



## GLOSSARY OF RUBBER AND SEALING TERMS

### A

**abrasion:** the surface loss of a material due to frictional forces.

**abrasion resistance index:** a measure of the abrasion resistance of a rubber relative to that of a standard rubber under the same specified conditions, expressed as a percentage.

**accelerated life test:** a test method designed to approximate, in a short time, the deteriorating effect of normal long-term service conditions.

**accelerator:** a compounding material used in small amounts, with a vulcanizing agent, to increase the speed of vulcanization.

**acid resistance:** the ability to resist the action of identified acids within specified limits of concentration and temperature.

**activator:** a compounding material used in small proportions to increase the effectiveness of an accelerator.

**aftercure:** a continuation of the process of vulcanization after the energy source has been removed.

**age resistance:** the ability of a material to resist deterioration caused by ageing.  
**ageing:** the irreversible change of material properties during exposure to a deteriorating environment, for a specified time interval.

**ageing, accelerated:** exposure of rubber to a test environment with the intent of producing, in a shorter time period, effects similar to normal ageing.

**ageing, air bomb:** the process of exposing materials to the action of air at an elevated temperature and pressure.

**ageing, air oven:** the process of exposing materials to the action of air at an elevated temperature at atmospheric pressure.

**ageing, oxygen bomb:** the process of exposing materials to the action of oxygen at an elevated temperature and pressure.

**ageing, shelf:** ageing during storage.

**agglomerate, compounding material:** a cluster of particles of one or more compounding materials loosely held together. Most commonly used to describe carbon black.

**air checks:** the surface markings or depressions due to trapping air between the material being cured and the mold surfaces.



**aniline point:** the lowest temperature at which equal parts of aniline and a test liquid (usually oil) will mix or blend. In general, the lower the aniline point of an oil, the more a given rubber compound will swell.

**antidegradant:** a compounding material used to retard deterioration caused by oxidation, ozone, light, and/or combinations of these.

**antiflex cracking agent:** a compounding material used to retard cracking caused by cyclic deformations.

**antioxidant:** a compounding material used to retard deterioration caused by oxidation.

**antiozonant:** a compounding material used to retard deterioration caused by ozone.

**aromatic oil:** a hydrocarbon process oil containing at least 35%, by mass, of aromatic hydrocarbons.

**atmospheric cracking:** cracks produced in surface of rubber articles by exposure to atmospheric conditions, usually due to sunlight and/or ozone.

**autoclave:** a vessel used for vulcanizing rubber products by means of steam under pressure.

**axial seal:** a term usually applied to an O-Ring where the squeeze is applied on the top and bottom surfaces. Another term for face seal.

## B

**backrind:** a molding defect in which the rubber adjacent to the parting line shrinks below the surface of the molded product, with the parting line often being ragged and torn.

**backup ring:** a device made of rubber, PTFE, leather, or another substance that will add strength or support when installed next to a seal. Most commonly used as an anti-extrusion device.

**bank:** the reservoir of material at the opening between rolls of a mill or calendar.

**batch:** the product of one mixing operation.

**bench marks:** two marks of known separation, applied to a specimen to measure the strain of the specimen during extension.

**blank:** a portion of a rubber compound of suitable volume to fill the cavity of a mold.

**bleeding:** the exuding of a liquid compounding material from the surface of vulcanized or unvulcanized rubber.



**blister:** a surface or internal imperfection, produced by entrapped gases or other volatiles during the manufacture of rubber articles.

**bloom:** a liquid or solid material that has migrated to the surface of a vulcanizate which generally changes the surface appearance.

**blow:** the volume expansion that occurs during the production of cellular or sponge rubber.  
**blowing agent:** a compounding material used to produce gas by chemical or physical action, or both, in the manufacture of hollow or cellular articles.

