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An American National Standard

Standard Terminology Relating to Plastic Piping Systems[1]

This standard is issued under the fixed designation F 412; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This terminology is a compilation of definitions of technical terms used in the plastic piping industry. Terms that are generally understood or adequately defined in other readily available sources are not included.

1.2 When a term is used in an ASTM document for which Committee F17 is responsible it is included only when judged, after review, by Subcommittee F17.91 to be a generally usable term.

1.3 Definitions that are identical to those published by other ASTM committees or other standards organizations are identified with the committee number (for example, D20) or with the abbreviation of the name of the organization (for example, IUPAC International Union of Pure and Applied Chemistry).

1.4 A definition is a single sentence with additional information included in notes.

1.5 Definitions are followed by the committee responsible for the standard(s) (for example, [F17.26]) and standard numbers(s) in which they are used (for example, F 714).

2. Referenced Documents

2.1 *ASTM Standards:* [2]

C 114 Test Methods for Chemical Analysis of Hydraulic Cement
D 256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
D 638 Test Method for Tensile Properties of Plastics
D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
D 747 Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
D 882 Test Method for Tensile Properties of Thin Plastic Sheeting
D 883 Terminology Relating to Plastics
D 907 Terminology of Adhesives
D 1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics
D 1238 Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
D 1488 Test Method for Amylaceous Matter in Adhesives
D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
D 1527 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
D 1785 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
D 2104 Specification for Polyethylene (PE) Plastic Pipe, Schedule 40
D 2239 Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
D 2241 Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
D 2282 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe
D 2444 Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)
D 2447 Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
D 2513 Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
D 2661 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings

[1] This terminology is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.91 on Editorial and Terminology.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

D 2666 Specification for Polybutylene (PB) Plastic Tubing
D 2680 Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping
D 2683 Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
D 2737 Specification for Polyethylene (PE) Plastic Tubing
D 2751 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
D 2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
D 2846/D 2846M Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems
D 3035 Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
D 3139 Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
D 3261 Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
D 3309 Specification for Polybutylene (PB) Plastic Hot- and Cold-Water Distribution Systems
D 3350 ~~Specification for Polyethylene Plastics Pipe and Fittings Materials~~ Specification for Polyethylene Plastics Pipe and Fittings Materials
F 402 Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
F 405 Specification for Corrugated Polyethylene (PE) Pipe and Fittings
F 441/F 441M Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
F 442/F 442M Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDRPR)
F 449 Practice for Subsurface Installation of Corrugated Polyethylene Pipe for Agricultural Drainage or Water Table Control
F 628 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core
F 645 Guide for Selection, Design, and Installation of Thermoplastic Water- Pressure Piping Systems
F 714 Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
F 771 Specification for Polyethylene (PE) Thermoplastic High-Pressure Irrigation Pipeline Systems
F 876 Specification for Crosslinked Polyethylene (PEX) Tubing
F 877 Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
F 891 Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core
F 948 Test Method for Time-to-Failure of Plastic Piping Systems and Components Under Constant Internal Pressure With Flow
F 1025 Guide for Selection and Use of Full-Encirclement-Type Band Clamps for Reinforcement or Repair of Punctures or Holes in Polyethylene Gas Pressure Pipe
F 1335 Specification for Pressure-Rated Composite Pipe and Fittings for Elevated Temperature Service
F 1473 Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins
F 1488 Specification for Coextruded Composite Pipe
F 1499 Specification for Coextruded Composite Drain, Waste, and Vent Pipe (DWV)
F 1668 Guide for Construction Procedures for Buried Plastic Pipe
F 1733 Specification for Butt Heat Fusion Polyamide(PA) Plastic Fitting for Polyamide(PA) Plastic Pipe and Tubing
F 1760 Specification for Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content
F 1924 Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing
F 1948 Specification for Metallic Mechanical Fittings for Use on Outside Diameter Controlled Thermoplastic Gas Distribution Pipe and Tubing
F 1970 Specification for Special Engineered Fittings, Appurtenances or Valves for use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems
F 1973 Specification for Factory Assembled Anodeless Risers and Transition Fittings in Polyethylene (PE) and Polyamide 11 (PA11) Fuel Gas Distribution Systems
F 1986 Specification for Multilayer Pipe Type 2, Compression Fittings, and Compression Joints for Hot and Cold Drinking-Water Systems
F 1987 Specification for Multilayer Pipe Type 2, Compression Fittings, and Compression Joints for Hydronic Heating Systems
F 2145 Specification for Polyamide 11 (PA 11) Mechanical Fittings for Use on Outside Diameter Controlled Polyamide 11 Pipe and Tubing
F 2158 Specification for Residential Central-Vacuum Tube and Fittings
F 2160 Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)
F 2176 Specification for Mechanical Couplings Used on Polyethylene Conduit, Duct and Innerduct

2.2 *ISO Standards:*[3]

