STANDARD STRENGTH AND EXTRA STRENGTH PERFORATED CLAY PIPE

COMMERCIAL STANDARD CS143-47

Effective Date for New Production From October 22, 1947

A RECORDED VOLUNTARY STANDARD
OF THE TRADE

UNITED STATES DEPARTMENT OF COMMERCE
W. AVERELL HARRIMAN, Secretary

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COMMODITY STANDARDS

Simplified Practice Recommendations and Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division[1] of the National Bureau of Standards. The purpose of Simplified Practice Recommendations is to eliminate avoidable waste through the establishment of standards of practice for stock sizes and varieties of specific commodities that currently are in general production and demand. The purpose of Commercial Standards is to establish standard methods of test, rating, certification, and labeling of commodities, and to provide uniform bases for fair competition.

The adoption and use of a Simplified Practice Recommendation or Commercial Standard is voluntary. However, when reference to a Commercial Standard is made in contracts, labels, invoices, or advertising literature, the provisions of the standard are enforceable through usual legal channels as a part of the sales contract.

A Simplified Practice Recommendation or Commercial Standard originates with the proponent industry. The sponsors may be manufacturers, distributors, or users of the specific product. One of these three elements of industry submits to the Commodity Standards Division the necessary data to be used as the basis for developing a standard of practice. The Division, by means of assembled conferences or letter referenda, or both, assists the sponsor group in arriving at a tentative standard of practice and thereafter refers it to the other elements of the same industry for approval or for constructive criticism that will be helpful in making any necessary adjustments. The regular procedure of the Division assures continuous servicing of each effective Simplified Practice Recommendation and Commercial Standard, through review and revision, whenever, in the opinion of the industry, changing conditions warrant such action. Simplified Practice Recommendations and Commercial Standards are printed and made available by the Department of Commerce through the Government Printing Office.

COMMERCIAL STANDARD FOR STANDARD STRENGTH AND EXTRA STRENGTH PERFORATED CLAY PIPE

On April 3, 1947, at the instance of the National Clay Pipe Manufacturers, Inc., a Recommended Commercial Standard for Standard Strength and Extra Strength Perforated Clay Pipe, proposed by the National Clay Pipe Manufacturers, Inc., and adjusted in accordance with comment from other interested organizations, was circulated to the trade for written acceptance. Those concerned have since accepted and approved the standard as shown herein.

Project Manager: F. W. Reynolds, assisted by H. A. Bonnet, Commodity Standards Division, National Bureau of Standards.
Technical Adviser: D. E. Parsons, Building Technology Division, National Bureau of Standards.

[1] Effective July 1, 1947, the Division of Simplified Practice, organized in 1921, and the Division of Trade Standards, organized in 1927, were combined to form the Commodity Standards Division. Since their organization, both of these Divisions have assisted many industries in the development of Simplified Practice Recommendations and Commercial Standards for a wide variety of commodities. A list of previously established Commercial Standards appears herein. A list of effective Simplified Practice Recommendations may be obtained from the Commodity Standards Division, National Bureau of Standards, Washington 25, D. C.

COMMERCIAL STANDARD CS143–47

for

STANDARD STRENGTH AND EXTRA STRENGTH PERFORATED CLAY PIPE

PURPOSE

1. The purpose of this commercial standard is to provide a nationally recognized specification for perforated clay pipe for drainage and similar purposes, as a basis of understanding in the industry. Architects, engineers, contractors, industrial users, and home owners will thus be enabled to specify their needs for perforated clay pipe in terms of an accepted standard.

SCOPE

2. This commercial standard [2] covers definitions and requirements for materials, workmanship and finish, absorption, crushing strength, dimensions, and resistance to action of acids for bell and spigot type glazed perforated clay pipe of the following grades and sizes.

2a. *Grades.*—Grades shall be those known in the trade as (1) standard strength perforated clay pipe, and (2) extra strength perforated clay pipe.

Perforated pipe of extra strength grade is intended for use where *extra-heavy live or static loads are encountered.* Purchasers should specify extra strength perforated pipe if required, otherwise standard strength perforated pipe will be furnished.

