

DEPARTMENT OF COMMERCE
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
OFFICE OF STANDARDS SERVICES

COMMERCIAL STANDARD CS228-61

STYRENE-RUBBER PLASTIC DRAIN AND
SEWER PIPE AND FITTINGS

Commercial Standard CS228-61, Styrene-Rubber Plastic Drain and Sewer Pipe and Fittings, was withdrawn by the Department of Commerce in 1972.

ASTM D2852, Standard Specification for Styrene-Rubber (SR) Plastic Drain Pipe and Fittings, is recommended.

This ASTM standard is under the jurisdiction of Committee F-17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.65 on Land Drainage. The Committee Staff Manager can provide additional assistance, information and contacts for the subcommittee.

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Society of the Plastics Industry can provide assistance and information.

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COMMERCIAL STANDARD CS228-61

Styrene-Rubber Plastic Drain and Sewer Pipe and Fittings

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



For sale by the Superintendent of Documents
U.S. Government Printing Office, Washington 25, D.C. Price 10 cents

Styrene-Rubber Plastic Drain and Sewer Pipe and Fittings

(Effective May 15, 1961)

1. PURPOSE

1.1 The purpose of this Commercial Standard is to provide a nationally recognized specification for the guidance of producers, distributors, testing laboratories, and users of styrene-rubber plastic drain and sewer pipe and fittings; and to maintain public confidence in the quality of the products of this industry.

2. SCOPE

2.1 This Commercial Standard covers requirements and methods of test for materials, dimensions, workmanship, chemical resistance, crushing strength, water resistance, dimensional stability, and joint tightness of styrene-rubber plastic pipe and fittings. A form of marking to indicate compliance with this standard is also included.

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: D883-59T), unless otherwise indicated.

4. USES

4.1 The requirements of this standard are intended to provide pipe and fittings suitable for non-pressure drainage of sewage and certain other liquid wastes, where toughness, resistance to deterioration from water and chemicals, dimensional stability, resistance to aging, and strong tight joints are required. The plastic drain and sewer pipe and fittings described in this standard are intended for use in the following applications:

1. Building sewers and underground building drains in dwellings of four families or less.
2. Storm drainage.
3. House connections to septic tanks.
4. Leaching-system piping for septic-tank effluents.
5. Footing drains (foundation drains).
6. Sanitary sewers and storm sewers.

Industrial waste disposal lines should be installed only with the specific approval of the cognizant building code authority, since chemicals not commonly found in drains and sewers and temperatures in excess of 180° F. may be encountered.

5. REQUIREMENTS

5.1 Materials.—The pipe and fittings shall be made of styrene-rubber plastic. This plastic may contain stabilizers, lubricants, dyes, pigments, and fillers. Test specimens molded from the extrusion compound or from pieces of finished pipe and fittings shall have the following properties:

5.1.1 Deflection temperature.—The average deflection temperature shall be not less than 65° C. (149° F.) when tested in accordance with paragraph 7.3.

5.1.2 Impact resistance.—The average Izod impact strength shall be not less than 0.80 ft-lb/in of notch when tested in accordance with paragraph 7.4.

5.1.3 Tensile properties.—The average tensile strength and elongation at rupture shall be not less than 3,000 p.s.i. and 15 percent, respectively, when tested in accordance with paragraph 7.5.

5.2 Dimensions.

5.2.1 Pipe diameters.—The outside diameter of the pipe shall be within the tolerances given in table 1 when measured in accordance with paragraph 7.6. The inside diameter of the pipe shall meet the requirement given in table 1.

TABLE 1.—Pipe diameters and tolerances

Nominal size	Outside diameter	Minimum inside diameter	Minimum wall thickness ¹
<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
2.....	2.250+ .010 - .000	2.000	0.073
3.....	3.250+ .015 - .005	2.875	.100
4.....	4.215+ .018 - .007	3.875	.125
5.....	5.300+ .020 - .007	4.875	.150
6.....	6.275+ .020 - .007	5.875	.180
8.....	8.400+ .030 - .010	7.750	.200
10.....	10.500+ .035 - .012	9.750	.225
12.....	12.500+ .040 - .015	11.750	.300

¹ These minimum wall thickness requirements do not apply to perforated drain pipe.

5.2.2 Pipe length.—The pipe shall be in 10-foot $\pm 1/4$ inch lengths unless otherwise specified.

5.2.3 Fitting dimensions.—The dimensions of fittings shall meet the requirements given in table 2 when measured in accordance with paragraph 7.6.

5.3 Workmanship.—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.

5.4 Crushing strength.—The minimum crushing strength of pipe and fittings in sizes 2' to 6' nominal diameter shall be 1000 lb. per lineal foot, and the minimum crushing strength for sizes 8', 10', and

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: D618-58) for those tests where conditioning is required and in all cases of disagreement.

7.2 Test Conditions.—Tests shall be conducted in a laboratory atmosphere of $23 \pm 2^\circ$ C. ($73.4 \pm 3.6^\circ$ F.) and 50 ± 5 percent relative humidity, unless otherwise specified.

