



## Standard Terminology Relating to Plastic Piping Systems<sup>1</sup>

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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 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 F-17 is responsible it is included only when judged, after review, by Subcommittee F17.94 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, D-20) 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.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- C 114 Test Methods for Chemical Analysis of Hydraulic Cement<sup>2</sup>
- D 256 Test Methods for Impact Resistance of Plastics and Electrical Insulating Materials<sup>3</sup>
- D 638 Test Method for Tensile Properties of Plastics<sup>3</sup>
- D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load<sup>3</sup>
- D 747 Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam<sup>3</sup>
- D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials<sup>3</sup>
- D 882 Test Methods for Tensile Properties of Thin Plastic Sheeting<sup>3</sup>
- D 1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics<sup>3</sup>
- D 1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer<sup>3</sup>
- D 1505 Test Method for Density of Plastics by the Density-

#### Gradient Technique<sup>3</sup>

D 2444 Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)<sup>4</sup>

D 2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials<sup>4</sup>

#### 2.2 ISO Standards:<sup>5</sup>

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 Thermoplastics 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:<sup>5</sup>

Z17.1 ANSI Preferred Numbers

#### 2.4 PPI Standard:<sup>6</sup>

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.

**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.

**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.

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

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

<sup>1</sup> This terminology is under the jurisdiction of ASTM Committee F-17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.94 on Terminology.

Current edition approved . . . . . Published . . . . . Originally published as F 412 – 75b. Last previous edition F 412 – 94b.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 08.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 08.04.

<sup>5</sup> Available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.

<sup>6</sup> Available from the Plastic Pipe Institute, 1825 Connecticut Ave., NW Suite 680 Washington, DC 20009

*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. (D-20)

**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. (D-20)

**alloy, n**—in *plastics*, two or more immiscible polymers united, usually by another component, to form a plastic vein having enhanced properties. (D-20)

**antioxidant**—compounding ingredient used to retard deterioration caused by oxidation. (D-11)

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

DISCUSSION—The term bulk density is commonly used for material such as molding powder. (D-20)

**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.

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.

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

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

**backfill, unconsolidated**—noncompacted material in place in trench.

**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.

**bedding, n**—materials that provide support for buried pipe.

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

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

**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.

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

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.

**binder**—in a reinforced plastic, the continuous phase that holds together the reinforcement.

DISCUSSION—During fabrication, the binder, which may be either thermoplastic or thermoset, usually undergoes a change in state. (D-20)

**blinding**—placing selected material to completely cover the pipe or tubing.

**blister, n**—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. (D-20)

**bloom, n**—a visible exudation or efflorescence on the surface of a material. (D-20)

**blow molding**—a method of fabrication in which a parison (hollow tube) is forced into the shape of the mold cavity by internal gas pressure. (D-20)

**blowing agent**—a compounding ingredient used to produce gas by chemical or thermal action, or both, in manufacture of hollow or cellular articles. (D-20).

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

**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.

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.

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

**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.

**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.

*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.

DISCUSSION—The bulk factor is also equal to the ratio of the density of the material to its apparent density in the unmolded form. (D-20, ISO)

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

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. (D-20)

**cell, n**—a small partially or completely enclosed cavity. (D-20)

**cell, closed**—a cell totally enclosed by its walls and hence not

interconnecting with other cells. (ISO, D-20)(See also **cell** and **cell, open**.)

**cell, open**—a cell not totally enclosed by its walls and hence interconnecting with other cells. (D-20) (See also **cell** and **cell, closed**.)

**cellular plastic**—a plastic containing numerous cells, intentionally introduced, interconnecting or not, distributed throughout the mass. (D-20)

**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.

**chalking, *n*—in plastics**, a powdery residue on the surface of a material resulting from degradation or migration of an ingredient, or both. (D-20)

DISCUSSION—Chalking may be a designed-in characteristic.

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

**chemical resistance**—the ability to resist chemical attack.

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. (D-20)

**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. (D-20)

**chlorofluorocarbon plastics**—plastics based on polymers made with monomers composed of chlorine, fluorine, and carbon only. (ISO, D-20)

**chlorofluorohydrocarbon plastics, *n***—plastics based on polymers made with monomers composed of chlorine, fluorine, hydrogen, and carbon only. (ISO, D-20)

**cleaner, chemical**—an organic solvent used to remove foreign matter from the surface of plastic pipe and fittings.

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.

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. (D-20)

**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.

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

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

**code, thermoplastic pipe materials designation**—ciphers and letters 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.

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

**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.

**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. (D-20)

**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.

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

**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.

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

**compound, *n***—a mixture of a polymer with other ingredients such as fillers, stabilizers, catalysts, processing aids, lubricants, modifiers, pigments, or curing agents.

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

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

**compression molding**—the method of molding a material in a confined cavity by applying pressure and usually heat. (D-20)

**conduit**—a tubular raceway for carrying electric wires, cables, or other conductors.

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

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

**continuous waste**—a drain connecting two or more plumbing



fixtures or components of plumbing fixtures to a common trap.