2b. *Sizes.*—Sizes for standard strength pipe shall be from 4 to 24 in. nominal inside diameter, inclusive; and for extra strength pipe from 6 to 24 in. nominal inside diameter, inclusive.

DEFINITIONS

3. *Clay.*—An earthy or stony mineral aggregate consisting essentially of hydrous silicates of alumina, plastic when sufficiently pulverized and wetted, rigid when dry, and vitreous when fired at a sufficiently high temperature.

3a. *Surface clay* is an unconsolidated, unstratified clay occurring on the surface of the ground.

3b. *Fire clay* is sedimentary clay of low-flux content.

3c. *Shale* is a thinly stratified, consolidated, sedimentary clay with well-marked cleavage parallel to the bedding.

[2] The requirements of this standard are identical in substance with Federal Specification SS–P–361a and with ASTM Designations C13–44T and C200–44T, with the addition of requirements covering perforation. Fittings, requirements relating to scoring, and some sizes of pipe not regularly used in perforated form, are omitted.

GENERAL REQUIREMENTS

4. *Materials and manufacture.*—Clay pipe shall be manufactured from surface clay, fire clay, or shale, or a combination of these materials.

4a. These materials or any combination thereof, when molded into pipe and subjected to suitable temperatures, shall yield a product that will be strong, durable, serviceable, free of objectionable defects, and otherwise conform to this standard.

5. *Salt glaze.*—The glaze shall consist of a continuous layer of salt glaze substantially free of blisters or pimples. Not more than 10 percent of the inner surface of any pipe barrel shall be bare of glaze except the socket, where it may be entirely absent. Glazing shall not be required on the outer surface of the barrel at the spigot end for a distance from the end of the pipe equal to the specified depth of socket. There shall be no well defined network of crazing lines or hair cracks.

6. *Blisters.*—No blisters shall exceed 3 in. in diameter, and no blisters or pimples shall project more than ⅛ in. above the surrounding surface of the pipe for sizes up to and including 18 in. in internal diameter. For sizes over 18 in. in internal diameter, no blisters shall exceed in diameter more than 2 in. per foot of the internal diameter of the pipe, nor project above the surrounding surface of the pipe more than ⅛ in. per foot of the internal diameter of the pipe.

7. *Finish of ends.*—The ends of the pipes shall be square with their longitudinal axis, except as provided in tables 2 and 4.

8. *Straightness.*—The maximum ordinate as measured from the concave side of the pipe shall not exceed ⅛ in. per foot of length.

9. *Resistance to action of acids.*—Tests for resistance to action of acids shall be optional with the purchaser, and shall be made only when specified by him in advance or in the "call for bids." When the test for resistance to action of acids is specified, the pipe of each size and shipment shall be acceptable only when the percentage of acid-soluble matter for specimens representing such pipe does not exceed 0.25 percent. (See par. 19.)

10. *Absorption.*—The average absorption of the pipe shall not exceed 8 percent of the dry weight when tested as described in par. 20.

DETAIL REQUIREMENTS

Standard Strength Perforated Clay Pipe

11. *Crushing strength.*—The crushing strength shall conform to the requirements prescribed in table 1, when tested according to par. 21.

12. *Sizes and dimensions.*—Pipe shall be furnished of the sizes and of the dimensions, including permissible variations, prescribed in table 2. When more than one length is permitted, the purchaser shall indicate, at the time of purchase, which lengths shall be furnished; unless so indicated, the manufacturer shall furnish such lengths as he may elect.

TABLE 1. *Crushing strength requirements for standard strength perforated clay pipe*

Nominal size, in.	Average strength, min, lb per linear ft	
	Three-edge-bearing method	Sand-bearing method [1]
4	1,000	1,430
6	1,000	1,430
8	1,000	1,430
10	1,100	1,570
12	1,200	1,710
15	1,400	2,000
18	1,700	2,430
21	2,000	2,860
24	2,400	3,430

[1] See ASTM Designation: C13-44T.

