COMMERCIAL STANDARD CS270-65

Acrylonitrile-Butadiene-Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and Fittings

A recorded voluntary standard of the trade published by the U.S. Department of Commerce

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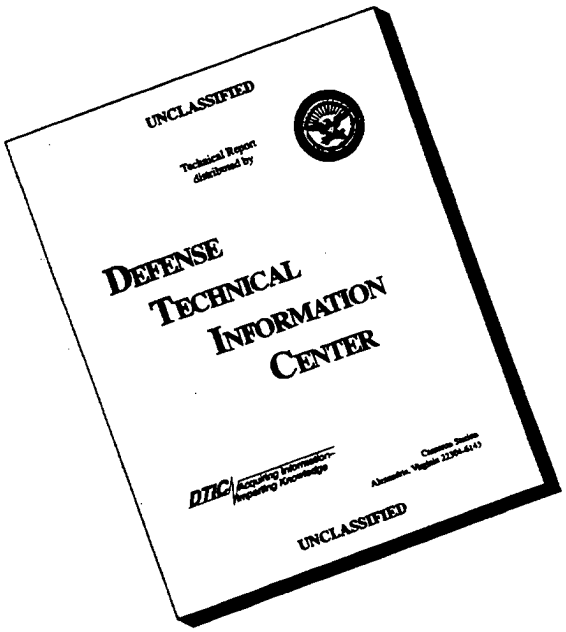

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U.S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

Office of Commodity Standards

EFFECTIVE DATE

Having been passed through the regular procedures of the Office of Commodity Standards (formerly the Commodity Standards Division, Office of Technical Services; transferred to the National Bureau of Standards July 1, 1963), and approved by the acceptors hereinafter listed, this Commercial Standard is issued by the U.S. Department of Commerce, effective April 1, 1965.

JOHN T. CONNOR, *Secretary.*

COMMERCIAL STANDARDS

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Office of Commodity Standards of the National Bureau of Standards. Their purpose is to establish quality criteria, standard methods of test, rating, certification, and labeling of manufactured commodities, and to provide uniform bases for fair competition.

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Under a similar procedure the Office of Commodity Standards cooperates with industries in the establishment of Simplified Practice Recommendations. Their purpose is to eliminate avoidable waste through the establishment of standards of practice for sizes, dimensions, varieties, or other characteristics of specific products to simplify packaging practices; and to establish simplified methods of performing specific tasks.

The initial printing of CS270–65 was made possible through the Plastics Pipe Institute, A Division of The Society of The Plastics Industry, Inc.

Acrylonitrile-Butadiene-Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and Fittings

(Effective April 1, 1965)

1. PURPOSE

1.1 The purpose of this Commercial Standard is to establish, on a national basis, standard dimensions and significant quality requirements for acrylonitrile-butadiene-sytrene (ABS) plastic drain, waste, and vent (DWV) pipe and fittings. It is also intended to inform producers, distributors, engineers, code officials, and users of the significant qualities of this product, to assist buyers and vendors in obtaining and vending quality merchandise for the benefit of the user, and to promote understanding among all these groups concerning commercially available ABS plastic DWV pipe and fittings.

2. SCOPE

2.1 This Commercial Standard covers requirements and methods of test for materials, dimensions and tolerances, deflection load, crush resistance, hydrostatic burst resistance, chemical resistance, water resistance, flattening resistance, impact resistance, joint tightness, and solvent cement. A form of marking to indicate compliance with this standard is also included. Installation procedures are given in Appendix I and the recommended safety precautions for using the cement are given in Appendix II.

3. TERMINOLOGY

3.1 The plastics terminology used in this Commercial Standard is in accordance with the definitions given in Tentative Definitions of Terms Relating to Plastics (ASTM Designation: D883–62T), unless otherwise indicated.[1]

3.2 The plumbing terminology used in this Commercial Standard is in accordance with the definitions given in National Plumbing Code, Minimum Requirements for Plumbing (ASA A40.8–1955), unless otherwise indicated.[2]

4. USES

4.1 The requirements of this standard are intended to provide pipe and fittings suitable for drainage, waste, and vent piping systems in the drainage of sewage and certain other liquid wastes where toughness, resistance to deterioration from water and chemicals, flattening and aging resistance, and strong tight joints are required.

[1] Copies of ASTM publications are obtainable from The American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa., 19103.

[2] Copies of ASA publications are obtainable from the American Standards Association, 10 East 40th St., New York, N.Y., 10016.

5. MATERIAL REQUIREMENTS

5.1 **Pipe.**—The pipe shall be made of virgin black ABS plastic meeting the requirements of Type I, Grade 2 Tentative Specification for Rigid Acrylonitrile-Butadiene-Styrene (ABS) (ASTM Designation: D1788–62T). This plastic may contain stabilizers, lubricants, and pigments. Test specimens shall be molded under conditions specified by the manufacturer from the extrusion compound, or be cut from sections of finished pipe. In all cases of disagreement, test specimens molded under conditions specified by the manufacturer shall be used.

5.2 **Fittings.**—The fittings shall be made of virgin black or gray ABS plastic of a grade suitable for injection molding. This plastic may contain stabilizers, lubricants, and pigments. Test specimens molded under conditions specified by the manufacturers or cut from finished molded fittings shall have the following properties:

5.2.1 **Deflection temperature.**—The average deflection temperature shall not be less than 85 °C (185 °F) when tested in accordance with paragraph 8.4.

5.2.2 **Impact resistance.**—The average Izod impact resistance shall be not less than 4.0 ft-lb/in. of notch at 23 °C (73.4 °F) and 1.0 ft.-lb/in. of notch at −40 °C (−40 °F) when tested in accordance with paragraph 8.5.

5.2.3 **Tensile properties.**—The average tensile strength and modulus of elasticity shall be not less than 4800 psi and 210,000 psi, respectively, when tested in accordance with paragraph 8.6.

5.3 **Rework material.**—Clean, rework material, generated from the manufacturer's own pipe or fitting production, may be used by the same manufacturer, provided that the pipe or fittings produced meet all the requirements of this standard.

6. PHYSICAL AND CHEMICAL REQUIREMENTS

6.1 **General.**—The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

6.2 **Dimensions and tolerances.**—

6.2.1 **Pipe**

6.2.1.1 **Pipe diameters.**—The outside diameter of the pipe shall meet the requirements given in Table 1 when measured in accordance with paragraph 8.7.

6.2.1.2 **Pipe wall thicknesses.**—The wall thickness of the pipe shall meet the requirements given in table 1 when measured in accordance with paragraph 8.7.

6.2.1.3 **Pipe length.**—The pipe shall be in either 10-foot or 20-foot lengths, unless otherwise specified, when measured in accordance with paragraph 8.7 with allowable tolerance of +½ inch, minus 0 inch.

6.2.2 **Fittings**

6.2.2.1 **Fitting socket dimensions.**—The socket dimensions of fittings shall meet the requirements given in table 2 when measured in accordance with paragraph 8.7.

6.2.2.2 **Fitting laying length dimensions.**—The laying dimensions of fittings shall conform to the requirements given in tables 3 and 4.[3]

[3] Fittings other than the standard fitting shown in tables 3 and 4 are available. Laying lengths for these fittings are determined by the individual manufacturers.

6.2.2.3 **Transition adapters.**—The dimensions of adaptors for connecting plastic pipe to cast iron and clay hubs and spigots shall conform to the dimensions given in table 5.

