

Decarlo Associates

Glossary

A2LA

American Association for Laboratory Accreditation. The standard, internationally recognized body for accrediting laboratories in the USA.

ASTM

American Society for Testing and Materials

Abrasion Resistance

The ability of a rubber compound to withstand mechanical action, such as rubbing, scraping or erosion, which tends to remove material progressively from its surface.

Accelerated Aging

Sometimes called "Accelerated Life". The act of subjecting rubber to any set of conditions designed to produce in a short time the results obtained under normal conditions of aging. In accelerated aging tests, the usual factors considered are heat, light and oxygen, either separately or combined. Most often accomplished by heating rubber samples in an atmosphere of oxygen at 300 psi pressure and 70°C (158°F), by heating them in an oven provided with circulating air maintained at 70 or 100°C (158 or 212°F), or by heating them in air in large test tubes to prevent interaction among different rubber compounds.

Adhesion

The clinging or sticking of two material surfaces to one another. In rubber parlance, the strength of the bond or union between two rubber surfaces or plies, cured or uncured. The bond between a cured rubber surface and a non-rubber surface, for example, glass, metal, wood or fabric.

Age Resistance

The resistance to deterioration by oxygen and ozone in the air, and by heat and light. A variety of anti-oxidants are available which provide protection in differing degrees to these deteriorating factors.

Bias

The difference between the average measured test result and the accepted reference value; it measures in an inverse manner the accuracy of a test.

Bouyancy

The capacity to float in water.

C Factor

One of two Retention Factors; it is the projected percentage of bouyancy remaining when used in cushions for one year.

Cellular Rubber

Low-density rubber products containing a cellular structure. The cells may either be open and interconnecting or closed and not interconnecting; a generic term for materials containing many cells (either open, closed or both) dispersed throughout the mass.

Closed Cell

An expanded structure consisting of a multitude of individual, non-connecting, gas-tight cells.

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Compression Deflection

The force needed to compress a cellular rubber material to a specified percentage of the original thickness (25%, 50%, etc.); can be expressed in lb/in² or psi or kPa; the measurement of the force necessary to produce a 25% compression over the entire top area of the foam specimen.

Compression Set

The residual decrease in thickness of a test specimen measured 30 minutes or 24 hours after removal from a suitable loading device in which the specimen had been subjected for a definite time to compressive deformation under specified conditions of load application and temperature.

Cork

The well-known natural product, the inner bark of the Cork Oak. Monarch incorporates cork particles in some of its fine products to achieve the resilience and wear resistance of rubber with the rich natural look of cork.

Corkrich

Cork based Thermoplastic rubber that can be molded or shaped.

C-Tear

See Die C-Tear Strength

Density

The ratio of a mass of a body to it's volume, or the mass per unit volume of the substance. When centimeter-gram-seconds units are used, the density of a substance is numerically equal to the specific gravity of the substance referred to at 4°C (39°F), the temperature of maximum density (1.0000) of water. For ordinary practical purposes, density and specific gravity may be regarded as equivalent.

Die C-Tear Strength

The maximum force required to cause a rupture by tearing action of the right angle test specimen; the force divided by the thickness of the specimen. The force acts parallel to the tab ends of the specimen or at 45° to the 90° center angle. Refer to ASTM Method D624.

Diffusion

The migration of wandering of the particles or molecules of a body of fluid matter away from the main body through a medium or into another medium. Caused by the kinetic energy of molecules, diffusion is most marked in gasses, less so in liquids, and practically nonexistent in rigid solids. Solids dissolved in a liquid medium tend to diffuse at rates that depend on the physical properties of the dissolved substances as well as the solvent; crystalloids diffuse readily and will pass through a combining membrane or septum, whereas colloids do so extremely slowly or not at all.

Durometer

An instrument for determining the hardness of rubber by measuring it's resistance to the penetration (without puncturing) of a blunt indented point impressed on the rubber surface against the action of a spring. A hand and a special scale indicate the resistance to penetration or "hardness". The scale of the Shore hardness testers reads from 0 to 100, 0 being very soft and 100 being very hard. There are several Shore hardness gauges available and the proper durometer depends on the hardness of the surface being measured (Shore A, D and 00).

EPDM (Ethylene - propylene - diene)

Ethylene - propylene - diene backbone is saturated so the terminology requires it to end with "M". These elastomers contain ethylene, propylene and a third monomer to provide unsaturation, which allows conventional vulcanization off of the backbone, which is saturated. They have excellent resistance to

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sunlight, ozone and heat, and good resistance to alkalis, acids and oxygenated solvents. Applications include radiator and heater hoses, seals and weather-stripping.