13. *Perforations.*—Perforations shall be circular, cleanly cut, one-quarter (¼) inch in diameter (±1/16 in.), and arranged in rows parallel to the axis of the pipe. Perforations shall be approximately three (3) inches, center to center, along rows. The spigot end shall be unperforated for a length equal to the depth of socket.

Rows shall be arranged in two equal groups on either side of the vertical center line of the pipe, and the total number of rows shall be as shown in table 2. The lower rows of perforations in each group shall be separated by an arc of 90°, and the upper rows of perforations in each group shall be separated by an arc of 200°. (See fig. 1.) Spacing of rows between these limits shall be uniform.

Extra Strength Perforated Clay Pipe

14. *Crushing strength.*—The crushing strength shall conform to the requirements prescribed in table 3, when tested according to par. 21.

15. *Sizes and dimensions.*—Pipe shall be furnished of the sizes and of the dimensions, including permissible variations, prescribed in table 4. When more than one length is permitted, the purchaser shall indicate, at the time of purchase, which lengths shall be furnished; unless so indicated, the manufacturer shall furnish such lengths as he may elect.

16. *Perforations.*—Perforations shall be circular, cleanly cut, one-quarter (¼) inch in diameter (±1/16 in.), and arranged in rows parallel to the axis of the pipe. Perforations shall be approximately three (3) inches, center to center, along rows. The spigot end shall be unperforated for a length equal to the depth of socket.

Rows shall be arranged in two equal groups on either side of the vertical center line of the pipe and the total number of rows shall be as shown in table 4. The lower rows of perforations in each group shall be separated by an arc of 90°, and the upper rows of perforations in each group shall be separated by an arc of 200°. (See fig. 1.) Spacing of rows between these limits shall be uniform.

TABLE 2. *Dimensions of standard strength perforated clay pipe*

Nominal size, in.	Laying length		Maximum difference in length of two opposite sides, in.	Rows of perforations	Perforations per row (according to laying length)	Outside diameter of barrel, in.		Inside diameter of socket at ½ in. above base, in.		Depth of socket, in.		Thickness of barrel, in.		Thickness of socket at ½ in. from outer end, in.	
	Nominal, ft.	Limit of minus variation,[1] in./ft. length				Min	Max	Min	Max	Nom	Min	Nom	Min	Nom	Min
4	2, 2½, 3	¼	5/16	4	7, 9, 11	4 7/8	5 1/8	5 3/4	6 1/8	1 3/4	1½	½	7/16	7/16	3/8
6	2, 2½, 3	¼	3/8	4	7, 9, 11	7 1/16	7 7/16	8 3/16	8 5/8	2 1/4	2	5/8	9/16	½	7/16
8	2, 2½, 3	¼	7/16	4	7, 9, 11	9 1/4	9 3/4	10½	11	2½	2¼	¾	1 1/16	9/16	½
10	2, 2½, 3	¼	7/16	6	7, 9, 11	11½	12	12 3/4	13 1/4	2 5/8	2 3/8	⅞	1 3/16	5/8	9/16
12	2, 2½, 3	¼	7/16	6	7, 9, 11	13 3/4	14 5/16	15 1/8	15 3/4	2¾	2½	1	1 5/16	¾	1 1/16
15	3 4	¼	½	6	10, 14	17 3/16	17 13/16	18 5/8	19¼	2 7/8	2 5/8	1¼	1⅛	1 5/16	⅞
18	3 4	¼	½	8	10, 14	20 5/8	21 7/16	22¼	23	3	2¾	1½	1 3/8	1⅛	1 1/16
21	3 4	¼	9/16	8	10, 14	24 1/8	25	25 7/8	26 3/4	3¼	3	1¾	1⅝	1 5/16	1 3/16
24	3 4	3/8	9/16	8	10, 14	27½	28½	29 3/8	30 3/8	3 3/8	3⅛	2	1 7/8	1½	1 3/8

[1] There is no limit for plus variation.