TABLE 1. *Dimensions and tolerances for ABS plastic drain, waste, and vent pipe*

Nominal pipe size	Outside diameter			Minimum wall thickness
	Average	Tolerance on average	Permissible deviations of diameter from measured average (out-of-roundness)	
inch	*inch*	*inch*	*inch*	*inch*
1¼	1.660	+.010 −.000	±.012	0.140
1½	1.900	+.010 −.000	±.012	0.145
2	2.375	+.010 −.000	±.012	0.154
3	3.500	+.015 −.000	±.015	0.216
4	4.500	+.015 −.000	+.015	0.237

TABLE 2. *Dimensions and tolerances for fitting sockets for ABS plastic drain, waste, and vent pipe fittings (inches)*

Size	Socket entrance diam.		Socket bottom diam.		Socket depth	Wall thickness	Internal thread length
	Average [1]	T_m [2]	*Average* [3]	T_m [2]	*Min.*	*Min.* [4]	*Min.*
1¼	1.670	±.012	1.655	±.012	1 1/16	5/32	1 1/16
1½	1.910	±.012	1.895	±.012	1 1/16	5/32	1 1/16
2	2.385	±.012	2.370	±.012	¾	5/32	¾
3	3.515	±.015	3.495	±.015	1½	7/32	1 5/16
4	4.515	±.015	4.495	±.015	1¾	¼	1 9/32

[1] Average is the maximum plus the minimum diameters divided by 2. The tolerance on this average is +0.010 to −0.005 inch.
[2] T_m = Permissible deviation of diameter from measured average, often called out-of-roundness.
[3] Tolerance on average ±0.005 inch for 1¼ through 2 inch sizes; +0.005 −0.010 inch for 3 and 4 inch sizes.
[4] This minimum wall thickness requirement applies throughout the fitting.

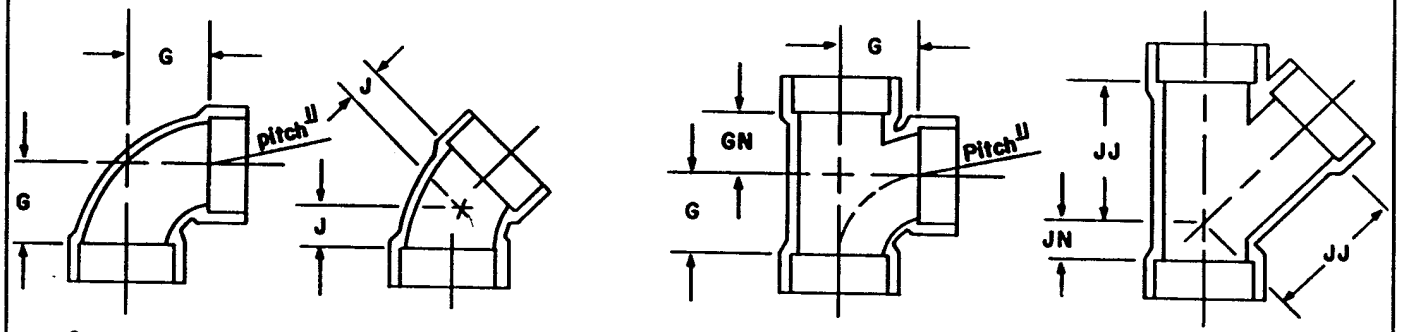
6.3 **Deflection load and crush resistance**

6.3.1 **Pipe.**—The pipe shall support a minimum load of 1000 pounds per linear foot at 15 percent deflection of the original diameter (deflection load) and shall deflect 60 percent of the original diameter (crush resistance) without cracking, rupture, or other visible evidence of failure when tested in accordance with section 8.8. (This test is intended only for use as a quality control test, not for use as a simulated service test.)

6.3.2 **Fittings.**—Individual fittings unassembled shall withstand a minimum load of 750 pounds per foot of length without cracking or other visible evidence of failure when tested in accordance with section 8.8. (This test is intended only for use as a quality control test, not for use as a simulated service test.)

6.4 **Minimum hydrostatic burst pressure.**—When tested at 23 °C (73.4 °F) in accordance with paragraph 8.9, the minimum burst

TABLE 3. Laying Length Dimensions for ABS Plastic Drainage Pipe Fittings[1]

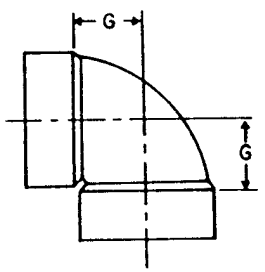


90° Long Elbow | 45° Long Elbow | 90° Short Y-Branch | 45° Y-Branch

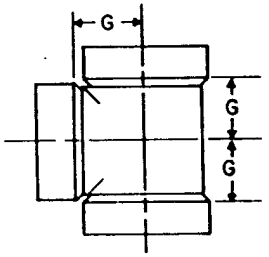
Size	G	J	GN Min.	JJ	JN	Laying Length, Tolerance, Center Line to Socket Bottom
1-1/4	1-9/16	1-1/16	11/16	2-9/16	1-1/16	± 5/32
1-1/2	1-25/32	1-5/32	15/16	2-29/32	1-5/32	± 3/16
2	2-5/16	1-1/2	1-5/16	3-5/8	1-3/8	± 3/16
3	3-1/16	1-3/4	1-11/16	5-5/32	1-9/16	± 1/4
4	3-7/8	2-7/32	2-3/16	6-13/32	1-29/32	± 1/4

[1] All dimensions are in inches. The pitch of socket for parts with 90° angles shall be 1/4 inch per foot or 1 degree 12 minutes.

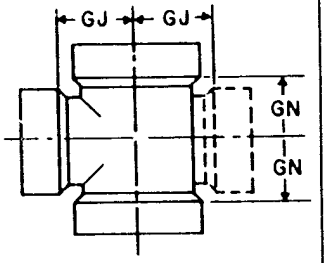
TABLE 4. Laying Length Dimensions for Plastic Vent Fittings[1]



1/4 BEND
VENT



TEE VENT

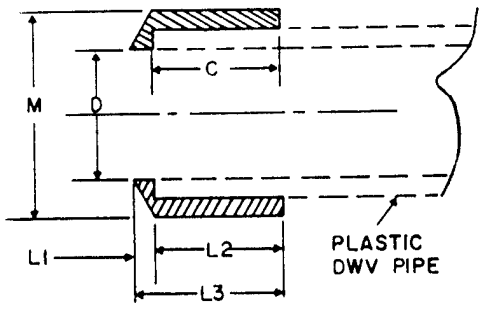


TEE VENT
REDUCING
SINGLE & DOUBLE

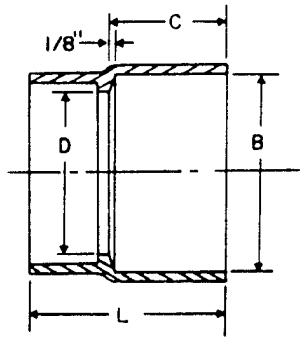
Size	G Min.	GN Min.	GJ Min.
1-1/4	7/8	-----	-----
1-1/2	1	-----	-----
2	1-1/4	-----	-----
3	1-13/16	-----	-----
3 x 3 x 1-1/2	-----	1	1-13/16
3 x 3 x 2	-----	1-1/4	1-13/16

[1]All dimensions are in inches.

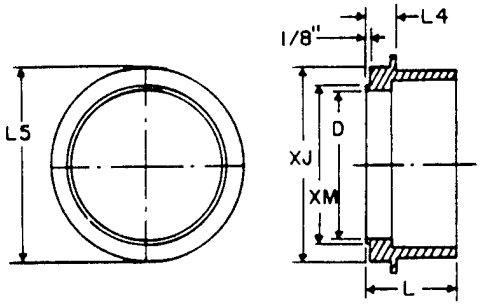
TABLE 5. Transition Adapters



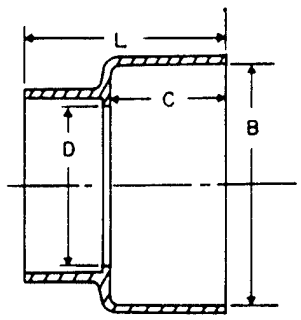
PLASTIC ADAPTER
Cemented over end of plastic pipe to adapt it for connection to cast iron hub.



PLASTIC HUB
Adapts cast iron spigot to plastic pipe.



PLASTIC ADAPTER
Cements over end of plastic pipe to adapt it for connection to clay pipe hub.



PLASTIC HUB
Adapts clay pipe spigot to plastic pipe.

TABLE 5. TRANSITION ADAPTERS (Cont.)[1]

PLASTIC ADAPTER FOR CAST IRON						
SIZE	C Min.	D Min.	M Min.	L1 Min.	L2 Min.	L3 Min.
2	13/16	2-1/16	2-5/8	1/8	7/8	1
3	13/16	3-1/16	3-3/4	1/8	7/8	1
4	13/16	4-1/32	4-3/4	1/8	7/8	1

PLASTIC HUB FOR CAST IRON				
SIZE	L Min.	B Min.	C Min.	D Min.
2	3-1/2	2-15/16	2-1/2	2-1/16
3	4-3/8	3-15/16	2-3/4	3-1/16
4	4-7/8	4-15/16	3	4-1/32

PLASTIC ADAPTER FOR CLAY PIPE						
SIZE	L Min.	D Min.	XM Min.	XJ Min.	L4 Min.	L5 Min.
4	2-7/16	4	4-1/4	5-1/4	13/16	5-7/8

PLASTIC HUB FOR CLAY PIPE				
SIZE	L Min.	B Min.	C Min.	D Min.
4	5	6-1/8	3	4-1/32

[1]All dimensions are in inches.