**breakout friction:** the force required to initiate sliding between a rubber seal and its mating surfaces.

**brittle point:** the highest temperature at which a rubber specimen will fracture under sudden impact.

**buffing:** the grinding of a vulcanizate, producing a roughened or velvety texture.

**bumping, molding process:** the application, release, and reapplication of pressure prior to the start of vulcanization to vent entrapped gases, thereby facilitating complete filling of the mold cavities.

## C

**calender:** a machine with two or more parallel, counter-rotating rolls, with controllable roll-to-roll spacing, rotating at selected surface speeds and controlled temperatures.

**carbon black:** a material consisting essentially of elemental carbon in the form of near-spherical colloidal particles and particle aggregates. It is produced by partial combustion or thermal decomposition of hydrocarbons. Primarily used as a reinforcing agent, but also affects many other dynamic properties of a rubber compound.

**catalyst:** a chemical that, in small quantities, accelerates a chemical reaction without itself necessarily becoming part of the final product.

**cell:** a single small cavity surrounded partially or completely by walls.

**cell, closed:** a cell totally enclosed by its walls, hence not interconnected with other cells.

**cell, open:** a cell not totally enclosed by its walls and hence interconnected with other cells.

**cellular rubber:** a generic term for materials containing many cells (either open, closed, or both) dispersed throughout the mass of rubber.

**cellular material, collapse:** an undesirable densification of a cellular material resulting from the breakdown of its cellular structure.



**cement, rubber:** an adhesive that is either a liquid dispersion or solution of raw or compounded rubber, or both.

**chalking:** the formation of a powdery residue on the surface of a rubber, commonly resulting from surface degradation.

**checking:** the short, shallow cracks on the surface of a rubber product, usually resulting from damaging action by environmental elements.

**coagent:** a compounding ingredient used in small amounts to increase the crosslinking efficiency of certain non-sulfur vulcanizing systems (especially organic peroxides), or to modify the properties given by such systems.

**coated fabric:** a flexible product composed of a textile fabric and an adherent polymeric material applied to one or both surfaces.

**coefficient of thermal expansion:** average expansion per degree over a stated temperature range, expressed as a fraction of the initial dimension.

**cold checks:** a defect on calendered sheeting consisting of surface roughness.

**cold flow:** slow deformation, under gravitational force, at or below room temperature. Sometimes referred to as "creep".

**compound:** a term applied to a mixture of polymers and other ingredients to produce a usable rubber material.

**compound, standard:** a control or reference compound prepared according to a prescribed formula and mixing procedure.

**compression molding:** molding process in which the material is placed directly in the mold cavity and compressed to shape by closure of the mold, under heat and pressure.

**compression set:** the residual and permanent deformation of a rubber material after removal of the compressive stress.

**conditioning (environmental):** the storage of a rubber, under specified conditions (time, temperature, humidity) prior to testing.

**conditioning (mechanical):** the prescribed program of deformation of a specimen prior to testing.

**conductive rubber:** a rubber capable of conducting (generally static) electricity.  
**copolymer:** a polymer formed from two different monomers.

**cracker:** a heavy-duty mill having two deeply corrugated or pyramid-cut rolls for breaking down a rubber or a mix, or for cutting rubber or a mix into pieces.



**crack:** a fissure originating in the surface of a rubber vulcanizate or product as a result of natural weathering.

**crack, flex:** a fissure originating in the surface of a rubber vulcanizate, resulting from cyclic deformation (usually bending).

**crack, ozone:** fissures originating in the surface of a rubber vulcanizate, caused by exposure to an ozone-containing environment; these fissures are perpendicular to the direction of strain, and usually occur in rubbers having main chain unsaturation.

**crazing:** formation of a random pattern of shallow cracks on a rubber surface usually due to ageing by light. Unlike ozone cracking, crazing does not depend on the presence of a tensile strain in the rubber.

**creep:** the time-dependent part of a strain resulting from stress.

**crosslink:** the chemical bond bridging one polymer chain to another.

**crosslinking:** formation of chemical bonds between polymer chains to give a network structure.

**crystallinity:** orientation of the disordered long chain molecules of a polymer into repeating patterns. The degree of crystallinity effects stiffness, hardness, low temperature flexibility, and heat resistance.