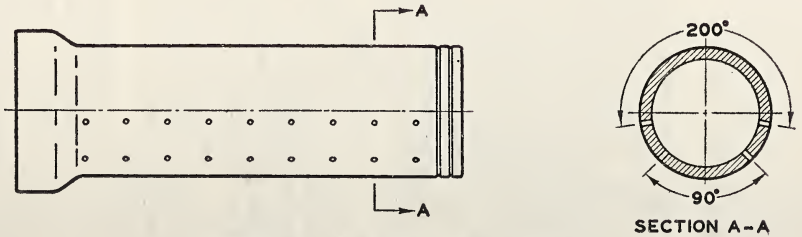

FIGURE 1. *Location of perforations.*

TABLE 3. *Crushing strength requirements for extra strength perforated clay pipe*

Nominal size, in.	Average strength, min, lb per linear ft	
	Three-edge-bearing method	Sand-bearing method [1]
6	2,000	2,850
8	2,000	2,850
10	2,000	2,850
12	2,250	3,200
15	2,750	3,925
18	3,300	4,700
21	3,850	5,500
24	4,400	6,300

[1] See ASTM Designation: C200–44T.

Acceptance or Rejection on Results of Physical Tests

17. Pipe shall be accepted or rejected on results of physical tests in accordance with par. F–5 of Fed. Spec. SS–P–361a.

SAMPLING AND METHODS OF TEST

18. *Sampling.*—Sampling shall be in accordance with par. F–1 of Fed. Spec. SS–P–361a.

19. *Resistance to action of acids.*—Test shall be in accordance with par. F–4 of Fed. Spec. SS–P–361a.

20. *Absorption.*—Test shall be in accordance with par. F–2 of Fed. Spec. SS–P–361a.

21. *Crushing strength.*—Test shall be in accordance with par. F–3 of Fed. Spec. SS–P–361a, or ASTM Designation: C13–44T.

MARKING, INSPECTION, AND REJECTION

22. *Marking.*—Each length of pipe over 6 in. in diameter shall bear the initials or name of the person, company, or corporation by whom manufactured, and the location of the plant. In addition, extra strength perforated clay pipe shall bear the symbol "ES." The markings shall be indented on the exterior of the pipe near the socket and shall be plainly legible for purpose of identification.

23. *Inspection.*—All pipe shall be subject to inspection at the factory, trench, or other point of delivery by a competent inspector employed by the purchaser. The purpose of the inspection shall be to cull and reject pipe that, independent of the physical tests herein specified, fails to conform to the requirements of this standard.

24. *Rejection.*—Pipe shall be subject to rejection on account of any of the following:

(a) *Variations* in any dimensions exceeding the permissible variations given in tables 2 and 4;

(b) *Fractures or cracks* passing through the barrel or socket, except that a single crack at the spigot end of the pipe not exceeding 75 percent of the depth of the socket, or a single fracture in the socket not exceeding 3 in. around the circumference nor 2 in. lengthwise shall be permitted;

TABLE 4. *Dimensions of extra strength perforated clay pipe*

Nominal size, in.	Laying length		Maximum difference in length of two opposite sides, in.	Rows of perforations	Perforations per row (according to laying length)	Outside diameter of barrel, in.[2]		Inside diameter of socket at ½ in. above base, in.		Depth of socket, in.		Thickness of barrel, in.		Thickness of socket at ½ in. from outer end, in.	
	Nominal, ft	Limit of minus variation,[1] in./ft length				Min	Max	Min	Max	Nom	Min	Nom	Min	Nom	Min
6	2, 2½, 3	¼	3/8	4	7, 9, 11	7 1/16	7 7/16	8 3/16	8 5/8	2 1/4	2	1 1/16	9/16	½	7/16
8	3	¼	7/16	4	11	9 1/4	9 3/4	10 1/2	11	2 1/2	2 1/4	7/8	¾	9/16	½
10	3	¼	7/16	6	11	11 1/2	12	12 3/4	13 1/4	2 5/8	2 3/8	1	7/8	5/8	9/16
12	3	¼	7/16	6	11	13 3/4	14 5/16	15 1/8	15 3/4	2 3/4	2 1/2	1 3/16	1 1/16	¾	1 1/16
15	3 4	¼	½	6	10, 14	17 3/16	17 13/16	18 5/8	19 1/4	2 7/8	2 5/8	1 ½	1 3/8	1 5/16	7/8
18	3 4	¼	½	8	10, 14	20 5/8	21 7/16	22 1/4	23	3	2 3/4	1 7/8	1 ¾	1 1/8	1 1/16
21	3 4	¼	9/16	8	10, 14	24 1/8	25	25 7/8	26 3/4	3 1/4	3	2 1/4	2	1 5/16	1 3/16
24	3 4	3/8	9/16	8	10, 14	27 ½	28 ½	29 3/8	30 3/8	3 3/8	3 1/8	2 ½	2 1/4	1 ½	1 3/8