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pressure of pipe shall be in accordance with table 6, and the minimum burst pressure of fittings shall be 200 psi.[4]

TABLE 6. *Minimum hydrostatic burst pressure of pipe at 23 °C (73.4 °F)*

Size, inch	Burst pressure,[a] min., psi
1¼	970
1½	870
2	730
3	690
4	580

[a] These burst pressures are calculated in accordance with Tentative Recommended Practice for Calculating Stress in Plastic Pipe under Internal Pressure (ASTM Designation: D2153-63T) using a hoop stress of 5240 psi. This practice is based on the "ISO equation."

6.5 **Chemical resistance.**—The pipe and fittings shall not increase in weight more than 0.50 percent and shall not change in deflection load and crush resistance more than ±15 percent when tested in accordance with paragraph 8.10.

6.6 **Water resistance**

6.6.1 **Water absorption.**—The pipe and fittings shall not increase in weight more than 0.50 percent when tested in accordance with paragraph 8.11.1.

6.6.2 **Wet deflection load and crush resistance.**—The minimum deflection load and crush resistance of wet specimens of pipe and fittings shall be within ±5 percent of the actual average deflection load and average crush resistance of dry specimens when tested in accordance with paragraph 8.11.2.

6.7 **Flattening resistance.**—The average decrease in inside diameter of pipe and fittings shall not exceed 10 percent when tested in accordance with paragraph 8.12.

6.8 **Impact resistance.**—The minimum impact resistance of pipe and fittings shall be in accordance with table 7 when tested in accordance with section 8.13. (This test is intended only for use as a quality control test, not for use as a simulated service test.)

6.9 **Joint-tightness.**—Joints made with pipe and fittings shall not leak when tested with an internal pressure of 25 psi in accordance with paragraph 8.14. (This test is intended only for use to evaluate the ability of the cement to produce tight joints between the pipe and the fittings, not for use as a simulated service test.)

7. SOLVENT CEMENT REQUIREMENTS

7.1 **Solvent cement.**—The solvent cements for use with this pipe and these fittings shall be those recommended by manufacturers for use on ABS plastic pipe and fittings, and shall meet the requirements of Tentative Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings (ASTM Designation: D2235–63T).[5]

[4] The minimum burst pressures for fittings are lower than that for pipe because the geometry is such, particularly area and radii, that the stresses produced in the walls of the fitting are higher than those produced in pipe tested at the same internal pressures. (This requirement is intended only for the purpose of quality control to insure that the pipe and fittings have no weak areas, particularly at flow and weld lines. It is not intended for use as a simulated service test.)

[5] The solvent cement will provide sufficient open time for making good joints and connections but joints should be completed immediately upon applying solvent cement. Should any delay develop in assembly, an additional coat of solvent cement should be applied immediately prior to joining.

CAUTION: If longer open time is required for some particular types of installation, special instructions and specifications should be requested from the cement manufacturer. Any solvent cement of this "longer-open-time" type should be evaluated for possible deleterious effects on the pipe and fittings. The use of slower drying solvent cement should be avoided if at all possible.

7.1.1 **Packaging and labeling.**—The solvent cement shall be packaged in one-quart containers or smaller for field use. The label on the container of solvent cement shall bear the name of the manufacturer, type of cement, recommended procedure for use, and safety procedures normally required for solutions containing solvents of this type.

7.1.2 **Safety requirements.**—(See Appendix II.)

8. METHODS OF TEST

8.1 **Sampling.**—A sample of the pipe and fitting sufficient to determine conformance with this standard shall be taken at random from each lot or shipment. About 40 feet of pipe are required to make the test prescribed. The number of fittings required varies depending on the size and type of fitting.

8.2 **Conditioning test specimens.**—Unless otherwise specified the specimens shall be conditioned prior to test at 23±2 °C (73.4±3.6 °F) and 50±5 percent relative humidity for not less than 48 hours in accordance with Procedure A in Standard Method of Conditioning Plastics and Electrical Insulating Materials for Testing (ASTM Designation: D618–61) for those tests where conditioning is required and in all cases of disagreement.

8.3 **Test conditions.**—Tests shall be conducted in a laboratory atmosphere of 23±2 °C (73.4±3.6 °F) and 50±5 percent relative humidity, unless otherwise specified.

8.4 **Deflection temperature.**—The deflection temperatures shall be determined in accordance with Standard Method of Test for Deflection Temperature of Plastics under Load (ASTM Designation: D648–56) at a stress of 264 psi. Two injection-molded specimens shall be conditioned at 50±2 °C (122±3.6 °F) in accordance with Procedure B in Standard Methods of Conditioning Plastics and Electrical Materials for Testing (ASTM Designation: D618–61) except that the conditioning period shall be 24 hours. The immersion medium shall be light mineral oil. The heating rate shall be 2.0±0.2 °C (3.6±0.36 °F) per minute. The results shall be examined for conformance with paragraph 5.2.1.

8.5 **Impact resistance.**—The Izod impact resistance shall be determined in accordance with Method A in Standard Methods of Test for Impact Resistance of Plastics and Electrical Insulating Materials (ASTM Designation: D256–56). Ten injection-molded specimens ⅛ by ½ by 2½ inches, notched by a machining operation using a milling cutter, shall be tested and the results averaged.

8.6 **Tensile properties.**—The tensile strength and modulus of elasticity shall be determined in accordance with Method of Test for Tensile Properties of Plastics (ASTM Designation: D638–61). Five injection-molded Type I test specimens approximately ⅛ inch thick shall be tested and the results averaged. The speed of testing shall be 0.20 to 0.25 inch per minute.

8.7 **Dimensions and tolerances.**—Dimensions shall be measured on five cleanly cut specimens of pipe and on five fittings with micrometers accurate to 0.001 inch. Measurements shall be made in accordance with method of Determining Dimensions of Thermoplastic Pipe

(ASTM Designation: D2122–62T). Measured values shall be examined for conformance to the requirements of paragraphs 6.2.1 and 6.2.2.

8.7.1 **Outside diameter.**—Sufficient measurements shall be made in accordance with Section 7 of D2122–62T, a minimum of four, around the pipe or fitting to ascertain that the maximum and minimum outside diameters have been determined. The average outside diameter is the arithmetic average of the maximum and minimum diameters at any cross section. All individually measured outside diameter values shall be examined for conformance with the tolerances specified in tables 1 and 2.

8.7.2 **Wall thickness.**—Sufficient wall thickness measurements shall be made in accordance with Section 4 of D2122–62T, a minimum of four, around the pipe or fitting to ascertain that the minimum wall thickness has been determined. The wall thicknesses shall be measured at both ends of the specimens.

8.7.3 **Length.**—Pipe length and other linear dimensions shall be measured with a steel tape accurate to $\pm 1/32$ inch in 10 feet.

8.8 **Deflection load and crush resistance.**—The deflection load and crush resistance of pipe and fittings shall be measured by the following method:

8.8.1 **Principle.**—A short length of pipe or a fitting is loaded between two rigid parallel flat plates at a controlled rate of approach to one another. In the test for pipe the load when the initial diameter is reduced 15 percent shall be noted (deflection load). The test shall be continued until the diameter is deflected to 60 percent of its original value (crush resistance).

8.8.2 **Apparatus.**—The apparatus shall consist of the following:

(a) *Testing machine*—A properly calibrated compression testing machine of the constant-rate-of-crosshead-movement type meeting the requirements of Section 4(a) in ASTM D695–63T shall be used to make the tests. The rate of head approach shall be 0.20 to 0.25 inch per minute.

(b) *Loading plates*—The load shall be applied to the specimen through two parallel steel bearing plates. The plates shall be flat, smooth (free from machining marks) and clean. The thickness of each plate shall be not less than 0.25 inch and the length not less than 6.5 inches. The width of each plate shall be not less than 1.5 times the outside diameter of the pipe specimen.