**cure date:** the date a rubber product was molded. Normally expressed, for example, as 1Q04, meaning the first quarter of the year 2004.

**cure meter:** a testing device that measures the progress of vulcanization.

## D

**damping:** that property of a material or system that causes it to convert mechanical energy to heat when subjected to deflection; in rubber the property is caused by hysteresis.

**deflashing:** any of various processes used to remove the waste edge from a molded rubber part.

**density:** the mass per unit volume of a material. Also referred to as specific gravity.

**desiccant:** a compounding material used to irreversibly absorb moisture, particularly for the purpose of minimizing risk of porosity during vulcanization.

**die swell:** the difference between the dimensions of the cross section of an extrudate, and the corresponding dimensions of the die orifice from which the extrudate was formed. It is usually expressed as the percent increase in the cross-sectional area.





**diene polymer:** a polymer formed from one or more monomer species, at least one of which is a diolefin.

**dielectric strength:** the measure of a vulcanizate's ability to resist passage of a disruptive discharge produced by an electric stress.

**dispersion:** the application of shearing forces to distribute one or more compounding materials uniformly throughout the mass of a rubber compound.

**dumbbell specimen:** a flat specimen of rubber having a narrow straight central portion of essentially uniform cross section with enlarged ends. Used for testing purposes.

**durometer:** an instrument for measuring the indentation hardness of rubber.

**dusting:** the application of a powder to a rubber surface, generally to prevent adhesion to another surface.

**dynamic properties:** mechanical properties exhibited under repeated cyclic deformation.

**dynamic seal:** a seal which is subjected to reciprocating, rotational, or oscillating motion.

## E

**ejector pins:** pins or blades that, when activated internally to the mold, eject the part from the mold cavity. Sometimes referred to as "knock outs".

**elasticity:** the rapid recovery of a material to its approximate initial shape and dimensions after substantial deformation by force and subsequent release of that force.

**elastomer:** an elastic polymer.

**elongation:** extension produced by a tensile stress.

**elongation, percent:** the extension of a uniform section of a specimen expressed as percent of the original length.

**elongation, ultimate:** the elongation at the time of rupture.

**explosive decompression:** the rupture of a rubber article caused by the rapid reversal of pressure, causing dissolved gases in the rubber to escape quickly to the surface of the vulcanizate.

**extender:** an material (usually organic) used to augment the polymer in a compound.

**extensometer:** a device for determining elongation of a specimen as it is strained.

**extrudate:** the material that issues from an extruder.



**extruder:** a machine designed to force rubber through an orifice, which is shaped to the geometry of the desired end product.

**extrusion:** the continuous shaping of a material during passage through a die.

**extrusion (seal):** distortion, under pressure, of a portion of a seal into the clearance between mating metal parts.

## F

**face seal:** a seal between two flat surfaces. In an O-Ring, this means it seals on the top and bottom, not the ID and OD. Also referred to as an axial seal.

**fatigue breakdown:** the deterioration of an elastomeric product during repeated deformation.

**fatigue life:** the number of deformations required to produce a specified state of fatigue breakdown in a test specimen or product that is deformed under a prescribed set of conditions.

**filler:** a solid compounding material, usually in finely divided form, which may be added in relatively large proportions to a polymer for technical or economic reasons. The most commonly used filler is carbon black. Most fillers also function as reinforcing agents.

**filler, inert:** a filler having no reinforcing effect.

**flash:** the excess material protruding from the surface of a molded article at the mold junctions. Mold overflow.

**flex life:** the number of cycles required to produce a specified state of failure in a specimen that is flexed in a prescribed method.

**flexometer:** a machine that subjects a test specimen to repeated deformation by compression, tension, shear, bending, torsion or any combination thereof.