[1] There is no limit for plus variation.
[2] The average actual inside diameters of pipe having the nominal thickness of barrel shown in table 4 may be smaller than the nominal sizes.

(c) *Chips or fractures* on the interior of the pipe exceeding 2 in. in length, 1 in. in width, and of a depth more than one-fourth of the thickness of the shell;

(d) *Blisters* that are broken or exceed the dimensions specified in par. 6;

(e) *Fire cracks or hair cracks* sufficient to impair the strength, durability, or serviceability of the pipe;

(f) *Variation* of more than ⅛ in. per linear foot in straightness (see par. 8);

(g) *Glaze* that does not conform to the requirements specified in par. 5;

(h) *Perforations* having diameters greater than 5/16 in. or less than 5/16 inch. (See par. 13 and 16.)

25. *Marking of rejected pipe.*—All pipe accepted may be plainly marked by the inspector. Rejected pipe shall not be marked or defaced so as to impair its value, but shall be replaced by the manufacturer or seller with pipe that meets the requirements of this standard, without additional cost to the purchaser.

IDENTIFICATION

26. In order to assure the purchaser that perforated clay pipe complies with all requirements of this standard, manufacturers may identify their products by means of a statement of compliance on labels, invoices, sales literature, etc. The following statement is recommended:

> This (standard strength or extra strength) perforated clay pipe complies with Commercial Standard CS143–47, as developed by the trade, under the procedure of the National Bureau of Standards, and issued by the United States Department of Commerce.

When available space on labels is insufficient for the full statement in legible type, an abbreviated statement, as follows, is recommended:

> Complies with CS143–47, as developed by the trade, and issued by the United States Department of Commerce.

EFFECTIVE DATE

27. Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this Commercial Standard was issued by the Department of Commerce, effective from October 22, 1947.

Edwin W. Ely,
Chief, Commodity Standards Division.

STANDING COMMITTEE

28. 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 to the Commodity Standards Division, National Bureau of Standards, which acts as secretary for the committee.

F. S. Cresswell (chairman), National Clay Pipe Manufacturers, Inc., Rupley Building, Alexandria, Va.
W. E. Robinson, Robinson Clay Product Co., 1100 Second National Bank Bldg., Akron, Ohio.
H. P. Wilhelmsen, W. S. Dickey Clay Mfg. Co., 922 Walnut Street, Kansas City 6, Mo.
Roy Lacy, Pacific Clay Products Co., 306 West Avenue 26, Los Angeles, Calif.
John M. Palmer, Lee Clay Products Co., Clearfield, Ky.
Howard M. Williams, Office, Chief of Engineers, Department of the Army, Washington 25, D. C.
John A. C. Callan, Drainage Section, Paving Division, Civil Aeronautics Administration, Washington 25, D. C.
E. L. Schmidt, Pennsylvania State Highway Department, Harrisburg, Pa.
Rex Whitten, Missouri State Highway Department, Jefferson City, Mo.

HISTORY OF PROJECT

29. On January 9, 1947, the National Clay Pipe Manufacturers, Inc., requested the cooperation of the National Bureau of Standards in the establishment of a commercial standard for standard strength and extra strength perforated clay pipe. The following specifications were used as a basis for a proposed commercial standard:

Federal Specification SS–P–361a; Pipe; clay, sewer.
ASTM Designation C13–44T; Standard strength clay sewer pipe.
ASTM Designation C200–44T; Extra strength clay pipe.