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

ISO 3 Preferred Numbers
ISO 497 Preferred Numbers
ISO R 161 Pipes of Plastics Materials for the Transport of Fluids (Outside Diameters and Nominal Pressures) Part I, Metric Series
ISO TR 9080 Thermolplastics Pipes for the Transport of Fluids-Methods of Extrapolation of Hydrostatic Stress Rupture Data to Determine the Long-Term Hydrostatic Strength of Thermoplastic Pipe Materials
2.3 *ANSI Standard:*[3]
Z17.1 ANSI Preferred Numbers
2.4 *PPI Standard:*[4]
PPI TR-4

3. Terminology

acceptance testing—testing performed on a product to determine whether or not an individual lot of the product conforms with specified requirements. **[F17]**

DISCUSSION—The number of requirements are usually fewer than for **qualification testing** (see definition).

acetal plastics, *n*—highly crystalline linear thermoplastic homopolymers or copolymers characterized by repeating oxymethylene units. **[F17]**

acrylonitrile-butadiene-styrene (ABS) pipe and fitting plastics —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 styrene content, or both, is 15 %, and the maximum content of all other monomers is not more than 5 %; plus lubricants, stabilizers, and colorants. **[F17.61] D 1527, D 2282 [17.62] D 2680, D 2751**

adhesive—a substance capable of holding materials together by surface attachment. **[F17]**

*adhesive bonded joint***—** see **joint, adhesive bonded**.

*adhesive, solvent***—** see **solvent cement**.

adiabatic extrusion—~~a method of extrusion in which the sole source of heat is the conversion of the drive energy, through viscous resistance of the plastic mass in the extruder. (D20)~~ —a method of extrusion in which, after the extrusion apparatus has been heated sufficiently by conventional means to plastify the material, the extrusion process can be continued with the sole source of heat being the conversion of the drive energy, through viscous resistance of the plastic mass in the extruder. **[D20] D 883**

aging, *n*—(*1*) the effect on materials of exposure to an environment for an interval of time.

(*2*) the process of exposing materials to an environment for an interval of time. ~~(D20)~~ **[D20] D 883**

alloy, *n—in plastics,* two or more immiscible polymers united, usually by another component, to form a plastic ~~vein~~resin having enhanced performance properties. ~~(D20)~~ **[D20] D 883**

antioxidant, *n*—compounding ingredient used to retard deterioration caused by oxidation. ~~(D-11)~~ **[F17]**

apparent density—the weight per unit volume of a material including voids inherent in the material as tested. **[F17]**

DISCUSSION—The term bulk density is commonly used for material such as molding powder. ~~(D20)~~

approving authority—the individual official, board, department, or agency established and authorized by a state, county, city, or other political subdivision, created by law to administer and enforce specified requirements.

artificial weathering—exposure to laboratory conditions, which may be cyclic, involving temperature, relative humidity, radiant energy, or any other conditions or pollutants found in the atmosphere in various geographical areas; or both. **[F17]**

DISCUSSION—The interlaboratory exposure conditions are usually intensified beyond those encountered in actual outdoor exposure in an attempt to achieve an accelerated effect.

backfill—all material used to fill the trench from bedding to finished surface. **[F17.65] F 449, F 1668**

backfill, final—material used to fill the trench from initial backfill to finished surface. **[F17]**

backfill, initial—material used to fill the trench from top of bedding to a designated height over the pipe. **[F17]**

backfill, pipe zone—see **pipe zone backfill** .

backfill, unconsolidated—noncompacted material in place in trench. **[F17]**

beam loading—the application of a load to a pipe between two points of support, usually expressed in newtons (or pounds-force) and the distance between the centers of the supports. **[F17]**

bedding, *n*—~~materials that provide support for buried pipe.~~ —materials placed in the bottom of the trench on top of the foundation soil which provides stable bottom support for buried pipe including the trench bottom groove support angle or select material placed around the pipe, and envelope or filter materials where used during insulation. **[F17.65] F 449, F 1668**

bedding, *v*—placement of support materials for buried pipe. **[F17]**

*bell-and-spigot joint***—** see **joint, bell-and-spigot gasket.**

[4] Available from the Plastic Pipe Institute, 1825 Connecticut Ave., NW Suite 680 Washington, DC 20009

bell end—the enlarged portion of a pipe that resembles the socket portion of a fitting and that is intended to be used to make a joint. **[F17]**

bend—a fitting either molded separately or formed from pipe for the purpose of accommodating a directional change. **[F17]**

DISCUSSION—Also called *ell*, *elbow*, or *sweep.* Bends generally imply fittings of relatively shorter radii than sweeps.

beveled pipe—a pipe with an end chamfered to mate or adjust to another surface or to assist in assembly. **[F17]**

binder—~~in a reinforced plastic, the continuous phase that holds together the reinforcement.~~ binder, *n*—in a reinforced plastic, the continuous phase which holds together the reinforcement. **[D20] D 883**