**flow marks:** marks or line on a molded product, caused by imperfect flow of the raw compound during forming.

**formula:** a list of the materials and their amounts used in the preparation of a compound. Also called a recipe.

**frosting:** the formation of a matte, whitish appearance on a rubber surface exposed to air, resulting from the action of ozone. Often confused with bloom.

**fuel, aromatic:** fuel which contains benzene or aromatic hydrocarbons.

**furnace carbon black:** a type of carbon black produced by the decomposition reaction of hydrocarbons, when injected into a high velocity stream of combustion gases under controlled conditions.



## G

**gasket (mechanical):** a deformable material clamped between essentially stationary faces to prevent the passage of matter through an opening or joint. A static seal.

**gate (injection or transfer mold):** the orifice through which a shaped cavity in a mold is filled with rubber.

**gland:** a seal assembly which includes an O-Ring, the groove which holds the O-Ring, and contacting surfaces.

**glass transition temperature:** the approximate mid-point of the temperature range over which a reversible change in a polymer occurs from (or to) a viscous or rubbery condition to (or from) a hard and relatively brittle one.

**grain:** the unidirectional orientation of rubber or filler particles in a rubber compound.

**green strength:** the resistance to deformation of rubber stock in the uncured state.

**groove:** the machined recess into which a seal is fitted.

**ground vulcanized rubber:** vulcanized rubber in particulate form; used as an extender or filler.

**guayule rubber:** a form of natural rubber, cis polyisoprene, obtained from the shrub, *Parthenium Argentatum*.

**gum compound:** a rubber compound containing only those ingredients necessary for vulcanization and small amounts of other ingredients for processing, coloring, and for improving the resistance to ageing.

## H

**hardness:** a physical property of a rubber vulcanizate, characterized by resistance to indentation.

**heat buildup:** the accumulation of thermal energy generated within a material as a result of hysteresis, evidenced by an increase in temperature.

**heat history:** the accumulated amount of heat a rubber stock has been subjected to during processing operations. Incipient cure or scorch can take place if heat history is excessive.

**homopolymer:** a polymer formed from a single monomer species.

**hysteresis loss:** the loss of mechanical energy due to hysteresis.

**hysteresis:** the conversion of mechanical energy to heat in rubber undergoing strain.





## I

**impact resistance:** resistance to fracture under shock force.

**impact strength:** a measure of the toughness of the material, as the energy required break a specimen with a single blow.

**inhibitor:** a material used to suppress a chemical reaction.

**insert:** typically, a metal or plastic component to which rubber is chemically and/or physically bonded during the molding process.

**IRHD:** International Rubber Hardness Degrees. An alternate method of measuring rubber hardness. IRHD units are approximately equivalent to Shore A durometer units, although a different apparatus is used.

## K

**knit line:** an internal or external defect in a vulcanizate, where raw stock did not unite into a homogeneous mass during vulcanization.

**knuckles:** small tough rubber pieces scattered throughout a bale of raw rubber that do not disperse easily or accept carbon black and other compounding materials during mixing.

## L

**liquid curing medium (LCM):** a molten phase, generally a mixture of sodium nitrate, that is used as a heating medium for the continuous vulcanization of a rubber mix, usually following extrusion.

**logy:** sluggish, low snap, or recovery of a rubber material.

## M

**mandrel:** a bar, serving as a core, around which rubber is extruded, forming a center hole.

**masterbatch:** a homogeneous mixture of rubber and one or more materials in known proportions for use as a raw material in the preparation of the final compounds. Masterbatches are used to facilitate processing or enhance the properties of the final product, or both.

**mastication:** the breakdown or softening of raw rubber by the combined action of mechanical work (shear), and atmospheric oxygen, sometimes accelerated by the use of a peptizer, and frequently at elevated temperatures.

**memory:** the tendency of a rubber material to return to its original shape after deformation.



**microhardness:** hardness measured with an instrument having a smaller indenter and applying a lower force than the standard instrument (durometer), permitting measurements on smaller specimens or thinner sheets that are not amenable to measurement by normal instruments.