(c) *Deformation (deflection) indicator*—The change in inside diameter or deformation (deflection) parallel to the direction of loading shall be measured with a suitable instrument meeting the requirements of Section 4(d) in ASTM D695–63T except that the instrument shall be accurate to the nearest 0.001 inch. The instrument shall not support the pipe test specimen or affect in any way the load-deflection measurements. Alternatively, changes in outside diameter may be measured during loading by continuously recording plate travel in place of inside diameter measurements.

8.8.3 **Pipe test specimens.**—Three specimens, each $6 \pm 1/8$ inches long, shall be tested. The ends shall be cut square and free of burrs and jagged edges. Each specimen shall meet the requirement in paragraph 6.3.1.

8.8.4 **Fitting test specimens.**—Three complete fittings shall be tested. Each specimen shall meet the requirement in paragraph 6.3.2.

Fittings having nonuniform diameters such as reducers, shall be considered acceptable when the wall thickness at all points is equal to or greater than the wall thickness of pipe of the same material and diameter that meets the crush resistance requirements.

8.8.5 **Procedure—**

(a) Starting at the thinnest wall location, measure the wall thickness to the nearst 0.001 inch at 45° intervals. At these same locations, measure the inside diameters to the nearest 0.01 inch. The pipe length shall be measured to the nearest 0.01 inch. These measurements shall be made on each test specimen after conditioning.

(b) Locate pipe specimen with its axis parallel to the bearing plates and center it laterally in the testing machine. The line marking the thinnest wall of the specimen shall be either at the top or bottom bearing plate.

(c) Measure the vertical inside or outside diameter near the center with specimen in test position but not in contact with the upper plate.

(d) With deflection indicator in place, bring upper plate down to contact specimen with no more load than necessary to hold it in place. Record any deflection.

(e) Specimen shall be compressed at a constant (vertical) deflection rate of 0.20 to 0.25 inch per minute.

(f) Terminate the test when the diameter of pipe test specimens is reduced to 40 percent of its original value or the pipe cracks or shows other evidence of visible failure. Terminate the test on fittings when the load reaches 750 pounds per foot of length.

(g) Observe the load and deflection at the first evidence of cracking if any. Record location and type of failure.

8.8.6 **Calculations.—**For pipe, divide the load in pounds at 15 percent deflection (deflection load) and also at failure (crush resistance), if such occurred, by the length of the pipe test specimen in feet to obtain the deflection load and crush resistance respectively in pounds per linear foot. Calculate the values for each specimen separately. The test results for each specimen of pipe and fittings shall be examined for conformance to the requirements of paragraphs 6.3.1 and 6.3.2.

8.9 **Minimum hydrostatic burst pressure.—**The test equipment and procedure shall be as specified in Tentative Method of Test for Short Time Rupture Strength of Thermoplastic Pipe, Tubing and Fittings (ASTM Designation: D1599–62T). The test specimens shall be selected at random. Three specimens of pipe, each ten times the nominal diameter or a maximum of three feet in length, shall be tested. Three complete fittings shall be tested. The specimens shall be tested individually with water under pressure that is increased at an even rate to burst the specimen within a period of 60 to 90 seconds. One end of the pipe of fitting shall be rigidly fitted to the pressurizing apparatus and the other end shall be free but supported at the free end if necessary. Care shall be taken to remove all air from the pipe before capping and testing. Any suitable closure that is free of leaks at maximum pressure may be used. The specimen shall be conditioned at 23 °C (73.4 °F), for at least two hours before testing. The water temperature shall be within plus or minus 1.7 °C (3.0 °F) of the conditioning temperature and the test results for each specimen shall be examined for conformance to the requirements of paragraph 6.4.

8.10 **Chemical resistance.**—The resistance to the following chemicals shall be determined in accordance with Tentative Method of Test for Resistance of Plastics to Chemical Reagents (ASTM Designation: D543–60T):

Chemicals	*Concentration in water solution*
Sodium carbonate	0.1 *N*
Sodium acid sulfate	0.1 *N*
Sodium sulfate	0.1 *N*
Sodium chloride	5 percent
Sulfuric acid	0.1 *N*
Hydrochloric acid	0.2 *N*
Acetic acid	5 percent
Sodium hydroxide	0.2 *N*
Ivory soap	5 percent
Household detergent	5 percent
Raw sewage	------

The test specimen for pipe shall be six inches long and cleanly cut. The fittings specimens shall consist of complete fittings. Three specimens shall be tested with each reagent. The specimen shall be weighed to the nearest 0.1 gram and completely immersed in the chemicals for 72 hours. On removal from the chemicals, the specimens shall be washed with running water, wiped with a clean dry cloth, conditioned for a period between 120 and 135 minutes, and reweighed. The increase in weight shall be calculated to the nearest 0.01 percent on the basis of the initial weight. The specimen shall then be tested to determine deflection load and crush resistance in accordance with section 8.8 within 30 minutes after weighing. Weight and deflection-crush tests for each specimen shall be examined for conformance to the requirement of paragraph 6.5.

8.11 **Water resistance.**—

8.11.1 **Water absorption.**—Three cleanly cut test specimens of pipe at least 6 inches long or three complete fittings shall be weighed to the nearest 0.1 gram and immersed in water at 23±2 °C (73.4±3.6 °F) for 48 hours. The specimens shall be removed, wiped dry with a clean dry cloth, and reweighed immediately. The average percent gain in weight shall be calculated to the nearest 0.01 percent on the basis of the initial weight, and shall be used to determine compliance with paragraph 6.6.1.

8.11.2 **Wet deflection load and crush resistance.**—The specimens used to make the water absorption tests shall be tested for deflection load and crush resistance in accordance with section 8.8 within 30 minutes after removal from the water. Test results for deflection load and crush resistance of each specimen shall be examined for conformance with the requirement of paragraph 6.6.2. For the calculation of percent change in deflection load and crush resistance, the average values for dry specimens shall be obtained by averaging the results obtained to determine compliance with paragraph 6.3.

8.12 **Flattening resistance.**—Four test specimens each 6 inches in length shall be cleanly cut from the pipe. The fitting specimens shall consist of four complete fittings. A diameter shall be marked and measured on the inside to the nearest 0.001 inch. The specimens shall be placed on a flat rigid base with the measured diameter in a vertical position and the assembly placed in a circulating-air oven. Pairs

of test specimens shall be loaded symmetrically by means of a rigid plate with a total load of 55 pounds. The heat shall then be turned on in the oven and the temperature raised to 50±3 °C (122±5.4 °F) and held there for 40±1 hours. The specimens shall then be unloaded and removed from the oven. After cooling for one hour, the marked and measured inside diameters shall be remeasured and the average change in percent of the initial diameter shall be calculated. The results shall be examined for conformance to the requirement of paragraph 6.7.

8.13 **Impact resistance.**—The impact resistance of pipe and fittings shall be measured by the following method.

8.13.1 **Principle.**—The pipe or fitting test specimen is struck by a 12-pound tup with a ½-inch radius nose, dropped from the proper height to produce the required impact energy.

8.13.2 **Apparatus.**—The apparatus shall consist of the following:

8.13.2.1 **Tup.**—A steel cylinder 2.500±0.002 inches in diameter weighing 12 pounds with a taper on one end, and flat or with a rod extending on the other end as shown in figures 1 and 2.

8.13.2.2 **Drop tube.**—The drop tube shall be made of cold-drawn seamless steel tubing with an inside diameter of 2.563±0.003 inches; or of acrylonitrile-butadiene-styrene (ABS) or polyvinyl chloride (PVC) plastic pipe, 2½-inch nominal pipe size with a standard dimension ratio (SDR) of 21. Alternately, the tup may be dropped without a protective tube provided other means are provided to protect the operator from the random rebound of the tup. The tube shall be sufficiently long (at least 6 feet) to provide for a height of fall of at least 5 feet and shall be mounted so that the lengthwise dimension is vertical as determined by a plumb bob.

8.13.2.3 **Tup hold and release.**—Means shall be provided to hold the tup at steps of 1-inch up to 5 feet above the pipe or fitting test specimen, as measured from the bottom of the tup to the top of the specimen as mounted; to release the tup in a reproducible manner; to allow the tup to fall freely through the tube to strike the specimen; and to catch the tup on the first rebound. One suitable device is shown in figure 3.