EPT

Identical to EPDM (Refer to EPDM)

Elastomer

A macromolecular material that returns rapidly to approximately the initial dimensions and shape after substantial deformation by a weak stress and the release of the stress.

Elongation

The extension between benchmarks produced by a tensile force applied to a specimen, expressed as a percentage of the original distance between the marks. Ultimate elongation is the elongation at the moment of rupture. If a 1 inch length is marked on a specimen and it is stretched until the bench marks are 7 inches apart, the elongation is: $7 - 1 = 6$ inches or 600%.

Expanded Rubber

A type of cellular rubber, the cells of which are created from the reaction of a chemical blowing agent which creates gas when heated; cellular rubber having closed cells made from a solid rubber compound.

Extruded

Formed by being forced through a shaping orifice as a continuous body.

Fflammability

The characteristics of a material that pertain to its relative ease of ignition and relative ability to sustain combustion.

Flotation

Bouyant on the surface of the water.

Flex Resistance

The resistance to repeated distortions produced by extending, compressing and bending forces or combinations of them. The effect is to weaken rubber until surface cracking or rupture occurs.

Flexibility

Capable of being bent.

Fluid Immersion

Per ASTM D 1056-91-Flexible Cellular Materials-Sponge or Expanded Rubber shall be measured for diameter and thickness before and after immersion in the specified petroleum based oil for 7 days at 23°C (73.4°F).

Ggasket

A material, which may be clamped between faces, and acts as a static seal. Gaskets are cut, formed or molded into the desired configuration.

Grade

The designation given a material by a manufacturer such that it is always reproduced to the same specifications established by the manufacturer.

Hhardness

The measurement of the resistance to indentation. (See Durometer)

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Hypalon

Hypalon chlorosulfonated polyethylene rubber has excellent resistance to extended ozone and weathering exposure, which makes it good for marine and outdoor sports equipment applications. Hypalon can be embossed, has a very tight cell structure, and has excellent resistance to water absorption.

Impact

Impulse communicated by one object striking another.

Iron

Traditional unit of measurement equal to 1/48 of an inch, used to measure the thickness of sheet metal.
1 iron = 1/48 inch = 0.0208333 inch = 0.529167 mm.

ISO 9000

Internationally recognized quality system applicable to most industries. ISO 9000 requires rigorous documentation of procedures and standards, and constant internal auditing processes. ISO 9000 certification also requires regular independent auditing by third parties. Specific subsets of ISO 9000 are (ISO 9001, 9002, 9003) focus on special aspects of manufacture, design, testing, inspection and servicing. ISO 9000 certification is generally required for high-tech companies in Europe, and it is being increasingly required by manufacturers in the United States to guarantee that their suppliers have verifiable quality programs in operation.

ISO 9001

Specific subset of ISO 9000 (which see) focusing on the quality of production, testing and inspection of goods and services. ISO 9001 is also known as ANSI Q9001 in the USA.

K-factor

The thermal conductivity of a solid material. The time rate of steady heat flow, watts (or BTU/hour) through a unit area of m² (or ft²), per unit temperature gradient in the direction perpendicular to an isothermal surface °C/meter (or °F/inch).

Laboratory Accreditation

Formal recognition that a testing laboratory is competent to carry out specific tests or specific types of tests. See A2LA.

Laminating

The process of bonding (gluing) together two or more sheets of material.

Micrometer

Instrument for the very accurate measurement of thickness, length and depth, or other linear dimensions. Also: one millionth of a meter [Metric System].

Mold

A form or matrix for shaping anything in a fluid or plastic condition. In rubber manufacturing, the form in which a rubber article is vulcanized and given the shape desired.

Monomer

A molecule capable of reacting with like or unlike molecules to form a polymer.

Natural Rubber

The rubber obtained from botanical sources, primarily from the Heavea brasiliensis tree; and also from other trees such as Ficus elastica, shrubs such as Parthenium argentatum, and vines such as Landolphia. They all contain chiefly the same rubber hydrocarbon.

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Neoprene

An elastomer, polychloroprene, formed by adding hydrogen chloride monovinylacetylene. Applications include resistance to petroleum-based fluids, flame retardant and weather resistance.

Nitrile

This elastomer is made by copolymerizing acrylonitrile and butadiene. In commercial grades, increasing the Nitrile content increases the oil, solvent and abrasion resistance, but decreases low temperature flexibility and resilience. Applications include o-rings, oil seals, gaskets and hoses.

Olefin

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

Oil Resistance

Ability to withstand swelling by a specified oily liquid for a specified time and temperature, expressed as percentage swelling or volume increase of specimen.

Open cell

A cell not totally enclosed by its walls and hence interconnecting with other cells.