DISCUSSION—During fabrication, the binder, which may be either thermoplastic or thermoset, usually undergoes a change in state. ~~(D20)~~

blinding—~~placing selected material to completely cover the pipe or tubing.~~ —the placement of soil, bedding material over and on the sides of the pipe, tubing or envelope to ensure proper grade, alignment, support, and protection of pipe during backfilling and after installation. **[F17.65] F 449**

blister, *n*—an imperfection, a rounded elevation of the surface of a plastic, with boundaries that may be more or less sharply defined, somewhat resembling in shape a blister on the human skin. ~~(D20)~~ **[D20] D 883**

bloom, *n*—a visible exudation or efflorescence on the surface of a material. ~~(D20)~~ **[D20] D 883**

blow molding—a method of fabrication in which a heated parison (hollow tube) is forced into the shape of ~~the~~a mold cavity by internal gas pressure. ~~(D20)~~ **[D20] D 883**

blowing agent—a compounding ingredient used to produce gas by chemical or thermal action, or both, in manufacture of hollow or cellular articles. ~~(D20).~~ **[D20] D 883**

brittle failure—a pipe failure mode which exhibits no visible (to the naked eye) permanent material deformation (stretching, elongation, or necking down) in the area of the break. **[F17.40] F 1473**

building drain—that part of the lowest horizontal piping of a drainage system that receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer beyond the foundation walls of the building or structure. **[F17]**

DISCUSSION—The building sewer generally begins 2 to 5 ft beyond the foundation walls.

building drain (sanitary)—a building drain that conveys gray water or sewage, or both. **[F17]**

building drain (storm)—a building drain that conveys storm water only. **[F17]**

building sanitary sewer—that part of the horizontal piping of a sanitary drainage system which extends from the building sanitary drain, receives the discharge of the building sanitary drain, and conveys it to a public sewer, private sewer, individual sewage disposal system, or other point of disposal. **[F17]**

building storm sewer—that part of the horizontal piping of a storm drainage system which extends from the building storm drain, receives the discharge of the building storm drain, and conveys it to a public storm sewer, private storm sewer, or other point of disposal. **[F17]**

building supply—See **water service.**

bulk factor, *n*—the ratio of the volume of a given mass of molding material to its volume in the molded form. **ISO/[D20] D 883**

DISCUSSION—The bulk factor is also equal to the ratio of the density of the material to its apparent density in the unmolded form. ~~(D20, ISO)~~

burst strength—the internal pressure required to cause a pipe or fitting to fail. **[F17]**

DISCUSSION—This pressure will vary with the rate of buildup of the pressure and the time during which the pressure is held.

butt-fused joint— see **joint, butt-fused.**

butylene plastics—plastics based on resins made by the polymerization of butene or copolymerization of butene with one or more unsaturated compounds, the butene being in greatest amount by weight. ~~(D20)~~ **[D20] D 883**

cell, *n*—~~a small partially or completely enclosed cavity. (D20)~~ —a small cavity surrounded partially or completely by walls. **[D20] D 883**

cell, closed—a cell totally enclosed by its walls and hence not interconnecting with other cells. ~~(ISO, D20)(See~~(See also **cell** and **cell, open**.) **ISO/[D20] D 883**

cell, open—a cell not totally enclosed by its walls and hence interconnecting with other cells. ~~(D20)~~ (See also **cell** and **cell, closed**.) **[D20] D 883**

cellular plastic—a plastic containing numerous cells, intentionally introduced, interconnecting or not, distributed throughout the mass. ~~(D20)~~ **[D20] D 883 [17.63] F 628 [17.25] F 891**

cellulose acetate butyrate (CAB) plastics— plastic made by compounding a cellulose acetate butyrate ester with plasticizers and other ingredients. Cellulose acetate butyrate ester is a derivative of cellulose (obtained from cotton or wool pulp, or both) made by converting some of the hydroxyl groups in cellulose to acetate and butyrate groups with chemicals. **[F17]**

central vacuum tubing, *n*—plastic tubing used for residental central vacuum systems in which outside diameter is controlled and where the wall thickness is usually small when compared to the diameter. **[F17.25] F 2158**

chalking, *n—in plastics* , a powdery residue on the surface of a material resulting from degradation or migration of an ingredient, or both. ~~(D20)~~ **[D20] D 883**

DISCUSSION—Chalking may be a designed-in characteristic.

chemical cleaner— see **cleaner, chemical.**

chemical resistance—the ability to resist chemical attack. **[F17]**

DISCUSSION—The attack is dependent on the method of test and its severity is measured by determining the changes in physical properties. Time, temperature, stress, and reagent may all be factors that affect the chemical resistance of a material.

chemically formed polymeric material—a cellular material in which the cells are formed by gases generated from thermal decomposition or other chemical reaction. ~~(D20)~~ **[D20] D 883**

chlorinated poly(vinyl chloride) plastics— plastics based on chlorinated poly(vinyl chloride) in which the chlorinated poly(vinyl chloride) is in the greatest amount by weight. ~~(D20)~~ **[D20] D 883**

chlorofluorocarbon plastics—plastics based on polymers made with monomers composed of chlorine, fluorine, and carbon only. ~~(ISO, D20)~~ **ISO/ [D20] D 883**

chlorofluorohydrocarbon plastics, *n*— plastics based on polymers made with monomers composed of chlorine, fluorine, hydrogen, and carbon only. ~~(ISO, D20)~~ **ISO/[D20] D 883**

cleaner, chemical—an organic solvent used to remove foreign matter from the surface of plastic pipe and fittings. **[F17.20] F 402**