8.13.2.4 **Specimen holder.**—The pipe specimen holder shall consist of a steel plate, 8 by 12 by 1 inch in which a V-groove to position the pipe specimen shall be cut. This V-groove shall be ⅛-inch deep with an included angle of 120 degrees. The edges of the V-groove shall be rounded to 1/16-inch. Fittings shall be laid on their side on a 1-inch-thick steel plate. Fittings that do not contact the steel plate directly under the point of impact shall be supported in this area by a steel shim or small steel plate. The specimen holders shall be mounted on a firm rigid base fastened to a heavy concrete slab. Means shall be provided to adjust the specimen holders so that the specimens can be centered under the end of the drop tube. A bar or rod placed inside the pipe specimen and held there by a light spring may be used to fix the specimen if difficulty is encountered in holding the specimen in place.

8.13.3 **Test specimens.**—

8.13.3.1 At least six pipe specimens shall be tested. Specimen length shall be 6±⅛ inches after burrs on ends have been removed.

8.13.3.2 Six fittings shall be tested unassembled, except for couplings. Pieces of pipe shall be cemented into couplings so that each

piece of pipe extends 6±0.5 inches and the assembly allowed to stand in open air for 24 hours, after which period the cemented assembly shall be tested.

8.13.4 **Procedure.—**

8.13.4.1 The dimensions of the pipe test specimens shall be measured in accordance with Tentative Method of Determining Dimensions of Thermoplastic Pipe (ASTM Designation: D2122–62T). The position of the thinnest wall of each pipe specimen shall be noted.

8.13.4.2 The thinnest wall of each fitting shall be determined.

8.13.4.3 The first pipe test specimen shall be mounted with the thinnest wall section on top so that the tup strikes this area. The second specimen shall be mounted so that the point of impact is 18 degrees from the thinnest wall, the third 36 degrees, etc.

8.13.4.4 (1) Symmetrical fittings shall be struck on the weld mark and 90 degrees from the weld mark; three specimens shall be impacted on the weld and three specimens 90 degrees from the weld. If the weld mark cannot be located, then the thinnest wall shall be used in place of the weld.

(2) Unsymmetrical fittings shall be tested by laying the specimen on its side and impacting the other side at the geometrical center. Three specimens shall be struck on one side and three on the other.

8.13.4.5 The test specimen shall be placed under the end of the drop tube so that the side of the pipe or fitting shall be struck by the tup on the geometrical center of the side. The 12-pound tup shall be dropped from the height necessary to provide the impact energy requirement given in table 7. Each test specimen shall be subjected to one only impact blow.

8.13.4.6 The impacted specimen shall be carefully examined visually inside and outside to observe cracking or any other evidence of failure.

8.13.4.7 Failure in the test specimens shall be any crack or split on the inside or outside that was created by the impact that can be seen by the naked eye. Lighting devices shall be used to assist in examining for cracks and splits in the walls of the pipe or fittings specimens. Cracks not in the wall of the fitting, that is in places that would not be expected to affect the strength of the fitting such as cracks in the stop of a coupling parallel to the wall of the coupling, shall not be considered as failure.

8.13.4.8 Failure of two or more of the specimens shall be deemed as failure of the product to meet the specified impact resistance requirement as given in paragraph 6.8 and table 7. When only one specimen fails, a retest shall be made utilizing six additional specimens. To meet the specified impact resistance requirement, none of the six additional specimens shall fail in the retest.

8.14 **Joint tightness.**—Two pieces of pipe shall be joined together with a fitting by solvent cement and allowed to stand for 24 hours at room temperature. The specimen shall then be subjected to an internal pressure of 25 psi, with water as the medium, for 24 hours. The pipe, fitting and joints shall be examined for leakage to determine conformance to the requirement of paragraph 6.9.[6]

[6] For test conditions involving higher pressures in the field, joints should be allowed to stand for more extended periods.

TABLE 7. *Impact resistance of ABS plastic DWV pipe and fittings*

Nominal pipe size	Impact resistance, minimum	
	at 73 °F	at −40 °F
inch	*ft-lb*	*ft-lb*
1¼	21	10
1½	26	13
2	32	16
3	47	25
4	56	28
Fittings		
All sizes and types	20	5

9. MARKING AND LABELING

9.1 **Marking.**—

9.1.1 **Pipe.**—The pipe shall be marked on two sides 180 degrees apart or spirally in letters not less than 3/16 inch high in a contrasting color and shall at least consist of the manufacturer's name or trademark, the nominal pipe size, the symbol ABS, Schedule 40, CS270–65, and the symbol DWV, spaced at intervals of not more than 2 feet.

9.1.2 **Fittings.**—All fittings shall be marked on the body or hub on both sizes. The marking shall consist, at least, of the manufacturer's name and/or trademark, and the symbol ABS.

9.2 **Labeling.**—In order that purchasers may be assured that the ABS plastic drain, waste, and vent pipe and fittings actually comply with all requirements of this Standard, it is recommended that the manufacturers include a statement in conjunction with their name and address on labels, invoices, sales literature, etc., to the effect that the specific pipe and/or fittings covered by the statement meet the requirements of this standard, referenced by number and title.