**mill:** a machine used for rubber mastication, mixing, or sheeting, having two counter-rotating rolls with adjustable longitudinal axis separation that usually rotate at different speeds.

**mismatch:** a mold defect which produces an asymmetrical part, caused by dissimilar cavities in mating mold plates.

**mixer:** a machine that incorporates and disperses compounding ingredients into rubber to form a mix or a compound through the action of mechanical work (shear).

**mixer, internal:** a machine with a closed chamber in which specially shaped rotors masticate the rubber or incorporate and disperse compounding materials, or both, into the rubber.

**modulus:** the ratio of stress to strain; that property of a material, which, together with the geometry of a specimen, determines the stiffness of the specimen. In the physical testing of rubber, the force necessary to produce a stated percentage of elongation.

**molding, compression:** the process of forming a material to a desired shape by flow induced by a force applied after material is placed in the mold cavity.

**molding, injection:** the process of forming a finished product by forcing material from an external heated chamber through a sprue (runner, gate) into the cavity of a closed mold. This is accomplished by means of a pressure gradient that is independent of the mold clamping force.

**molding lubricant:** a material usually sprayed onto the mold cavity surface prior to the introduction of the uncured rubber, to facilitate the easy removal of the vulcanizates. Also known as a mold release agent.

**molding shrinkage:** the difference in dimensions between a molded product and the mold cavity in which it was molded, both the mold and product being at normal room temperature when measured.

**molding, transfer:** the process of forming a material by forcing it from an auxiliary heated chamber through a sprue hole (runner, gate) into the cavity of a closed mold by means of a pressure gradient that is dependent on the mold clamping force.

**monomer:** a low molecular weight substance consisting of molecules capable of reacting with like or unlike molecules to form a polymer.

**mold marks:** a surface imperfection transferred to a molded product from corresponding marks on a mold.



## N

**naphthenic oil:** a hydrocarbon process oil containing more than 30 %, by mass, of naphthenic hydrocarbons.

**necking:** the localized reduction in cross section that may occur in a material under tensile stress.

**nerve:** the elastic resistance of unvulcanized rubber or rubber mixes to permanent deformation.

**nip:** the radial clearance between rolls of a mill or calendar on a line of centers.

**non-fill:** a defect resulting from the failure of the rubber material to fill out all of a mold cavity.  
**non-sulfur vulcanizing system:** a vulcanizing system not requiring free or donated sulfur.

## O

**O-Ring:** a product of precise dimensions, molded in one piece, to the configuration of a torus (doughnut) with a circular cross section, suitable for use in a machined groove for static or dynamic sealing.

**off-register:** misalignment of mold halves causing asymmetrical parts, i.e. top and bottom mold plates don't line up properly.

**optimum cure:** the state of vulcanization at which a desired property value or combination of property values is obtained.

**outgassing:** a vacuum phenomenon wherein a substance spontaneously releases volatile constituents in the form of vapors or gases. In rubber compounds, these constituents may include water vapor, plasticizers, air, etc.

**overcure:** a degree of cure greater than the optimum causing some desirable properties to be degraded. Usually results in a loss of elongation and an increase in hardness.

**oxidation:** the reaction between oxygen and a rubber vulcanizate, usually detected by a change in the appearance or feel of the surface, or by a detrimental change in physical properties.

**oxygen bomb:** a pressure resistant apparatus, used in an aging test, in which rubber is deteriorated in hot, compressed oxygen.

## P

**packing (mechanical):** a deformable material used to prevent or control the passage of matter between surfaces that move in relation to each other.

**paraffinic oil:** a hydrocarbon process oil, most or all of which is composed of alkanes

**parting line:** the line on the surface of a molded product at the junction of mold plates.



**peptizer:** a compounding material used in small proportions to accelerate, by chemical action, the softening of rubber under the influence of mechanical action, or heat, or both.