DISCUSSION—Cleaners have essentially no effect on the plastic surface being cleaned and may be used prior to joining with a solvent cement or adhesive.

cleaner, mechanical—an abrasive material or device used to remove foreign matter and gloss from the surface of plastic pipe and fittings. **[F17]**

DISCUSSION—Mechanical cleaners may be used prior to joining with a solvent cement or adhesive.

closed-cell cellular plastics—cellular plastics in which almost all the cells are noninterconnecting. ~~(D20)~~ **[D20] D 883 [F17.63] F 628**

closed-cell foamed plastics—See **closed-cell cellular plastics.**

code—(*1*) a system of symbols, letters or numbers, used to convey a message requiring brevity; (*2*) a set of rules established by a legal or quasi-legal body. **[F17]**

code, classification—a code that identifies a plastic material by its properties in accordance with the pertinent ASTM specification. **[F17]**

code, manufacturer's—a code that provides manufacturing identity for a piping product. **[F17]**

code, thermoplastic pipe materials designation— letters and ciphers for the designation of stress-rated thermoplastic compound, which consists of two or three letters to indicate the abbreviation as listed in Terminology D 1600, for the type of thermoplastic resin—followed by four Arabic numerals—two to describe the short-term properties, in accordance with the ASTM standard being referenced, and two to designate the hydrostatic design stress when tested in water at 73°F (23°C) in units of 100 psi, with any decimal figures dropped. **[F17]**

DISCUSSION—In some ASTM standards, the short-term properties with more than two numbers have a table provided to convert to two numbers to be used in the code.

DISCUSSION—When the hydrostatic design stress code is less than two numbers, a zero is inserted before the number.

DISCUSSION—For polyethylene compound, the short-term properties are described using two Arabic numerals in accordance with Specification D 3350, specifically, the cell classification number value for density followed by the cell classification number value for slow crack growth resistance.

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. **[F17.63] D 2661, F 628 [F17.25] F 891, F 1760 [F17.11] F 1488**

cold flow—See **creep.**

cold molding—a special process of compression molding in which the molding is formed at room temperature and subsequently baked at elevated temperatures. ~~(D20)~~ **[D20] D 883**

collapse, *n*—(*1*) inadvertent densification of cellular material during manufacture resulting from breakdown of cell structure; (*2*) the buckling of the inner liner of composite piping; (*3*) the buckling or flattening of a plastic rehabilitation liner; (*4*) the buckling or crushing of a plastic pipe from external forces, such as earth loads or external hydrostatic load. **[F17]**

compaction, soil—act of packing soil with mechanical force to increase its density. **[F17]**

compatible—(*1*) a condition wherein components of a plastic piping system or different specific plastic materials, or both, can be joined together for satisfactory joints. (*2*) in relation to elastomeric seal joints, a condition wherein the elastomer does not adversely affect the pertinent properties of the plastic pipe or fittings, or both, when the sealing gasket is in intimate contact with the plastic for a prolonged period. **[F17]**

composite pipe—pipe consisting of two or more different materials arranged with specific functional purpose to serve as pipe. **[F17]**

compound, *n*—a mixture of a polymer with other ingredients such as fillers, stabilizers, catalysts, processing aids, lubricants, modifiers, pigments, or curing agents. **[F17.11] F 1488, F 1499**

compression fitting joint—see **joint, compression fitting.**

compression gasket joint—see **joint, compression gasket.**

compression molding—the method of molding a material already in a confined cavity by applying pressure and usually heat. ~~(D20)~~ **[D20] D 883**

~~**conduit**~~conduit, (duct), *n*—a tubular raceway for carrying electric wires, cables, or other conductors. **[F17.10] F 2176 [F17.26] F 2160**

consolidation—reduction in volume of soil as a result of gravitational forces. **[F17]**

contamination—the presence of a substance not intentionally incorporated in a product. **[F17]**

continuous waste—a drain connecting two or more plumbing fixtures or components of plumbing fixtures to a common trap. **[F17]**

crack—any narrow opening or fissure in the surface that is visible to the naked eye. **[F17.65] F 405**

crater, *n*—a small, shallow surface imperfection. ~~(D20)~~ **[D20] D 883**

crazing, *n*—apparent fine cracks at or under the surface of a plastic. **[D20] D 883**

DISCUSSION—The crazed areas are composed of polymeric material of lower density than the surrounding matrix. ~~(D20)~~

creep, *n*~~—the time-dependent part of strain resulting from stress. (D20)~~ —the time-dependent part of strain resulting from stress, that is dimensional change caused by the application of load over and above the elastic deformation and with respect to time. **[D20] D 883, [17.60] F 1025**

cross laminate—a laminate in which some of the layers of material are oriented approximately at right angles to the remaining layers with respect to the grain or strongest direction in tension. (See also **parallel laminate**.) ~~(D20)~~ .) **[D20] D 883**

crosslinking, *n*—the formation of a three dimensional polymer by means of interchain reactions resulting in changes in physical properties. ~~(D20)~~ **[D20] D 883**

cure, *v*—to change the properties of a polymeric system into a more stable, usable condition by the use of heat, radiation, or reaction with chemical additives. ~~(ISO, D20)~~ **ISO/[D20] D 883**