7.3 Deflection Temperature.—The deflection temperature shall be determined in accordance with Standard Method of Test for Deflection Temperature of Plastics under Load (ASTM Designation: D648-56). Two test specimens shall be injection molded under conditions specified by the manufacturer and shall be $\frac{1}{2}$ by $\frac{1}{2}$ by 5 inches. The test shall be made only at stress of 264 p.s.i. The immersion medium shall be water. The heating rate shall be $2 \pm 0.2^\circ$ C. per minute.

7.4 Impact Resistance.—The Izod impact strength 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 test specimens $\frac{1}{2}$ by $\frac{1}{2}$ by $2\frac{1}{2}$ inches shall be injection molded under conditions specified by the manufacturer except that the notch shall be produced by a machining operation using a single-tooth milling cutter.

7.5 Tensile Properties.—The tensile strength and elongation at rupture shall be determined in accordance with Method of Test for Tensile Properties of Plastics (ASTM Designation: D638-58T). Five Type 1 test specimens approximately $\frac{1}{8}$ -inch thick shall be injection molded under conditions specified by the manufacturer. The speed of testing shall be 0.20 to 0.25 inch per minute.

7.6 Dimensions.—Dimensions shall be measured on five cleanly cut specimens of pipe and fittings with micrometers accurate to 0.001 inch. For materials that are sufficiently flexible, a tapered plug may be used to measure the diameter provided that the diameter is not expanded by inserting the plug into the pipe or fittings. The pipe length shall be measured with a steel tape accurate to plus or minus $\frac{1}{32}$ " in 10 feet.

7.7 Crushing Strength.—The crushing strength shall be measured by the sand bearing method described in Standard Specifications for Drain Tile (ASTM Designation: C4-55). Five specimens, each sufficient in length to test an area at least 1-foot along the axis of the pipe, shall be tested. Each specimen shall meet the requirement in paragraph 5.4. When the design of a fitting does not permit the selection of a length sufficient for a test area 1-foot long, sections from several fittings may be used to obtain a composite specimen with the required length. Fittings having non-uniform diameters, such as reducers, shall be considered acceptable when the wall thicknesses at all points are equal to or greater than the wall thickness of pipes of the same diameters and of the same plastic compound that have been found to meet the crushing strength requirements for those diameters.

7.8 Chemical Resistance.—The resistance to the following chemicals shall be determined in accordance with Tentative Method of Test

7.9 Water Resistance.

7.9.1 Water absorption.—Three cleanly cut test specimens at least 6-inches long of pipe or three complete fittings shall be weighed to the nearest 0.1 gram and immersed in water at $23 \pm 2^\circ \text{C}$. ($73.4 \pm 3.6^\circ \text{F}$.) 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.

7.9.2 Wet strength.—The specimens used to make the water absorption tests shall be tested in accordance with paragraph 7.7 within 30 minutes after removal from the water. The crushing strength of each specimen shall meet the requirement.