Physical properties

Per ASTM D 1056-91 states: The various grades of cellular rubber shall conform to the requirements as to physical properties in Tables 1, 2 and 5, together with any additional requirements indicated by suffix letters in the grade designations as described in Section 4, Table 3.

Polymer

A substance consisting of molecules characterized by the repetition (neglecting ends, branch junctions and other minor irregularities) of one or more types of monomeric units.

Reclaimed Rubber

The product resulting from the treatment of vulcanized scrap rubber in various operations, such as grinding, defibering and devulcanizing by heating with aqueous alkali or with a metallic chloride solution and reclaiming agents, and refining, whereby the fabric is destroyed and the rubber compound is recovered and made suitable for use in the manufacture of rubber goods; the fiber may also be removed mechanically, followed by devulcanization of the rubber.

Resilience

The energy returned by vulcanized rubber when it is suddenly released from a state strain or deformation, for example in the pendulum test which determines rebound; the returned energy, expressed as percentage of the original potential energy, is a measure of the resilience.

Rubber

A material that is capable of recovering from large deformation quickly and forcibly, and can be, or already is, modified to a state in which it is essentially insoluble (but can swell) in boiling solvent, such as benzene, methyl ethyl ketone and ethanol - toluene azeotrope.

R-Number

K-Factor is related to the R-value which is commonly used to define the heat transfer properties of construction material $R\text{-value} = \text{Thickness (inches)}/K\text{-Factor}$.

SAE

Society of Automotive Engineering

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Shelf life

Maximum time interval during which a material may be stored and remain in a usable condition; usually related to storage conditions.

Skin

A relatively dense layer at the surface of a cellular material.

Soling material

Sheets of rubber typically used by customers to manufacture shoe soling. These sheets may be expanded or solid.

Specifications

A precise statement of a set of requirements to be satisfied by a material, product, system or service indicating, whenever appropriate, the procedure by means of which it may be determined whether the requirements given are satisfied. As far as practicable, it is desirable that the requirements be expressed numerically in terms of appropriate units together with their limits.

Split

To cut a sheet of material horizontally (i.e. parallel to the large surface). This may be done to reduce the sheet to a specified thickness, or to open a check sheet for an examination of its internal appearance and properties.

Split-Tear Strength

A tear strength test of the old Rubber Manufacturers Association, still widely used in the soling trade. The split end of a half-split sample of sheet rubber is pulled open, perpendicular to the plane of the split, until the split propagates through the material.

Splitter

Machine used for splitting rubber sheets.

Sponge Rubber

Vulcanized rubber having a porous or cellular structure like that of a sponge, made by incorporating gasifying substances or blowing agents such as sodium bicarbonate and ammonium carbonate in the mixing, and then vulcanizing in a mold cavity larger than the piece of rubber to be vulcanized. Gas is generated from the dispersed particles of the blowing agent, producing the porous structure and inflating the rubber to the size of the mold cavity.

Swelling

The property of a raw or vulcanized rubber of absorbing organic liquid, such as benzene and gasoline, and swelling to many times its original volume; the property is also shown by other colloids in contact with other liquids; in a general sense, it may be any increase in volume in a solid substance caused by the absorption of a liquid.

Synthetic Rubber

Rubber produced by polymerizing one or more types of monomers with or without post-polymerization chemical modification.

Tear Resistance

The force required to tear completely across a specifically nicked rubber test specimen, or right angle test specimen, by elongating at a specific rate. See ASTM Method D 624. See also Die C-Tear Strength.

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Tear Strength

The force per unit thickness required to (1) initiate a rupture or tear of the material or (2) to propagate a tear under circumstances in which continued application of a force on a suitable test specimen results in a quasi-equilibrium tearing action.

Tensile Set

The extension remaining after a specimen has been stretched and allowed to retract in a specified manner, expressed as a percentage of the original length.

Tensile Strength

The maximum tensile stress applied in stretching a specimen to rupture.

Thermoplastic Elastomer

A diverse family of rubber-like materials that, unlike conventional rubbers, can be processed and recycled like thermoplastic materials.

Trouser Tear Strength

The force required to propagate a cut or tear in a specified trouser-shaped test specimen, divided by the tear thickness of the test specimen, tested with the grip force acting in a direction parallel to the two legs.

Ultimate Elongation

The elongation in which rupture occurs in the application of continued tensile stress.

Ultraviolet Light

Invisible light radiation, adjacent to the violet end of the visible spectrum, with wavelengths from about 200 to 400 NM (nanometers).

V Factor

One of two Retention Factors; it is the projected percentage of buoyancy remaining when used in vests for one year.

Vulcanization

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

Water Absorption

The amount of water absorbed by a material under specified test conditions commonly expressed by weight percent of the test specimen.
