

PLASTIC PIPE TERMS & DEFINITIONS

Every product has certain terms and definitions that are unique to that particular product. Listed below are some of the more common terms and definitions that relate to plastic pipe. A good understanding of these definitions is essential to understanding flexible pipe and future Info Briefs and Information Series. ASTM D 883 and F 412 define additional terms relating to plastic pipe.

ACRYLONITRILE-BUTADIENE-STYRENE (ABS):

Plastics containing polymers or blends of polymers, or both, in which the minimum butadiene content is 6%, the minimum acrylonitrile content is 15%, the minimum styrene or substituted content, or both, is 15%, and the maximum content of all other monomers is not more than 5%; plus lubricants, stabilizers and colorants.

ADDITIVE: A substance added to another substance, usually to improve properties, such as plasticizers, initiators, light stabilizers, and flame retardants.

AGING: The effects on materials of exposure to an environment for an interval of time.

ASH CONTENT: Proportion of the solid residue remaining after a reinforcing substance has been incinerated (charred or intensely heated).

BURST STRENGTH: The internal pressure required to cause a pipe or fitting to fail.

CARBON BLACK: A black pigment produced by the incomplete burning of natural gas or oil. Because it possesses useful ultraviolet protective properties, it is also much used in molding compounds intended for outside weathering applications.

CELL CLASSIFICATION: A rating of the primary properties of the resin material. To include density, melt index, flexural modulus, tensile strength at yield, environmental stress crack resistance, hydrostatic design basis, color and UV stabilizer.

COEXTRUSION: A process whereby two or more heated or unheated plastic material streams forced through one or more shaping orifice(s) become one continuously formed piece.

CRACK: Any narrow opening or fissure in the surface.

CRATER: A small, shallow surface imperfection.

CRAZING: Fine cracks at or under the surface of a plastic.

CREEP: The time-dependent part of strain resulting from stress, that is, the dimensional change caused by the application of load over and above the elastic deformation and with respect to time.

DEFLECTION: Any change in the inside diameter of the pipe resulting from installation and imposed loads. Deflection may be either vertical or horizontal and is usually reported as a percentage of the base (undeflected) inside pipe diameter.

DEGRADATION: A deleterious change in the chemical structure, physical properties, or appearance of a plastic.

DETERIORATION: A permanent change in the physical properties of a plastic evidenced by impairment of these properties.

ENVIRONMENTAL STRESS CRACKING: The development of cracks in a material that is subjected to stress or strain in the presence of specific chemicals.

EXTRUSION: A process in which heated or unheated plastic is forced through a shaping orifice (a die) in one continuously formed shape, as in film, sheet, rod, or tubing.

FILLER: A relatively inert material added to a plastic to modify its strength, permanence, working properties, or other qualities or to lower costs.

FLEXURAL STRENGTH: The stress that a specimen will withstand when subjected to a bending moment.

HOOP STRESS: The tensile stress acting on the pipe along the circumferential direction of the pipe wall when the pipe contains liquid or gas.

HYDROSTATIC DESIGN BASIS (HDB): One of a series of standard long-term strength values that is established in accordance with ASTM D 2837.

HDPE PLASTIC: Linear polyethylene plastics having a standard specific gravity of 0.941 g/cm³ or greater.

IMPACT STRENGTH: The characteristic that gives a material the ability to withstand shock loading. The work done in fracturing a test specimen in a specified manner under shock loading.

LONG-TERM HYDROSTATIC STRENGTH (LTHS): The hoop stress that when applied continuously will cause failure of the pipe at 100,000 hours (11.43 years).

MODULUS OF ELASTICITY: The ratio of stress to the strain produced in a material that is elastically deformed. Also called Young's modulus.

MONOMER: A low molecular weight substance consisting of molecules capable of reacting with like to unlike molecules to form a polymer.

PERMANENT SET: The deformation remaining after a specimen has been stressed a prescribed amount in tension, compression, or shear for a specified time period and released for a specified time period. For creep tests, the residual unrecoverable deformation after the load causing the creep has been removed for a substantial and specified period of time. Also, the increase in length, expressed as a percentage of the original length, by which an elastic material fails to return to its original length after being stressed for a standard period of time.

PIPE STIFFNESS: A measure of the inherent strength of the pipe as a function of applied load and resulting deformation (See ASTM Method D 2412).

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

POLYETHYLENE: A plastic or resin prepared by the polymerization of ethylene as essentially the sole monomer.

POLYMER: A substance consisting of molecules characterized by the repetition of one or more types of monomeric units.

POLYMERIZATION: A chemical reaction in which the molecules of a monomer are linked together to form polymers.

POLYVINYLCHLORIDE: A polymer prepared by the polymerization of vinyl chloride with or without small amounts of other monomers.

RECYCLED PLASTIC: A plastic prepared from discarded articles that have been cleaned and reground.

REPROCESSED PLASTIC: A thermoplastic prepared from usually melt processed scrap or reject parts by a plastics processor, or from non-standard or non-virgin material.

RESIN: Any polymer that is a basic material for plastics.

REWORKED PLASTIC: A plastic from a processor's own production that has been reground, pelletized, or solvated after having been previously processed by molding, extrusion, etc.

SET: Strain remaining after complete release of the force producing the deformation.

STABILIZERS: Chemicals used in plastics formulation to help maintain physical and chemical properties during processing and service life. A specific type of stabilizer, known as an ultraviolet stabilizer, is designed to absorb ultraviolet rays and prevent them from attacking the plastic.

STANDARD DIMENSION RATIO: The ratio of the outside pipe diameter to the wall thickness (D_o/t).

STIFFNESS FACTOR: A physical property of plastic pipe that indicates the degree of flexibility of the pipe, when subjected to external loads. See ASTM D 2412.

STRAIN: The change per unit of length in a linear dimension of a body, that accompanies a stress.

STRESS: When expressed with reference to pipe: the force per unit area in the wall of the pipe in the circumferential orientation due to internal hydrostatic pressure.

STRESS-CRACK: An external or internal crack in a plastic caused by tensile stresses less than its short-time mechanical strength.

STRESS-CRACKING FAILURE: The failure of a material by cracking or crazing some time after it has been placed under load. Time-to-failure may range from minutes to years. Causes include molded-in stresses, postfabrication shrinkage or warpage, and hostile environment.

STRESS RELAXATION: The decrease of stress with respect to time in a piece of plastic that is subject to a constant strain.

TENSILE STRENGTH: The maximum pulling stress or force per unit cross-sectional area that the specimen can withstand before breaking.

THERMOPLASTIC: A plastic that repeatedly can be softened by heating and hardened by cooling through a temperature range characteristic of the plastic, and that in the softened state can be shaped by flow into articles by molding or extrusion.

THERMOSET: A plastic, after being reacted (i.e., cured) cannot be reversed to its original state.

VIRGIN MATERIAL: A plastic material in the form of pellets, granules, powder floc or liquid that has not been subjected to use or processing other than that required for its original manufacture.

REFERENCES:

1. ASTM D 883 Standard Terminology Relating to Plastics
2. ASTM D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
3. ASTM F 412 Standard Terminology Relating to Plastic Piping Systems
4. Glossary Of Terms, Engineering Plastics, Vol. 2 (Engineering Materials Handbook), Pages 2-45
5. Glossary Of Terms, Plastics Pipe Institute, Chapter 13