**permeability:** the permeation rate divided by the pressure gradient of the gas or vapor.

**permeation rate:** the flow rate of a gas or vapor, under specified conditions, through a prescribed area of a solid body, divided by that area.

**phr:** abbreviation for parts per hundred of rubber, used for indicating the proportions of ingredients in a rubber compound.

**pigment:** an insoluble compounding material used to impart color to rubber.

**plasticity:** a characteristic of unvulcanized rubber indicated by the degree of retention of deformation after removal of the deforming force.

**plasticizer:** a substance, usually a heavy liquid, added to an elastomer to decrease stiffness, improve low temperature properties, and/or improve processing.

**plastometer:** an instrument for measuring the plasticity of raw or unvulcanized compounded rubber.

**polymer:** a substance consisting of molecules characterized by the repetition of one or more types of monomeric units.

**porosity:** the presence of numerous small cavities.

**post cure:** heat or radiation treatment, or both, to which a cured or partially cured thermosetting rubber composition is subjected, to enhance one or more properties.

**pot:** the chamber in a transfer mold where raw material is placed before it is transferred into the cavity.

**pot life:** the period of time during which a reacting thermosetting composition remains suitable for its intended use, after mixing with a reaction-initiating agent.

**prevulcanization inhibitor (PVI):** a compounding material that increases the time to incipient vulcanization of a rubber mix. Unlike a retarder, a PVI does not significantly affect the vulcanization rate.

**primary accelerator:** the principal highest concentration accelerator used in a vulcanizing system.

**processability:** the relative ease with which raw or compounded rubber can be handled in rubber machinery.



**processing aid:** a compounding material that improves processability of a polymeric compound by reducing nerve, providing better dispersion of dry material, increasing the extension rate, reducing power consumption during mixing, producing smoother surfaces on calendered and extruded products, improving knitting, etc.

**process oil:** a hydrocarbon oil derived from petroleum or other sources, used as an extender or process aid.

## R

**rebound test:** the method of determining the resilient properties of vulcanized rubber by measuring the rebound of a steel ball or pendulum from a defined height onto a rubber sample. recipe: a formula, mixing procedure, and any other instructions needed for the preparation of a rubber compound.

**reclaimed rubber:** vulcanized rubber that has been thermally, mechanically, and/or chemically plasticized for use as a rubber diluent, extender, or processing aid.

**recovery:** the degree to which a rubber product returns to its normal dimensions after being distorted.

**register:** the accurate matching of the plates of a mold

**reinforcement:** the act of increasing the mechanical performance capability of a rubber by the incorporation of materials that do not participate significantly in the vulcanization process.

**reinforcing agent:** a material, not basically involved in the vulcanization process, used in rubber to increase the resistance of the vulcanizate to mechanical forces.

**release agent (mold):** a substance applied to the inside surface of a mold or added to a material to be molded, to facilitate removal of the product from the mold.

**resilience:** the ratio of energy output to energy input in a rapid (or instantaneous) full recovery of a deformed specimen.

**resin:** an organic material of indefinite and relatively high molecular mass that may be used as a softener, processing aid, vulcanizing agent, or reinforcing agent.

**retarder:** a material used to reduce the tendency of a rubber compound to vulcanize prematurely.

**reversion:** deterioration of vulcanizate properties that may occur when vulcanization time is extended beyond the optimum.

**RMS:** root mean square. A measure of surface roughness, calculated as the square root of the sum of the squares of micro-inch deviation from true flat.





**rubber:** a material that is capable of recovering from large deformations quickly and forcibly, and can be, or already is, modified to a state in which it is essentially insoluble.

**rubber, bound:** the portion of the rubber in a mix that is so closely associated with the filler as to be unextractable by the usual rubber solvents.

**rubber, cellular, closed cell:** a cellular material in which practically all the individual cells are non-connecting.

**rubber, expanded:** cellular rubber having closed cells made from a solid rubber compound.  
**rubber, gel:** the portion of rubber insoluble in a chosen solvent.