DISCUSSION—Cure may be accomplished, for example, by removal of solvent or by crosslinking.

deadload—the static load imposed on the top of the pipe. **[F17]**

deflection temperature—the temperature at which a specimen will deflect a given distance at a given load under prescribed conditions of test. (See Test Method D 648.) Formerly called heat distortion. **[F17]**

degradation, *n*—a deleterious change in chemical structure, physical properties, or appearance of a plastic. ~~(D20)~~ **[D20] D 883**

denisty, apparent—see **apparent density** .

density of plastics—the weight per unit volume of material at 23°C expressed as D23c, g/cm^3(kg/m ^{3}). **[F17]**

DISCUSSION—Taken from Test Method D 1505.

depth, *n*—in the case of a beam, the dimension parallel to the direction in which the load is applied. ~~(D20)~~ **[D20] D 883**

diffusion—the movement of a material such as a gas or liquid, in the body of a plastic. **[F17]**

DISCUSSION—If the gas or liquid is absorbed on one side of a piece of plastic and given off on the other side, the phenomenon is called permeability. Diffusion and permeability are not due to holes or pores in the plastic.

~~**dimension ratio**—the average specified diameter of a pipe divided by the minimum specified wall thickness.~~ dimension ratio (DR)—the average specified diameter of a pipe or tubing divided by the minimum specified wall thickness. The DR values shall be rounded to the nearest 0.5 unless otherwise specified. **[F17.10] D 2683, D 3261, F 1733 [17.11] D 1488 [F17.26] D 2737, [F17.60] D 2513**

DISCUSSION—Each pipe can have two dimension ratios depending on whether the outside or inside diameter is used. In practice, the outside diameter is used if the standards requirement and manufacturing control are based on this diameter. The inside diameter is used when this measurement is the controlling one.

dry-blend, *n*~~—a free-flowing dry~~ —dry compound prepared without fluxing or addition of solvent (also called powder blend). ~~(D20)~~ **[D20] D 883**

ductile failure—a pipe failure mode which exhibits material deformation (stretching, elongation, or necking down) in the area of the break. **[F17]**

elastomer, *n*—a macromolecular material that at room temperature returns rapidly to approximately its initial dimensions and shape after substantial deformation by a weak stress and release of the stress. ~~(D-11)~~ **[D20] D 883**

elastomeric seal—a material or device that uses an elastomer to effect a seal between separable piping components. **[F17]**

elevated temperature testing—tests on plastic pipe above 23°C (73°F). **[F17]**

embedment—the placement of materials completely around the pipe to provide support. **[F17.62] F 1668**

encasement, *n*—see **incasement,** *n*.

encasement, *v*—see **incasement,** *v.*

engineering plastics, *n*—those plastics and polymeric compositions for which well-defined properties are available, such that engineering rather than empirical methods can be used for design and manufacture of products requiring definite and predictable performance in structural applications over a substantial temperature range. ~~(D20)~~ **[D20] D 883**

envelope, drainage—the materials completely surrounding a pipe to provide support or protection or act as a filter. **[F17]**

environmental stress cracking—the development of cracks in a material that is subjected to stress or strain in the presence of specific chemicals. **[F17]**

ethylene plastics, *n*—plastics based on polymers of ethylene or copolymers of ethylene with other monomers, the ethylene being in greatest amount by mass. ~~(ISO, D20)~~ **ISO/[D20] D 883**

exfiltration, pipe—the passage of fluid from a pipe section through small holes or leaks. **[F17]**

expandable plastic, *n*—a plastic in a form capable of being made cellular by thermal, chemical, or mechanical means. ~~(D20)~~ **[D20] D 883**

expanded plastics— See **cellular plastics.**

extrusion, *n*—~~a process whereby heated or unheated plastic forced through a shaping orifice becomes one continuously formed piece. (D20)~~ —a process in which heated or unheated plastic is forced through a shaping orifice (a die) in one continuously formed shape as film, sheet, rod, or tubing. **[D20] D 883**

extrusion, adiabatic—see **adiabatic extrusion** .