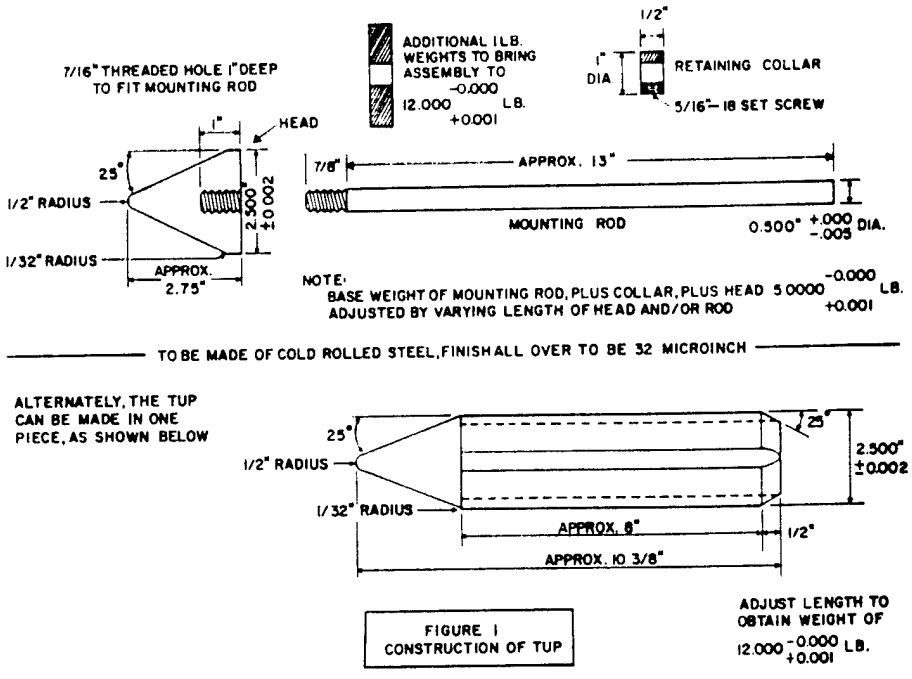

FIGURE 1
CONSTRUCTION OF TUP

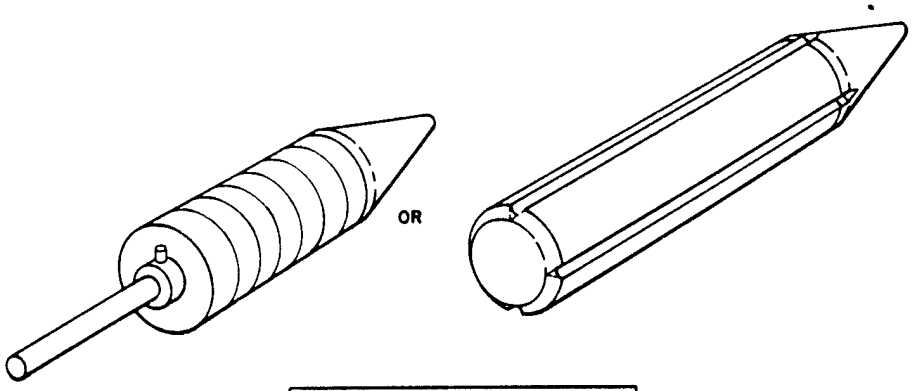

FIGURE 2
PERSPECTIVE VIEW OF TUP

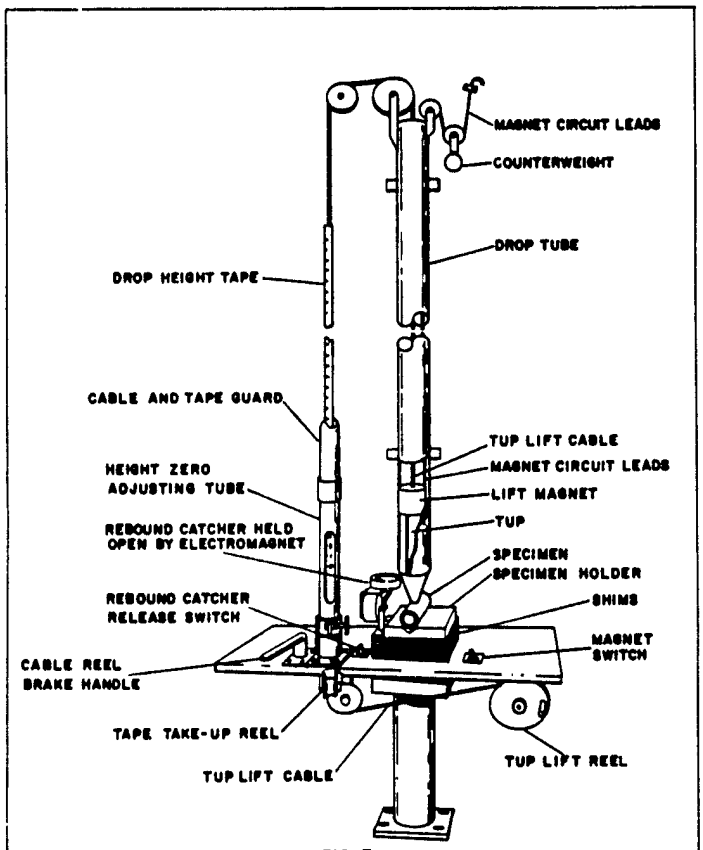

FIG. 3
ONE TYPE OF TUP IMPACT TESTER

HISTORY OF PROJECT

On June 2, 1962, the Thermoplastics Pipe Division, now the Plastics Pipe Institute, a Division of The Society of The Plastics Industry, Inc., requested the cooperation of the Office of Commodity Standards in establishing a Commercial Standard for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and Fittings. After discussions between members of the Division and the PPI it

was agreed that certain editorial changes were necessary. The revised draft was submitted in October 1962.

The Office of Commodity Standards circulated copies of the proposed Commercial Standard to representative producers, distributors, users, laboratories, builders, architects, and government agencies for comment on January 15, 1964. All comments and suggestions received were carefully considered and adjustments were made to the proposal to satisfy the comment wherever practicable. The Recommended Commercial Standard, TS–5607A, was widely circulated to industry on April 21, 1964, for consideration and acceptance. Sufficient acceptances were received from producers, distributors and users to indicate success of the project. Over 90 percent of the domestic production capacity of the industry returned signed acceptance forms indicating approval of this commercial Standard.

Accordingly, on March 11, 1965, the new edition, Commercial Standard CS270–65, was announced to become effective for new production on April 1, 1965.

Project Manager: C.G. Hemmer, Office of Commodity Standards, National Bureau of Standards, U.S. Department of Commerce.

STANDING COMMITTEE

The following individuals comprise the membership of the Standing Committee which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or the Office of Commodity Standards, National Bureau of Standards, which acts as Secretary for the committee.

Representing Producers:

John J. Halverson, Orangeburg Manufacturing Co., Division of the Flinkote Co., Orangeburg, N.Y., 10962 (Chairman)

Bryce N. Batzer, Plastiline, Inc., 1251 Northeast 48th Street, Pompano Beach, Fla., 33061

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Rom Rhome, Chemical Division, United States Rubber Co., Naugatuck, Conn., 06771

Representing Distributors:

A. John Howarth, Garden State Wholesale Building Materials Co., 1399 Walnut Street, Camden, N.J., 08107

James H. Perry, Central Supply Association, 221 North LaSalle Street, Chicago, Ill., 60601

R. O. Woolverton, Grover Electric & Supply Co., 215 West Fourth Street, Vancouver, Wash., 98660

R. A. Wynne, Drilling Specialties Co., 119½ West Frank Phillips Boulevard, Bartlesville, Okla., 74004

Representing Users:

W. M. Bane, Baystone Construction, Inc., P.O. Box 2727, Muncie, Ind., 47305

George D. Matthews, Mobile Homes Manufacturers Association, 20 North Wacker Drive, Chicago, Ill., 60606

Representing the Plastics Pipe Institute:

Frank W. Reinhart, Director, Technical Division, Plastics Pipe Institute, 9918 Sutherland Road, Silver Spring, Md., 20901

APPENDIX I

INSTALLATION PROCEDURES FOR ABS PLASTIC DRAIN, WASTE, AND VENT PIPE AND FITTINGS

1. **Visibility of marking.**—Always position pipe and fittings so that identifying markings are readily visible to inspection when installed.

2. **Jointing techniques.**—The following brief instructions summarize the more detailed instructions given in ASTM D2235–63T. It is recommended that D2235–63T be consulted periodically.

2.1 **Cutting of pipe.**—Cut pipe square without ragged or burred edges so that pipe ends seat squarely in the fitting socket. Insert pipe to the full depth of the socket.

2.2 **Preparation of socket joints.**—Clean all joining surfaces by wiping with a cloth dampened with methyl ethyl ketone so that they are free of dirt, grease, and any foreign matter. Apply solvent cement with a natural bristle brush (see Appendix II for Safety Precautions). Apply a light thin coat of solvent cement first to the fitting socket. Next apply a heavy coating of solvent cement to the pipe for a length equal to the socket depth. Immediately force the pipe and fittings together with a slight twisting motion, if possible, to insure full engagement of pipe into the fitting socket. Remove excess solvent cement from the exterior of the joint with a clean dry cloth. Reasonable handling of the assembly is permissible within two minutes after joining. Do not attempt to disturb the pipefitting joint after the cement has set; damage to the joint and loss of fit may result. Should any delay develop in assembly, apply an additional coat of cement immediately prior to joining.

3. **Alinement.**—In assembling plastic pipe and fittings, exercise care to establish proper grade and alinement before joining with solvent cement. Installation may not be satisfactory if pipe and fittings are subject to strain by forced positioning to obtain grade or alinement. Do not bend the pipe.

4. **Threaded connections.**—Do not thread the plastic pipe. Use adaptor fittings when transition from pipe to threaded construction is necessary. All fittings having threads shall be threaded with American Standard Taper Pipe Threads (ASA B2.1). The plastic pipe-fitting joint in these fittings must be of the solvent cement type.

5. **Transition fittings.**—

5.1 **Connections to traps.**—Use only approved type of traps and connect them by means of approved threaded trap adaptors. Solvent-cement the trap adaptors to the plastic pipe.

5.2 **Connection to closet flanges.**—Install screw type closet flanges in the drainage system by means of a threaded connection. Install calk type closet flanges in accordance with the procedures outlined in paragraph 8 of this Appendix.

5.3 **Connection to non-plastic pipe.**—When connecting plastic pipe to other types of piping use only approved types of fittings and adaptors, designed for the specific transition intended.

5.4 **Thread tightness.**—Where a threaded joint is made (see par. 4), obtain tightness by maximum hand tightening plus additional tightening with a wrench not to exceed one full turn.

5.5 **Thread lubrication.**—Use only thread tape, petroleum jelly or

thread lubricant recommended by the manufacturer of the ABS plastic pipe and/or fittings.

6. **Supports.**—

6.1 **Spacing.**—Support horizontal piping at intervals of not more than five (5) feet, at ends of branches, and at all points of change in direction. Support vertical piping in accordance with the recommendations of the manufacturer. Support trap arms in excess of three (3) feet as close as possible to the trap.