**crack**—any narrow opening or fissure in the surface that is visible to the naked eye.

**crater**, *n*—a small, shallow surface imperfection. (D-20)

**crazing**, *n*—apparent fine cracks at or under the surface of a plastic.

DISCUSSION—The crazed areas are composed of polymeric material of lower density than the surrounding matrix. (D-20)

**creep**, *n*—the time-dependent part of strain resulting from stress. (D-20)

**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**.) (D-20)

**crosslinking**, *n*—the formation of a three dimensional polymer by means of interchain reactions resulting in changes in physical properties. (D-20)

**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, D-20)

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.

**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.

**degradation**, *n*—a deleterious change in chemical structure, physical properties, or appearance of a plastic. (D-20)

**density of plastics**—the weight per unit volume of material at 23°C expressed as D23c, g/cm<sup>3</sup>(kg/m<sup>3</sup>).

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. (D-20)

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

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.

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 compound prepared without fluxing or addition of solvent (also called powder blend). (D-20)

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

**elastomer**, *n*—a macromolecular material that returns rapidly to approximately its initial dimensions and shape after

substantial deformation by a weak stress and release of the stress. (D-11)

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

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

**embedment**—the placement of materials completely around the pipe to provide support.

**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. (D-20)

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

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

**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, D-20)

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

**expandable plastic**, *n*—a plastic in a form capable of being made cellular by thermal, chemical, or mechanical means. (D-20)

*expanded plastics*—See **cellular plastics**.

**extrusion**, *n*—a process whereby heated or unheated plastic forced through a shaping orifice becomes one continuously formed piece. (D-20)

**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. (D-20)

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

**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**.) (D-20)

**fish-eye**, *n*—small globular mass that has not blended completely into the surrounding material. (D-20)

**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.

*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.

**fluorocarbon plastic**, *n*—a plastic based on polymers made

with perfluoromonomers. (ISO, D-20)

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, D-20)

**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. (D-20)

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). (D-20)

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

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. (D-20)

**frosting**, *n*—a light-scattering surface resembling fine crystals. See also **chalking**, **haze**, **bloom**. (D-20)

**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.

**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.

**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. (D-20)

**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. (D-20)

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.

DISCUSSION—This stage may be conveniently observed from the inflection point on a viscosity-time plot. (See **gel** (2).) (D-20)

**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.

DISCUSSION—For a material that must be processed by exposure to some form of energy, the zero time is the start of exposure. (D-20)

**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.

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. (D-20)

**glass transition temperature (T<sub>g</sub>)**—the approximate midpoint of the temperature range over which the glass transition takes place.

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 T<sub>g</sub> should be considered only an estimate. The most reliable estimates are normally obtained from the loss peak observed in dynamic mechanical tests or from dilatometric data. (D-20)

**graft copolymer**—a copolymer in which polymeric side chains have been attached to the main chain of a polymer of different structure. (D-20)

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

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

**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. (D-20)

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

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

**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. (D-20)

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.

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.**) (D-20)

**high-density polyethylene plastics (HDPE), n**—those linear polyethylene plastics, having a standard density of 0.941 g/cm<sup>3</sup> or greater. (D-20)

**homopolymer, n**—a polymer resulting from polymerization involving a single monomer. (D-20)

**hoop stress**—the tensile stress in the wall of the pipe in the circumferential orientation due to internal hydrostatic pressure.

DISCUSSION—Hydrostatic means fluid and is not limited to water.

**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.

**hydrostatic design stress**—the recommended maximum hoop stress that can be applied continuously with a high degree of certainty that failure of the pipe will not occur.

**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.

DISCUSSION—See Test Methods D 256.

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

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.

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

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

**inhibitor, n**—a substance used in low concentration which suppresses chemical reaction. (D-20)

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. (D-20)

**insert, n**—a part consisting of metal or other material that may be molded into position or may be pressed into the molding after the completion of the molding operation. (D-20, ISO)

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

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

$$S = \frac{P (ID + t)}{2t}$$

or

$$S = \frac{P (OD - t)}{2t}$$

where:

S = hoop stress,

P = pressure,

ID = average inside diameter,

OD = average outside diameter, and

t = minimum wall thickness.

(See ISO R 161.)

**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.

**joint**—the location at which two pieces of pipe or a pipe and a fitting are connected together.

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.

**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.*

**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.)

**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 Fig. 2).

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 seal.

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.

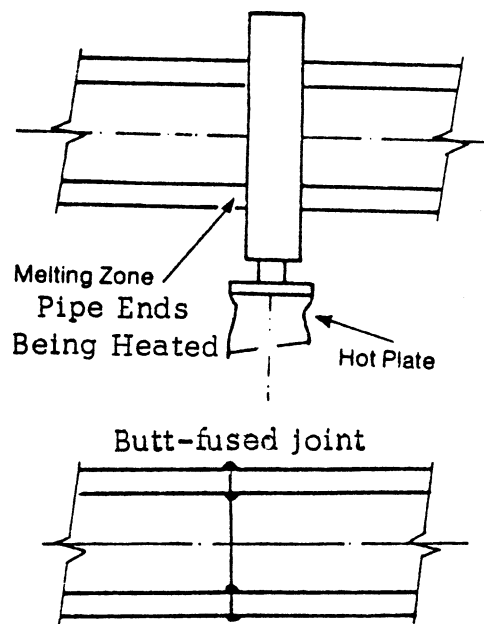


FIG. 1 Butt Fusion