30. On February 4, 1947, the proposed commercial standard, dated January 27, 1947, was submitted to producers, distributors, users, and interested government agencies, for their review and comment. The proposed draft was adjusted in accordance with the consensus of comment received.

31. The recommended commercial standard was submitted on April 3, 1947, to the entire trade for written acceptance. Upon receipt of written acceptances from a satisfactory majority of those interested, announcement was made on September 22, 1947, that the standard would be known as Commercial Standard CS143–47.

ACCEPTANCE OF COMMERCIAL STANDARD

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,
National Bureau of Standards,
Washington 25, D. C.

Gentlemen:

We believe that the Commercial Standard CS143–47 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 standard strength and extra strength perforated clay pipe.

We reserve the right to depart from it 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.

(Cut on this line)

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 which one. 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 associations, 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 commercial 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 Nation-wide 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 the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

32. The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, testing, or purchase of standard strength and extra strength perforated clay pipe. In accepting the standard they reserved the right to depart therefrom as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

ASSOCIATIONS

(General Support)

American Association of Engineers, Chicago, Ill.
American Society of Sanitary Engineering, Washington, D. C., and McKeesport, Pa.
American Specification Institute, Chicago, Ill.
Building Officials Conference of America, Washington, D. C.
Clay Products Association, Chicago, Ill.
Clay Sewer Pipe Association, Inc., Columbus, Ohio.
National Association of Master Plumbers, New York, N. Y.
National Clay Pipe Manufacturers, Inc., Alexandria, Va.
Prefabricated Home Manufacturers' Institute, Washington, D. C.