6.2 **Approved hangers.**—Use metal or other approved hangers. Exercise care not to compress and distort the pipe.

6.3 **Building drains under floor slabs.**—Make trench bottoms smooth and of uniform grade with either undisturbed soil or a layer of selected and compacted backfill so that no settlement will be encountered. Pipe must bear on this material throughout the entire length of its barrel.

7. **Exposure to elements.**—Normal construction site handling procedures can be followed. It is good practice to store pipe and fittings under suitable cover prior to installation.

8. **Transition to bell-and-spigot pipe.**—Make connections or transitions to bell-and-spigot cast-iron soil pipe and fittings, and to bell-and-spigot pipe and fittings of other materials, with approved mechanical compression joints or calked joints made in an approved manner. In calking, pack the joint with oakum or hemp and fill with molten lead to a depth of not less than 1 inch. Allow a period of 4 minutes for cooling, following which calk the lead at the inside and outside edges of the joint.

APPENDIX II

SOLVENTS FOR USE WITH ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PLASTIC DRAIN, WASTE, AND VENT PIPE AND FITTINGS

Safety precautions.—The following safety precautions are recommended when methyl ethyl ketone is used.

1. **Ventilation.**—

1.1 When pipe and fittings are being joined with solvent cement, or a solvent cleaner in partially enclosed working areas, a ventilation device should be used to clear these areas of all vapors.

2. **Flammability.**—

2.1 In no case should any source of ignition be permitted in any part of the areas where the solvent or the solvent cement is being used.

3. **Containers.**—

3.1 The solvent and methyl ethyl ketone cleaner should be dispensed only from approved safety containers.

3.2 The container for solvent cement should be tightly closed at all times except when the cement is being used.

3.3 All rags or other similar materials impregnated with the solvent or cleaner should be kept in a safety waste container. This container should be emptied of its contents on a daily basis.

4. **Protection.**—

4.1 Proper eye protection in the form of chemical workers goggles or face shields is advisable when handling the liquid solvent.

4.2 Proper gloves that are impervious to and unaffected by the solvents or cleaner should be worn when contact with the cleaner,

solvent or solvent cement is likely. Particular care should be taken to avoid skin contact with these substances at all times.

5. **Technical background material.—**

5.1 **Health hazards**

5.1.1 **Methyl ethyl ketone.**—The vapor of methyl ethyl ketone is irritating to the eyes, nose, and throat. Fortunately, the odor and irritant properties of this substance limit the probability of voluntary exposure to high concentrations. However, it may cause irritation and drying of the skin.

5.2 **Fire hazards**

5.2.1 **Methyl ethyl ketone.**—Is a very flammable substance, having a flash point (open cup) of 22 °F. The flammable limits are from 1.8 to 11.5 percent by volume. The substance is also quite volatile.

ACCEPTORS

The manufacturers, distributors, users, and others listed below have individually indicated in writing their acceptance of this Commercial Standard prior to its publication. The acceptances indicate an intention to utilize the standard as far as practicable, but reserve the right to depart from it as may be deemed desirable. The list is published to show the extent or recorded public support for the standard, and should not be construed as indicating that all products made by the acceptors actually comply with its requirements.

ASSOCIATIONS

(General Support)

ABS Council, a Division of The Society of The Plastics Industry, Inc., Pasadena, Calif.
American Institute of Supply Associations, Washington, D.C.
Carolina Lumber & Building Material Dealers Association, Charlotte, N.C.
Central Supply Association, Chicago, Ill.
Indiana Farm Bureau Cooperative Association, Inc., Indianapolis, Ind.
Mobile Homes Manufacturing Association, Chicago, Ill.
National Building Material Distributors Association, Chicago, Ill.
Plastics Pipe Institute, a Division of The Society of The Plastics Industry, Inc., New York, N.Y.

FIRMS AND OTHER INTERESTS

A.B.&I. Plastics Division of the American Brass & Iron Foundry, Newark, Calif.
Aetna Engineering Co., Ashaway, R.I.
African Explosives and Chemical Industries Limited, Johannesburg, South Africa (General Support).
Allied Chemical Corp., Plastics Division, Morristown, N.J.
Alpena Supply Co., Alpena, Mich.
American Car & Foundry Division, ACF Industries, Inc., St. Charles, Mo.
Anderson, Ted D., Construction Co., Kokomo, Ind.
Anesite Co., Chicago, Ill.
Arizona Plastic Extrusion Co., Phoenix, Ariz.
Ashton, Evans, Brazier & Associates, Architects, Salt Lake City, Utah
Associated Builders, Inc., Anderson, Ind.
Baldwin Extruded Products, Inc., Downey, Calif.
Barclay, Ayers & Bertsch Co., Grand Rapids, Mich.
Baystone Construction, Inc., Muncie, Ind.
Bellows, W. S., Construction Corp., Houston, Tex.
Bergemann & Associates, Architects, Alliance, Ohio
Beible's Pump & Supply, Emmaus, Pa.
Bellingham Supply, Inc., Bellingham, Wash.
Biggs Kurtz Co., The, Grand Junction, Colo.
Bowser, H. S., Santa Barbara, Calif.
Brunswick Corp., Marion, Va.
Brust & Brust, Architects, Milwaukee, Wis.
Busada Manufacturing Corp., Flushing, N.Y.
Busser Supply Co., Lewisburg, Pa.
Cabot Piping Systems, Plastics Division, Cabot Corp., Louisville, Ky.
California Chemical Co., Union, N.J.
California, State of, Department of Industrial Relations, Division of Housing, San Francisco, Calif.
Can-Tex Industries, Inc., Cannelton, Ind.
Can-Tex Industries, Inc., Southwestern Plastic Pipe Division, Mineral Wells, Tex.
Can-Tex Industries, Inc., Southwestern Plastic Pipe Division, Phoenix, Ariz.
Cannon & Mullen, Architects, Salt Lake City, Utah
Carlon Products Corp., Aurora, Ohio
Cary Chemicals, Inc., East Brunswick, N.J.
Celanese Plastics Co., A Division of Celanese Corp. of America, Newark, N.J.
Chemical Division, U.S. Rubber Co., Naugatuck, Conn.
Cia. de Productos de Arcilla, S.A., Panama, Republic of Panama
Colonial Plastics Manufacturing Co., The, Cleveland, Ohio
Columbia Gas System Service Corp., Columbus, Ohio
Consolidated Pipe Co. of America, Stow, Ohio

Consolidated Supply Co., Portland, Oreg.
Cracker Asphalt Corp., Douglasville, Ga.
Crane Supply Co., Chicago, Ill.
Crescent Plastics, Inc., Evansville, Ind.
Crown-Line Plastics, Inc., Hamburg, Iowa

Danielson Manufacturing Co., The, a Division of Nicholson File Co., Danielson, Conn.
Day & Zimmerman, Inc., Engineers, Philadelphia, Pa.
DeBell & Richardson, Inc., Hazardville, Conn. (General Support)
Diamond Alkali Co., Plastics Division., Cleveland, Ohio
Diversified Plastics, Inc., Memphis, Tenn.
Dow Chemical Co., The, Midland, Mich.
Drilling Specialists Co., Bartlesville, Okla.

Ellerbe Architects, St. Paul, Minn.
Ellingford Brothers, Inc., Evanston, Wyo.
Engineered Plastic Products Co., Spokane, Wash.
Esco Corp., Los Angeles, Calif.
Evanite Plastic Co., Division of Evans Pipe Co., Carrollton, Ohio

Farm & Home Wholesale Supply Co., Schneckville, Pa.
Federal Corp., Oklahoma City, Okla.
Ferguson, H. K. Co., The, Plastic Application Division, Cleveland, Ohio
Flannagan, Eric G., & Sons, Architects-Engineers, Henderson, N.C.
Florida State Board of Health, Bureau of Sanitary Engineering, Jacksonville, Fla.

Garden State Wholesale Building Materials Co., Camden, N.J.
GasprO, Ltd., Honolulu, Hawaii
Glamorgan Pipe & Foundry Co., Lynchburg, Va.
Goodall Rubber Co., Trenton, N.J.
Goodrich, B. F., Chemical Co., Cleveland, Ohio
Grace, W. R., & Co., Polymer Chemicals Division, Clifton, N.J.
Grellinger-Rose Associates, Inc., Architects, Milwaukee, Wis. (General Support)
Grinnell Co., Inc., Providence, R.I.
Grover Electric & Plumbing Supply Co., Vancouver, Wash.
Gulf Research & Development Corp., Materials & Equipment Division, Pittsburgh, Pa.