fabricating, *n*—the manufacture of plastic products from molded parts, rods, tubes, sheeting, extrusions, or other forms by appropriate operations such as punching, cutting, drilling, and tapping including fastening plastic parts together or to other parts by mechanical devices, adhesives, heat sealing, or other means. ~~(D20)~~ **[D20] D 883**

failure, adhesive—rupture of an adhesive bond, such that the plane of separation appears to be at the adhesive-adherend interface. **[F17]**

failure, brittle—see **brittle failure**

failure, ductile—see **ductile failure**

failure, slit —see **silt failure**

filler, *n*—a relatively inert material added to a plastic to modify its strength, permanence, working properties, or other qualities or to lower costs. (See also **reinforced plastic**.~~) (D20)~~ .) **[D20] D 883**

fish-eye, *n*—small globular mass that has not blended completely into the surrounding material. ~~(D20)~~ **[D20] D 883**

fitting, *n*—a piping component used to join or terminate sections of pipe or to provide changes of direction or branching in a pipe system. **[F17]**

flanged joint—see **joint, flanged.**

flare joint—see **joint, flare.**

flow rate—rate of extrusion, weight per unit of time, g/10 min (kg/s), of molten resins through a die of specified length and diameter, under prescribed conditions of temperature, load, and piston position in the barrel as the timed measurement is being made. **[F17]**

fluorocarbon plastic, *n*—a plastic based on polymers made with perfluoromonomers. ~~(ISO, D20)~~ **ISO/[D20] D 883**

DISCUSSION—When the monomer is essentially tetrafluoroethylene, the prefix TFE is sometimes used to designate these materials. It is preferable to use the accepted abbreviation, PFTE. TFE should not be used by itself to mean PTFE. When the resins are copolymers of tetrafluoroethylene and hexafluoropropylene, the resins may be designated with the prefix FEP. Other prefixes may be adopted to designate other fluorocarbon plastics.

fluorohydrocarbon plastics, *n*—plastics based on polymers made with monomers composed of fluorine, hydrogen, and carbon only. ~~(ISO, D20)~~ **ISO/[D20] D 883**

fluoroplastic, *n*—a plastic based on polymers made from monomers containing one or more atoms of fluorine, or copolymers of such monomers with other monomers, the fluorine-containing monomer(s) being in the greatest amount by mass. ~~(D20)~~ **[D20] D 883**

DISCUSSION—For specific examples of fluoroplastic see **fluorocarbon plastic, chlorofluorocarbon plastics, fluorohydrocarbon plastics, and chlorofluorohydrocarbon plastic.**

foamed plastics, *n*— See **cellular plastics** (the preferred terminology). ~~(D20)~~

forming, *n*—a process in which the shape of plastic pieces such as sheets, rods, or tubes is changed to a desired configuration. **[D20] D 883**

DISCUSSION—The use of the term "forming" in plastics technology does not include such operations as molding, casting, or extrusion, in which shapes or pieces are made from molding materials or liquids. ~~(D20)~~

frosting, *n*—a light-scattering surface resembling fine crystals. See also **chalking, haze, bloom** .~~(D20)~~ . **[F17]**

fungi resistance—the ability of plastic pipe to withstand fungi growth or their metabolic products, or both, under normal conditions of service or laboratory tests simulating such conditions. **[F17]**

fuse, *v*—(*1*) to convert plastic powder or pellets into a homogeneous mass through heat and pressure; (*2*) to make a plastic piping joint by heat and pressure. **[F17]**

gasket joint—see **joint, compression gasket** and **joint, bell-and-spigot gasket.**

gate, *n*—in an injection mold, a constriction in the flow channel between the runner and the mold cavity. ~~(D20)~~ **[D20] D 883**

gel, *n*—(*1*) a semisolid system consisting of a network of solid aggregates in which liquid is held; (*2*) the initial jelly-like solid phase that develops during the formation of a resin from a liquid; (*3*) with respect to vinyl plastisols, gel is a state between liquid and solid that occurs in the initial stages of heating, or upon prolonged storage. ~~(D20)~~ **[D20] D 883**

DISCUSSION—All three types of gel have very low strengths and do not flow like a liquid. They are soft, flexible, and may rupture under their own weight unless supported externally.

gel point—the stage at which a liquid begins to exhibit pseudo-elastic properties. **[D20] D 883**

DISCUSSION—This stage may be conveniently observed from the inflection point on a viscosity-time plot. (See **gel** (*2*).) ~~(D20)~~).)

~~**gel time**—the time from the initial mixing of the reactants of a plastic or rubber composition to the time when gelation occurs, as measured by a specific test.~~ gel time, *n*—the period of time from the initial mixing of the reactants of a liquid material composition to the time when gelation occurs, as defined by a specific test method. **[D20] D 883**

DISCUSSION—For a material that must be processed by exposure to some form of energy, the zero time is the start of exposure. ~~(D20)~~

glass transition—the reversible change in an amorphous polymer or in amorphous regions of a partially crystalline polymer from (or to) a viscous or rubbery condition to (or from) a hard and relatively brittle one. **[D20] D 883**

DISCUSSION—The glass transition generally occurs over a relatively narrow temperature region and is similar to the solidification of a liquid to a glassy state; it is not a phase transition. Not only do hardness and brittleness undergo rapid changes in this temperature region but other properties, such as thermal expansibility and specific heat also change rapidly. This phenomenon has been called second order transition, rubber transition, and rubbery transition. The word transformation has also been used instead of transition. Where more than one amorphous transition occurs in a polymer, the one associated with segmental motions of the polymer backbone chain or accompanied by the largest change in properties is usually considered to be the glass transition. ~~(D20)~~

glass transition temperature (Tg)—the approximate midpoint of the temperature range over which the glass transition takes place. **[D20] D 883**