FIRMS AND OTHER ORGANIZATIONS

Albany, City of, Bureau of Engineering, Albany, N. Y.
American Vitrified Products Co., Cleveland, Ohio.
Arizona Highway Department, Phoenix, Ariz.
Baltimore, City of, Division of Architecture, Bureau of Plans and Surveys, Baltimore, Md.
Blackmer & Post Pipe Co., St. Louis, Mo.
Boston & Maine Railroad, Boston, Mass.
Brockway Clay Co., Brockway, Pa.
Buffalo, City of, Department of Public Works, Architectural Service, Buffalo, N. Y.
Building Service, Inc., Great Falls, Mont.
California Pottery Co., Niles, Calif.
Camden, City of, Bureau of Engineering, Camden, N. J.
Cannelton Sewer Pipe Co., Cannelton, Ind.
Central of Georgia Railway, Savannah, Ga.
Charlotte, City of, Charlotte, N. C.
Chicago, Burlington & Quincy Railroad Co., Chicago, Ill.
Chicago, City of, Bureau of Engineering, Chicago, Ill. (General support).
Clay City Pipe Co., The, Uhrichsville, Ohio.
Colorado State Highway Department, Denver, Colo.
Columbus, City of, Columbus, Ga.
Conwell, E. L., & Co., Philadelphia, Pa.
Dallas, City of, Department of Public Works, Dallas, Tex. (General support).
Dayton, City of, Division of Engineering, Dayton, Ohio.
Dennison Sewer Pipe Corp., Cleveland, Ohio.
Detroit City Engineer's Office, Detroit, Mich.
Dickey, W. S., Clay Manufacturing Co., Kansas City, Mo.
District of Columbia, Engineer Department, Washington, D. C.
District of Columbia, Water Division, Washington, D. C.
Eastman Kodak Co., Rochester, N. Y.
Erie, City of, Bureau of Engineering, Erie, Pa.
Erie Railroad Co., Cleveland, Ohio.
Evens & Howard Sewer Pipe Co., St. Louis, Mo.
Fort Worth, City of, Department of Public Works, Fort Worth, Tex.
Georgia State Highway Department, Atlanta, Ga.
Gladding Bros. Mfg. Co., San Jose, Calif.
Gladding, McBean & Co., Los Angeles, Calif.
Graff Kittanning Clay Products Co., Worthington, Pa.
Grand Rapids, City of, Office of City Engineer, Grand Rapids, Mich.
Hagerstown, City of, Hagerstown, Md.
Harrisburg, City of, Harrisburg, Pa.
Hazleton, City of, Hazleton, Pa.
Illinois Division of Highways, Springfield, Ill.
Indianapolis, City of, Indianapolis, Ind.
Iowa Pipe & Tile Co., Des Moines, Iowa.
Jacksonville, City of, Jacksonville, Fla.
Junction City Clay Co., The, Cleveland, Ohio.
Kansas City Southern Railway Co., The, Kansas City, Mo.
Kaul Clay Manufacturing Co., The, Toronto, Ohio.
Kaul Clay Products Co., Clermont, Pa.
Kentucky, Commonwealth of, Department of Highways, Frankfort, Ky.
Knoxville, City of, Department of Public Service, Knoxville, Tenn.
Lee Clay Products Co., Inc., Clearfield, Ky.
Lehigh Sewer Pipe & Tile Co., Fort Dodge, Iowa.
Long Beach, City of, Long Beach, Calif.
Los Angeles, City of, Los Angeles, Calif.
Louisville & Nashville Railroad Co., Louisville, Ky.
Lovell Clay Products Co., The, Lovell, Wyo.
Manufacturer's Promotional Service, Atlanta, Ga. (General support.)
Maryland State Roads Commission, Baltimore, Md.
Milwaukee, City of, Testing Laboratory, Milwaukee, Wis.
Minneapolis, City of, Minneapolis, Minn.
Mississippi State Highway Department, Jackson, Miss.
Missouri Pacific Railroad Co., St. Louis, Mo.
Montana State Highway Commission, Helena, Mont.
Montgomery Ward, Chicago, Ill.
Nevada, State of, Department of Highways, Carson City, Nev.
New Hampshire Highway Department & Laboratory, Concord, N. H.
New Haven, City of, New Haven, Conn.
New Jersey State Highway Department, Trenton, N. J.
New Mexico State Highway Department, Santa Fe, N. Mex.
New York Central Railroad Co., The, New York, N. Y.
Niagara Falls, City of, Bureau of Engineering, Niagara Falls, N. Y.
North Carolina State Highway & Public Works Commission, Raleigh, N. C.
Oconee Clay Products Co., Milledgeville, Ga.
Pacific Clay Products, Los Angeles, Calif.
Peerless Clay Corp., Toronto, Ohio.
Pennsylvania Railroad, The, Philadelphia, Pa.
Peoria, City of, Engineering Department, Peoria, Ill.
Pere Marquette Railway Co., Detroit, Mich.
Pine Hall Brick & Pipe Co., Winston-Salem, N. C.
Pontiac, City of, Pontiac, Mich.
Portland, City of, Department of Public Works, Portland, Maine.

Portland, City of, Portland, Oreg.
Providence, City of, Public Works Division, Providence, R. I.
Reading, City of, Bureau of Engineering, Reading, Pa.
Reading Co., Philadelphia, Pa.
Red Wing Sewer Pipe Corp., Red Wing, Minn. (General support).
Rhode Island, State of, Division of Purchases, Providence, R. I.
Rhode Island, State of, Department of Public Works, Division of Roads and Bridges, Providence, R. I.
Richmond, Fredericksburg & Potomac Railroad Co., Richmond, Va.
Robinson Clay Product Co., The, Akron, Ohio.
Robinson Clay Product Co. of New York, The, New York, N. Y.
Saginaw, City of, Board of Education, School District, Saginaw, Mich.
St. Louis, City of, Board of Education, St. Louis, Mo.
St. Louis-San Francisco Railway Co., Springfield, Mo.
St. Petersburg, City of, Division of Technical Services, St. Petersburg, Fla.
San Antonio, City of, San Antonio, Tex.
San Francisco, City of, Bureau of Engineering, San Francisco, Calif.
Seattle, City of, City Engineer's Department, Seattle, Wash.
Sioux Falls, City of, Sioux Falls, S. Dak.
South Bend, City of, South Bend, Ind.
Southern Railway System, Washington, D. C.
Specification Record, Chicago, Ill.
Springfield, City of, Springfield, Mo.
Stillwater Clay Products Co., The, Cleveland, Ohio.
Streator Drain Tile Co., Streator, Ill.
Superior Clay Corp., Uhrichsville, Ohio.
Tacoma, City of, Tacoma, Wash.
Tennessee State Highway Department, Nashville, Tenn.
Texas Vitrified Pipe Co., Mineral Wells, Tex.
Toledo, City of, Sanitary Department, Division of Engineering and Construction, Toledo, Ohio. (General support.)
Trenton, City of, Trenton, N. J.
Tulsa, City of, Engineering Department, Tulsa, Okla.
Union Clay Manufacturing Corp., Empire, Ohio.
United States Testing Co., Inc., Hoboken, N. J.
Virginia Department of Highways, Richmond, Va.
Wabash Railroad Co., St. Louis, Mo.
Washington Brick & Lime Co., Spokane, Wash.
Waterloo, City of, Department of Engineering, Waterloo, Iowa.
West Virginia, The State Road Commission of, Charleston, W. Va.
What Cheer Clay Products Co., What Cheer, Iowa.
White Hall Sewer Pipe & Stoneware Co., White Hall, Ill.
Wilmington, City of, Office of City Engineer, Wilmington, N. C.
Wisconsin, State Highway Commission of, Madison, Wis.
Zimmerman, A. C., Los Angeles, Calif.