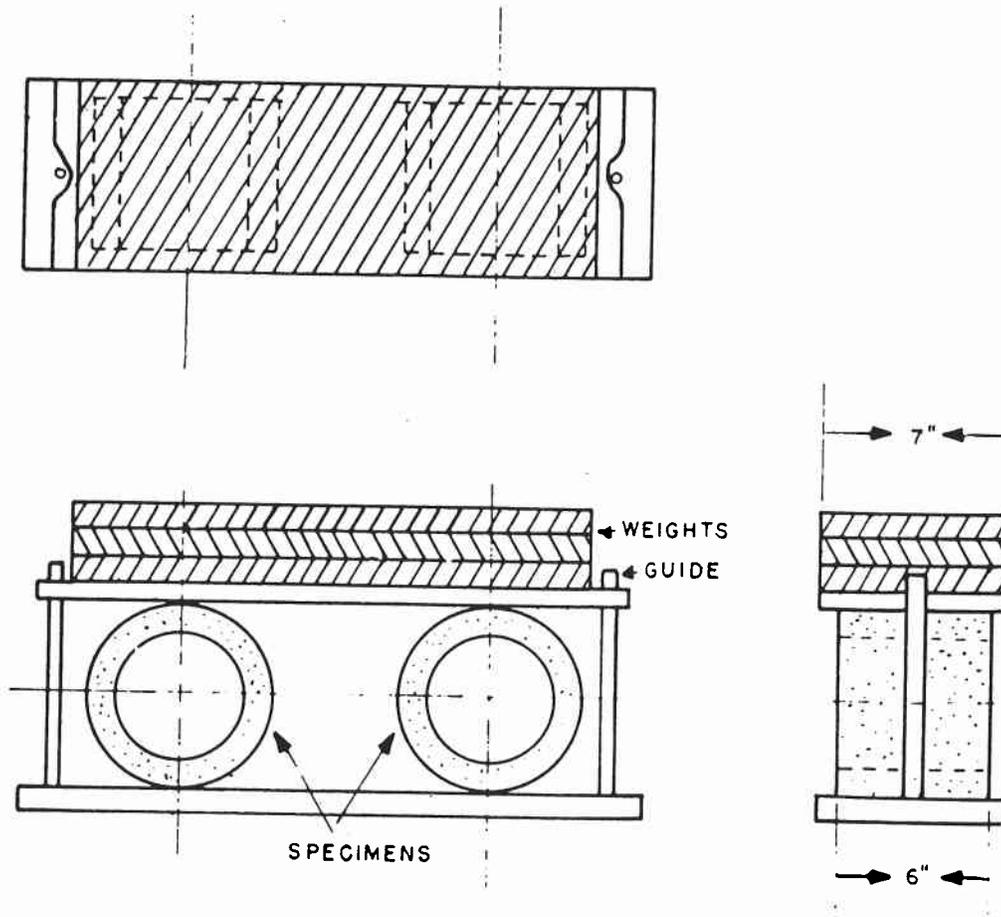


FIGURE 2. Apparatus for dimensional stability test.

7.10 Dimensional Stability.—The 6-inch long test specimens shall be cleanly cut from the pipe. 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. The pair of test specimens shall be loaded symmetrically as shown in figure 2 to produce the total load for the indicated diameter as shown in table 3.

ACCEPTANCE OF COMMERCIAL STANDARD

CS228-61 Styrene-Rubber Plastic Drain and Sewer 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 _____

Commodity Standards Division
Office of Technical Services
Business and Defense Services Administration
U. S. Department of Commerce
Washington 25, D. C.

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

production¹ distribution¹ purchase¹ testing¹
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, zone, and State _____

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 interest, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

(Cut on this line)

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 the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate 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.

Project Manager: H. A. Bonnet, Commodity Standards Division, Office of Technical Services.

Technical Advisor: Dr. Frank W. Reinhart, Chief, Plastics Section, National Bureau of Standards.

STANDING COMMITTEE

The function of the Standing Committee is to review, prior to circulation for acceptance, changes proposed to keep the standard abreast of progress. Comments concerning the standard and suggestions for revision may be addressed to the Commodity Standards Division, Office of Technical Services, U.S. Department of Commerce, which acts as secretary for the committee, or to any of its members listed below:

EDWARD CLEMENS, Southwestern Plastic Pipe Co., P.O. Box 117, Mineral Wells, Tex. (Chairman)

H. N. DANNEELS, 1109 Best Blvd., Marine City, Mich.

JAMES DAWSON, Carlon Products Corp., Chamberlain Road, P.O. Box 133, Aurora, Ohio.

ERNEST G. FRITSCH, 1489 North Bixby Road, Columbus, Ohio.

WILLIAM HITE, Yardley Plastics Co., 860 Jenkins Ave., Columbus, Ohio.

JOHN H. NIERMEYER, President, The Columbus Coal & Lime Co., 1150 Sullivant Ave., Columbus, Ohio.

WALTER PRENDERGAST, Evanite Plastic Co., Division of the Evans Pipe Co., Carrollton, Ohio.

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 of 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.

Products that meet all requirements of the standard may be identified as such by a certificate, grade mark, or label. Purchasers are encouraged to require such specific evidence of compliance, which may be given by the manufacturer whether or not he is an acceptor.

ASSOCIATIONS (General Support)

American Council of Independent Laboratories, Washington, D.C.

Home Manufacturers Association, Washington, D.C.

FIRMS AND OTHER INTERESTS

American Hard Rubber Co., Division of Amerace Corp., Butler, N.J.

Arizona Plastic Extrusion Co., Phoenix, Ariz.

Atlantic Coast Distributors, Corp., Chatham, N.J.

Bray Bros., Inc., Buffalo, N.Y.

Burritt Building Materials Inc., Stratford, Conn.

Campbell Metals Co., Los Angeles, Calif.

Cannelton Sewer Pipe Co., Cannelton, Ind.

Carlon Products Corp., Aurora, Ohio.

Columbus Coal & Lime Co., The, Columbus, Ohio.

Consolidated Pipe Company of America, Akron, Ohio.

Crescent Plastics, Inc., Evansville, Ind.

Dealers Supply Co., Pittsburgh, Pa.
Detroit, City of, Dept. of Buildings & Safety Engineering, Detroit, Mich.

Evanite Plastic Co., Division of the Evans Pipe Co., Carrollton, Ohio.

Flint, City of, Div. of Buildings and Inspections, Flint, Mich. (General Support)

Fox, E. S. & Co., Reading, Pa.

Herron Testing Laboratories, Inc., Cleveland, Ohio.

Industrial Plastic Fittings Div., R. & K. Plastic Industries Co., Cleveland, Ohio (General Support).

Lasco Industries, Inc., Montebello, Calif.
Loeb, Laurence M., Architect, White Plains, N.Y.

Malone Plumbing Supply Co., Pittsburgh, Pa.

Octagon Products, Inc., Erie, Pa.
Option Supply Co., Inc., Pittsburgh, Pa.