**rubber hardness degree, international:** a measure of hardness, the magnitude of which is derived from the depth of penetration of a specified indenter into a specimen. Commonly referred to as IRHD.

**rubber, natural:** cis-1,4-polyisoprene that is obtained from a botanical source, usually Hevea Brasiliensis.

**rubber, oil-extended:** a grade of raw rubber containing a relatively high proportion of processing oil.

**rubber, raw:** natural or synthetic elastomer, usually in bales or packages, that is the starting material for the manufacture of rubber articles.

**rubber, sponge:** cellular rubber consisting predominantly of open cells and made from a dry rubber compound.

**rubber, synthetic:** rubber produced by polymerizing one or more monomers with or without post-polymerization chemical modification.

**rubber, vulcanized compound:** a crosslinked elastic material compounded from an elastomer, susceptible to large deformations by a small force and capable of rapid, forceful recovery to approximately its original dimensions and shape upon removal of the deforming force.

**runner** (injection or transfer mold): the secondary feed channel for transferring material under pressure from the inner end of the sprue to the cavity gate.

## S

**salt bath:** a heat transfer apparatus, utilizing molten salts as the heating medium, generally used for vulcanization. Commonly used in extrusion systems.

**scorch:** premature vulcanization of a rubber compound.

**scorch, Mooney:** the time to incipient cure of a compound when tested in the Mooney shearing disk viscometer under specific conditions.



**seal (mechanical):** any material or device that prevents or controls the passage of matter across the separable members of a mechanical assembly.

**secondary accelerator:** an accelerator used in smaller concentrations compared to the primary accelerator, to achieve a faster rate of vulcanization.

**set:** the strain remaining after complete release of the force producing the deformation.

**sheeting:** the process of converting a rubber, rubber mix, rubber dough, or latex into a sheet.

**shelf life:** the period of time after production during which a material or product, that is stored under specified conditions, retains its intended performance capabilities.

**shock load:** the sudden application of an external force.

**shrinkage:** the linear contraction, upon cooling, of a molded rubber part.

**size, actual:** the actual dimensions of an O-Ring, including tolerance limits.

**size, nominal:** the approximate size of an O-Ring expressed in fractional dimensions.

**skin:** a relatively dense layer at the surface of a cellular polymeric material.

**softener:** a compounding material used to produce a mix of reduced viscosity, which facilitates incorporation of rubber additives.

**specimen, test:** a piece of material appropriately shaped and prepared so that it is ready to use for a test.

**spew:** surplus material forced from a mold on closure under pressure. Synonym for flash.

**spiral failure:** seal failure in reciprocating applications, that results from a twisting action that strains or ruptures the rubber.

**splice:** the uniting of two parts of a vulcanized rubber product to form a continuous length.

**sprue:** marks left on the surface of a rubber part, usually elevated, after removal of the sprue or cured compound in the gate through which the compound is injected or transfer molded.

**sprue hole:** the passageway through which a rubber is forced into a mold.

**squeeze:** the deformation or interference placed on a rubber component to affect a seal.

**stabilizer:** a substance present in or added to raw rubber to maintain properties at or near their initial values during its production, processing, and storage.



**static seal:** part designed to seal between parts having no relative motion. Opposite of a dynamic seal.

**stiffener:** a compounding material used to increase the viscosity of an unvulcanized rubber mix.

**stiffness:** that property of a specimen that determines the force with which it resists deflection.

**stiffness, bending:** the force required to produce a bent configuration under specified conditions.

**strainer:** a machine designed to force a rubber or rubber mix through a sieve to remove extraneous material.

**stock:** unvulcanized, mixed rubber compound of a definite composition.

**sulfur donor vulcanizing system:** a vulcanizing system in which there is no elemental sulfur present, and all of the sulfur available for the crosslinking is provided by the partial decomposition of sulfur-containing materials.

