, tension, flexural, or shear test.

Virgin Material

Any compound or resin that has not been subjected to use or processing other than that required for its original manufacture.

Viscosity

A measure of the resistance to flow due to internal friction when one layer of fluid is caused to move in relationship to another layer.

Void

In a solid rubber, an unfilled space.

Vulcanisation

A chemical reaction in a rubber compound caused by heat and pressure taking it from the uncured to the cured state.

Weathering

A broad term encompassing exposure of plastics to solar or ultraviolet light, temperature, oxygen, humidity, rain, snow, wind, and air-borne biological and chemical agents.