Halby Chemical Co., Inc., Wilmington, Del.
Hardware & Supply Co., The, Akron, Ohio
Harvel Plastics, Inc., Easton, Pa.
Hilton & Carr Construction Co., Ogden, Utah
Hogner, P. R. L., Architect, Fort Lauderdale, Fla.
Holmes & Hudson Co., Sioux City, Iowa
Hope, Frank L. & Associates, Architects, San Diego, Calif.
Hudson Extrusions, Inc., Hudson, Ohio

Induplas, Inc., Ponce, Puerto Rico
International Pipe & Ceramics Corp., East Orange, N.J.

Japan Cotton Co., Dallas, Tex.
Johnson Plastic Corp., Chagrin Falls, Ohio
Jones, Ralph, Co., Inc., Siloam Springs, Ark.

Kansas Plastics, Inc., Garden City, Kans.
Kathan & Son General Contractors, Inc., Onalaska, Wis.
Kemp, Bunch & Jackson, Architects, Jacksonville, Fla.
Kendall, J. B., Co., Washington, D.C.
Kerona Plastic Extrusion Co., Stockton, Calif.
Kerr-McGee Oil Industries, Inc., Oklahoma City, Okla.
Kraloy/Chemtrol, Santa Ana, Calif.

LaFavorite Rubber Manufacturing Co., Hawthorne, N.J.
Landmark Engineering Co., Tucson, Ariz.
Lasco Industries, Montebello, Calif.
Lindsay Brothers, Inc., Milwaukee, Wis.

Marbon Chemical Division of Borg-Warner Corp., Washington, W. Va.
Marion Supply Co., Marion, Ohio
Marken Plastic Corp., Los Angeles, Calif.
McDonald, A. Y., Manufacturing Co., Dubuque, Iowa
McPherson Co., The, Engineers-Architects, Greenville, S.C. (General Support)
Meyer, F. & J., New York, N.Y.
Miller, Miller & Associates, Architects, Terre Haute, Ind. (General Support)
Milnes, Kenneth W., A.I.A., Architect, Staten Island, N.Y.
Mitron Research & Development Corp., Waltham, Mass.
Monroe, Higgins & Lantow, Architects & Engineers, El Paso, Tex.
Monsanto Co., Plastics Division, Springfield, Mass.
Monsanto Co., St. Louis, Mo.
Moore, George A., & Associates, Inc., Portland, Oreg.

Nalgene Piping Systems, Division of the Nalge Co. Inc., Rochester, N.Y.
National Building Research Institute (C.S.I.R.), Pretoria, South Africa
Naylor, A. D., & Co., Inc., Oakland, Md.

Ohlinger-Jones Engineers, Merced, Calif.
Orangeburg Manufacturing Co., Division of the Flintkote Co., Orangeburg, N.Y.
Osage Building Material Co., Pawhuska, Okla.
Osmose Wood Preserving Co. of America Inc., Buffalo, N.Y.

Pacific Western Extruded Products, Inc., Downey, Calif.
Panhandle Eastern Pipe Line Co., Kansas City, Mo.
Patzig Testing Laboratories, Inc., Des Moines, Iowa
Plains Plastics, Inc., McPherson, Kans.
Plastex Co., The, Columbus, Ohio
Plastiline, Inc., Pompano Beach, Fla.
Plumbing Dealers Service, Inc., Jonesboro, Ark.
Polymer Corp. Ltd., Sarnia, Ontario, Canada
Portco Corp., Paper & Plastic Division, Vancouver, Wash.
Post, George B., & Sons, Architects, New York, N.Y.
Pyramid Industries, Inc., Erie, Pa.

Raindrain Corp., Seattle, Wash.
Republic Steel Corp., Cleveland, Ohio
Rextrude Co., The, Division of Ouimet Stay & Leather Co., Brockton, Mass.
Richfield Oil Corp., Wilmington, Calif.
Riverside Chemical Co., Inc., North Tonawanda, N.Y.
Robertson Heating Supply Co., Alliance, Ohio
Ryerson, Joseph T. & Son, Inc., Chicago, Ill., and Service Centers at Boston, Mass.; Buffalo, N.Y.; Charlotte, N.C.; Cincinnati, Cleveland, Ohio; Dallas, Tex.; Detroit, Mich.; Emeryville, Calif.; Houston, Tex.; Indianapolis, Ind.; Jersey City, N.J.; Los Angeles, Calif.; Milwaukee, Wis.; Philadelphia, Pittsburgh, Pa.; St. Louis, Mo.; Seattle, Spokane, Wash.; Wallingford, Conn.

Schulman, A., Inc., Akron, Ohio
Sears, Roebuck and Co., Chicago, Ill.
Sedco Manufacturing Co., Inc., Miami, Fla.
Sekisui Chemical Co., Ltd., Osaka, Japan
Sekisui New York Corp., New York, N.Y.
Skyline Industries, Inc., Titusville, Pa.
Soult Wholesale Co., Clearfield, Pa.
Southern California Gas Co., Los Angeles, Calif.
Spiegel Inc., Chicago, Ill.
Stauffer Chemical Co., Molded Products Division, Los Angeles, Calif.

Sterling Faucet Co., Morgantown, W. Va.
Stokes Molded Products, Trenton, N.J.
Sure Stop Brake Control, Inc., Paramount, Calif.
Swanson Co., The, Fresno, Calif.

Tampa Wholesale Plumbing Supply Corp., Tampa, Fla.
Telsco Industries, Dallas, Tex. (General Support)
Texas State Board of Plumbing Examiners, Austin, Tex.
Thiokol Chemical Corp., Trenton, N.J.

UOP Chemical Co., a Division of Universal Oil Products Co., East Rutherford, N.J.
Union Carbide Corp., Plastics Division, New York, N.Y.
Union Malleable Manufacturing Co., Plastics Division, Ashland, Ohio
United Pipe & Supply Co., Inc., Eugene, Oreg.
U.S. Testing Co., Inc., Hoboken, N.J.
United States Supply Co., Vancouver, Wash.
Uyesaka Brothers, Inc., Clovis, Calif.

Vogel, Willis A., Architect & Consultant, Toledo, Ohio
Vulcan-Cincinnati, Inc., Cincinnati, Ohio

Welch, Carroll E., Architect, Huntington, N.Y.
Western Industries, Inc. of Oklahoma, Tulsa, Okla.
Western Plastics Corp., Hastings, Nebr.
Western Plastics Corp., Tacoma, Wash.
Wigton-Abbott Corp., Plainfield, N.J.
Williams & Associates—Irrigation Consultants, Oakland, Calif. (General Support)
Worthington, J. W., Co., Narberth, Pa.

GOVERNMENT

Army, Department of the, Picatinny Arsenal, Ammunition Engineering Directorate, Dover, N.J.
General Services Administration, Standardization Division, Hardware & Construction Branch, Washington, D.C. (General Support)
Interior, Department of the, Washington, D.C.

OTHER COMMODITY STANDARDS

A list of Commercial Standards and Simplified Practice Recommendations may be obtained from the Office of Commodity Standards, National Bureau of Standards, U.S. Department of Commerce, Washington, D.C., 20234. This list includes the purchase price of each publication and gives directions for ordering copies.

ACCEPTANCE OF COMMERCIAL STANDARD

CS270-65 ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PLASTIC DRAIN, WASTE, AND VENT PIPE AND FITTINGS

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this Commercial Standard.

Date_____

Office of Commodity Standards
National Bureau of Standards
U.S. Department of Commerce
Washington, D.C. 20234

(Cut on this line)

Gentlemen:

We believe that this Commercial Standard constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production [1] distribution [1] purchase [1] testing [1]

of this commodity.

We reserve the right to depart from the standard as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer_____

(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer_____

Organization_____

(Fill in exactly as it should be listed)

Street address_____

City, State, and Zip Code_____

[1] Underscore the applicable words. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade association, trade papers, etc., desiring to record their general support, the words "General Support" should be added after the signature.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the standard, where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function, performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a nationwide basis is fourfold: First, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record to the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

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