DISCUSSION—The glass transition temperature can be determined readily only by observing the temperature at which a significant change takes place in a specific electrical, mechanical, or other physical property. Moreover, the observed temperature can vary significantly depending on the specific property chosen for observation and on details of the experimental technique (for example, rate of heating, frequency). Therefore, the observed Tg should be considered only an estimate. The most reliable estimates are normally obtained from the loss peak observed in dynamic mechanical tests or from dialatometric data. ~~(D20)~~

graft copolymer—a copolymer in which polymeric side chains have been attached to the main chain of a polymer of different structure. ~~(D20)~~ **[D20] D 883**

gray water—the waste water of a system that may be a combination of the liquid and water-carried wastes except human wastes. **[F17]**

groove angle—the angle of support for a pipe when a formed groove is made in bedding or foundation. **[F17]**

gusset, *n*—(*1*) a piece used to give additional size or strength in a particular location of an object.

(*2*) the folded-in portion of flattened tubular film. ~~(D20)~~ **[D20] D 883**

haunching—the act of placing bedding material around the haunch of the pipe. **[F17]**

haunch—that portion of the pipe barrel extending from bottom to springline. **[F17]**

haze—the cloudy or turbid aspect or appearance of an otherwise transparent specimen caused by light scattered from within the specimen or from its surfaces. ~~(D20)~~ **[D20] D 883**

DISCUSSION—For the purpose of Test Method D 1003, haze is the percentage of transmitted light which, in passing through the specimen, deviates from the incident beam through forward scatter more than 2.5° on the average.

heat-fused joint—see **joint, heat-fused.**

heat joining—making a joint by heating the mating surfaces of the pipe components to be joined and pressing them together so that they fuse and become essentially one piece. **[F17]**

DISCUSSION—Also known as heat fusion, thermal fusion, and fusion.

heat mark—extremely shallow depression or groove in the surface of a plastic visible because of a sharply defined rim or a roughened surface. (See also **sink-mark.**) ~~(D20)~~) **[D20] D 883**

high-density polyethylene plastics (HDPE), *n*—those linear polyethylene plastics, g.v., having a standard density of 0.941 g/cm^3 ~~or greater. (D20)~~ or greater. **[D20] D 883**

homopolymer, *n*—a polymer resulting from polymerization involving a single monomer. ~~(D20)~~ **[D20] D 883**

hoop stress—the tensile stress in the wall of the ~~pipe~~ piping product in the circumferential ~~orientation~~direction due to internal hydrostatic pressure. **[F17.48] D 2837, F 948**

DISCUSSION—~~Hydrostatic means fluid and is not limited to water.~~ —Hydrostatic means fluid and is not limited to water. Units will be reported as pounds per square inch (psi) or mega pascals (Mpa). Hoop stress is calculated by using ISO equation. Hoop stress should only be determined on straight hollow cylindrical specimens. Products of more complex shape may be evaluated by Option 2 of Appendix X1 of F 948 based on pressure.

hydrostatic design basis—one of a series of established stress values specified in Test Method D 2837 for a plastic compound obtained by categorizing the long-term hydrostatic strength determined in accordance with Test Method D 2837. **[F17.48] D 2837**

hydrostatic design stress (HDS)—the estimated maximum tensile stress the material is capable of withstanding continuously with a high degree of certainty that failure of the pipe will not occur. This stress is circumferential when internal hydrostatic water pressure is applied. **[D20.23] D 2104 [F17.25] D 1785, D 2241, F 442/F 442M [F17.26] D 2239, D 2447, D 2666, D 2737, D 3035, F 441/F 441M, F 876, [F17.40] D 2837 [F17.61] D 2282, F 771, D 1527**

impact, Izod—a specific type of impact test made with a pendulum-type machine on a cantilever beam specimen and also the values obtained by this method. **[F17]**

Discussion—See Test Methods D 256.

impact, tup—a falling weight (tup) impact test developed specifically for pipe and fittings. **[F17]**

Discussion—There are several variables that can be selected. (See Test Method D 2444.)

incasement, *n*—a rigid structure or pipe surrounding a buried pipe to provide additional support or protection. **[F17]**

incasement, *v*—placement of a rigid structure or pipe surrounding a buried pipe to provide additional support or protection. **[F17]**

infiltration, pipe—the passage of fluid into a pipe section through small holes or leaks. **[F17]**

inhibitor, *n*—a substance used in low concentration which suppresses a chemical reaction. ~~(D20)~~ **[D20] D 883**

Discussion—Inhibitors, unlike catalysts, are consumed during the reaction.

injection molding, *n*~~—the process of forming a material by forcing it, under pressure, from a heated cylinder through a sprue (runner, gate) into the cavity of a closed mold. (D20)~~ —the process of forming a material by forcing it, in a fluid state and under pressure, through a runner system (sprue, runner, gate(s)) into the cavity of a closed mold. **[D20] D 883**

insert, *n*—a part consisting of metal or other material ~~that~~which may be molded into position or may be pressed into the molding after the completion of the molding operation. ~~(D20, ISO)~~ **ISO [D20] D 883**

insert-fitting joint— see **joint, clamped insert-fitting.**

ISO equation—an equation showing the interrelations between stress, pressure and dimensions in pipe, namely:

$$S = P\ (ID + t)$$
~~2t~~
t *for inside diameter controlled pipe*

or

$$S = P\ (OD - t)$$
~~2t~~
2*t for outside diameter controlled pipe*

where:
S = hoop stress,
P = pressure,
ID = average inside diameter,
OD = average outside diameter, and
t = minimum wall thickness.