**sulfur, free:** the uncombined sulfur in a rubber mix or vulcanizate.

**sulfur, total:** all the sulfur present in a material irrespective of its chemical form or origin.

**sun checking:** surface cracks or crazing caused by exposure to direct or indirect sunlight.

**swelling:** the increase in volume of a specimen immersed in a liquid or exposed to a vapor.

## T

**tack, rubber:** the property that causes contacting surfaces of unvulcanized rubber to adhere to each other.

**tackifier:** a compounding material that enhances the ability of vulcanized rubber to adhere to itself or another material.

**tear:** mechanical rupture initiated and propagated at a site of high stress concentration caused by a cut, defect, or localized deformation.

**tear strength:** the maximum force required to tear a specified test specimen, the force acting substantially parallel to the major axis of the specimen.

**tensile set:** the extension remaining after a specimen has been stretched then allowed to retract in a specified manner. Expressed as a percentage of the original length.

**tensile strength:** force in pounds per square inch (or kilograms per square centimeter) required to cause the rupture of a specimen of a rubber material.



**tensile stress:** a stress applied to stretch a test specimen.

**tension fatigue:** a fracture, through crack growth, of a component or test specimen subjected to a repeated tensile deformation.

**tension set:** the extension remaining after a rubber specimen has been stretched and allowed to retract

**terpolymer:** a polymer formed from three monomer species.

**thermal carbon black:** a soft carbon black formed by the thermal decomposition of natural gas.

**thermal degradation:** irreversible and undesirable change in the properties of a material due to exposure to heat.

**thermoplastic:** a polymer that repeatedly can be softened by heating and hardened by cooling through a temperature range characteristic of the polymer, and in the softened state, can be shaped into articles.

**thermoplastic elastomer (TPE):** a diverse family of rubber-like materials that, unlike conventional vulcanized rubbers, can be processed and recycled like thermoplastic materials. Often referred to as TPR (thermoplastic rubber).

**thermoplastic vulcanizate (TPV):** a thermoplastic elastomer with a chemically cross-linked rubbery phase, produced by dynamic vulcanization.

**thermoset rubber:** an elastomer cured under the application of heat or chemical means to make a product substantially infusible or insoluble. Thermosetting is irreversible.

**TR-10:** a measure of the low temperature capability of an elastomer. It is the temperature at which a stretched and frozen specimen has retracted 10% of the stretched amount. TR stands for "temperature retraction".

**trapped air:** air which is trapped in a product or a mold during cure. Usually causes a loose ply or cover, or a surface mark, depression or void.

## U

**ultimate elongation:** the maximum elongation of a rubber specimen prior to rupture.

**undercure:** a state of vulcanization between the onset of vulcanization and the state of optimum cure. May be evidenced by tackiness, loginess, or inferior physical properties.

**UV absorber:** a compounding material that, through its ability to absorb ultraviolet radiation and render it harmless, retards the deterioration caused by sunlight and other UV light sources.



## V

**viscoelasticity:** a combination of viscous and elastic properties in a material, with the relative contribution of each being dependent on time, temperature, stress, and strain rate.

**viscosity:** the resistance of a material to flow under stress.

**viscosity, Mooney:** a measure of the viscosity of a rubber or rubber compound determined in a Mooney shearing disk viscometer.

**vulcanizate:** the product of vulcanization, a crosslinked rubber article.

**vulcanization:** an irreversible process during which a rubber compound, through a change in its chemical structure (for example, crosslinking), becomes less plastic and more resistant to swelling by organic liquids, while elastic properties are conferred, improved, or extended over a greater range of temperature.

**vulcanizing agent:** a compounding material that produces crosslinking in rubber.

**vulcanizing system:** the combination of vulcanizing agent and, as required, accelerators, activators, and retarders used to produce the desired vulcanizate characteristics.

## W

**water absorption:** the amount of water absorbed by a material under specified test conditions.

**weathering:** the surface deterioration of a rubber article during outdoor exposure.