

Rubber and Elastomer Compound Physical Properties

ASTM Testing Procedures

Physical Properties

TENSILE STRENGTH

ASTM D412

Tensile strength of a rubber compound is its resistance to rupture under tension. It is measured as strength at break and expressed in pound per square inch of cross section. This property has an absolute value in some applications where the product is actually subjected to tension in service, but like the other tensile properties, it is most frequently used in evaluating compounding materials on a comparative basis. The tensile strength may be considered either separately or together with the modulus and elongation in defining an optimum state of cure for any specific compound.

MODULUS

ASTM D412

Modulus is the quantity of stress required for a given elongation and is used as a supplement to modulus in comparative evaluations.

ELONGATION

ASTM D412

Elongation is used to describe the ability of a rubber compound to stretch without breaking. This property also is a function of the state of cure and is used as a supplement to modulus in comparative evaluations.

SPECIFIC GRAVITY

Specific gravity is defined as the ratio of the mass of a body to the mass of any equal volume of water at 4 C or other specified temperature. It is then translated into weight of specific recipe.

HARDNESS (DUROMETER)

ASTM D2240

Durometer hardness is the resistance to indentation under conditions which do not puncture the elastomers surface. The most frequently used device is the spring-loaded Shore "A" Durometer.

HEAT RESISTANCE

ASTM D573

Heat aging is test samples that are aged at an elevated temperature and re-tested for deterioration of original properties.

COMPRESSION SET

ASTM D395

Compression set is the amount in percent by which a standard test piece fails to return to its original thickness after being subjected to a standard compressive load for a fixed period of time and temperature. It is sometimes referred to as the elastomer's memory.

OZONE RESISTANCE

ASTM D1171

Ozone resistance is measured by testing within an ozone chamber for a specific amount of time at a specific temperature in a relaxed or elongated state. Failure is related to surface cracks, checks or crazing.

FLUID RESISTANCE

ASTM D471

Oil resistance of sheet rubber is measured by volume change of the material after immersion in standard test media under specified test conditions. The most commonly used oils are ASTM No.1, No. 2, and No. 3 and have decreasing aniline points. Generally, as their aniline points decrease, the swelling action of the oil becomes more severe.

Fuel resistance is measured in a similar fashion. The most commonly used fuels are ASTM Fuel A, Fuel B and Fuel C. Fuel A contains no aromatics, Fuel B contains 30% aromatics and Fuel C contains 50% aromatics. The higher the aromatic content of the fuel, the more severe its swelling action on an elastomer.

LOW TEMPERATURE RESISTANCE

ASTM D2137

Low temperature testing is done at an extreme temperature, usually -40 or -60F.