(See ISO R 161.) **[F17.25] D 1785, F 441/F 441M, F 442/F 442M [F17.26] D 2104, D 2239, D 2447, D 2666, D 2737, D 3035, F 714, F 876 [F17.61] D 1527, D 2282, D 2846/D 2846M, D 3309, F 645, F 771, F 877**

isotactic, *adj*—pertaining to a type of polymeric molecular structure containing a sequence of regularly spaced asymmetric atoms arranged in like configuration in a polymer chain. **[D20] D 883**

joint—the location at which two pieces of pipe or a pipe and a fitting are connected together. **[F17.10] F 2145 [F17.60] F 1924, F 1948, F 1973**

Discussion—The joint may be made by an adhesive, a solvent-cement, heat joining, or a mechanical device such as threads or a ring seal.

joint, adhesive-bonded—a joint made using an adhesive to bond the piping components. **[F17]**

joint, bell and spigot gasket—a connection between piping components consisting of a bell end on one component, an elastomeric gasket between the components, and a spigot end on the other component. See *joint, push on*. **[F17]**

joint, butt-fused—a joint in which the prepared ends of the joint components are heated and then placed in contact to form the joint. (See Fig. 1.) **[F17]**

joint, compression—a mechanical joint made by deforming a sealing member to form a pressure seal between the fitting or pipe bell and the pipe or tube ~~(see~~(See Fig. 2). **[F17]**

Discussion—Compression joints include, but are not limited to, insert fitting joints, compression gasket joints and flare joints.

joint, compression gasket—a mechanical joint that utilizes a compression nut or a gland nut against a gasket to develop a pressure

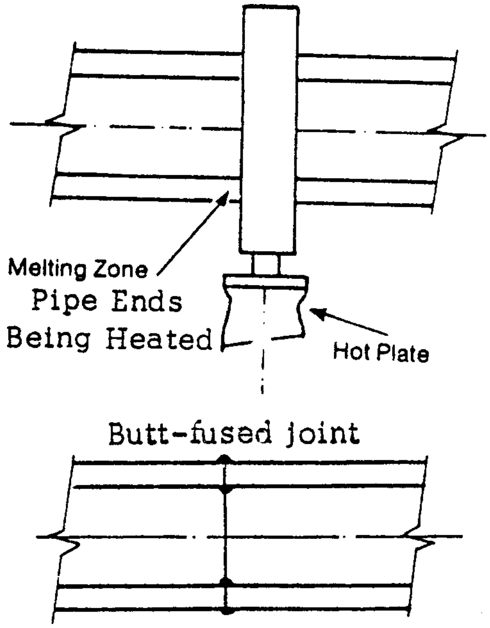

FIG. 1 Butt Fusion

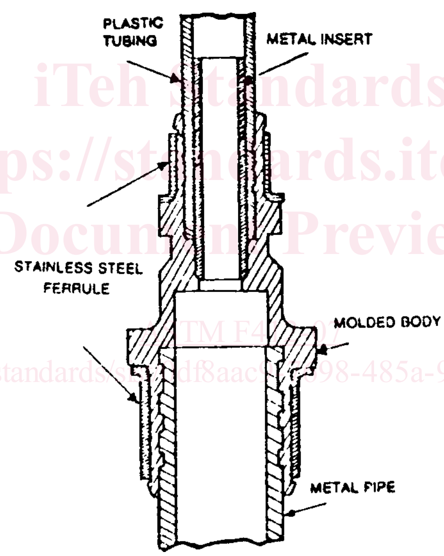

FIG. 2 Compression Fitting

seal. **[F17]**

Discussion—There are currently available various designs of compression gasket joints in fittings, transition fittings, and couplings.

joint, flanged—a mechanical joint using pipe flanges, a gasket, and bolts. **[F17]**

Discussion—The flanges are normally fastened to the pipe or fittings but there are some systems in which the flanges are free to rotate.

joint, flare—a mechanical compression connection between flared-end plastic pipe and a fitting specifically designed to accept flared-end plastic pipe. (See Fig. 3.) **[F17]**

Discussion—A special tool is used to flare plastic pipe.

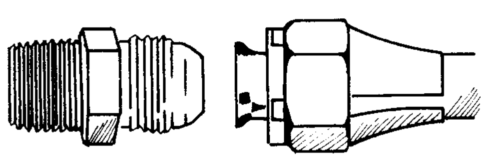

FIG. 3 Flare Joint