UNITED STATES GOVERNMENT

Agriculture, U. S. Department of, Division of Purchase, Sales, and Traffic, Washington, D. C.
Civilian Production Administration, Metals and Minerals Division, Washington, D. C. (General support.)
Federal Works Agency, Office of Buildings Management, Public Buildings Administration, Washington, D. C.
Interior, U. S. Department of the, Office of Indian Affairs, Chicago, Ill., and Oklahoma City, Okla.
Interior, U. S. Department of the, National Capital Parks, Washington, D. C.
Interior, U. S. Department of the, National Park Service, Chicago, Ill.
Justice, U. S. Department of, Bureau of Prisons, Construction Division, Washington, D. C.
National Housing Agency, Washington, D. C. (General support.)
Veterans Administration, Washington, D. C.

COMMERCIAL STANDARDS

CS No.	Item
0–40.	Commercial standards and their value to business (third edition).
1–42.	Clinical thermometers (third edition).
2–30.	Mopsticks.
3–40.	Stoddard solvent (third edition).
4–29.	Staple porcelain (all-clay) plumbing fixtures.
5–46.	Pipe nipples; brass, copper, steel and wrought-iron (second edition).
6–31.	Wrought-iron pipe nipples (second edition). Superseded by CS5–46.
7–29.	Standard weight malleable iron or steel screwed unions.
8–41.	Gage blanks (third edition).
9–33.	Builders' template hardware (second edition)
10–29.	Brass pipe nipples. Superseded by CS5–46.
11–41.	Moisture regains of cotton yarns (second edition).
12–40.	Fuel oils (fifth edition).
13–44.	Dress patterns (fourth edition).
14–43.	Boys' button-on waists, shirts, junior and sport shirts (made from woven fabrics) (third edition).
15–46.	Men's pajama sizes (made from woven fabrics) (third edition).
16–29.	Wall paper.
17–47.	Diamond core drill fittings (fourth edition).
18–29.	Hickory golf shafts.
19–32.	Foundry patterns of wood (second edition).
20–47.	Staple vitreous china plumbing fixtures (fourth edition).
21–39.	Interchangeable ground-glass joints, stopcocks, and stoppers (fourth edition).
22–40.	Builders' hardware (nontemplate) (second edition).
23–30.	Feldspar.
24–43.	Screw threads and tap-drill sizes.
25–30.	Special screw threads. Superseded by CS24–43.
26–30.	Aromatic red cedar closet lining.
27–36.	Mirrors (second edition).
28–46.	Cotton fabric tents, tarpaulins and covers (second edition).
29–31.	Staple seats for water-closet bowls.
30–31.	Colors for sanitary ware.
31–38.	Wood shingles (fourth edition).
32–31.	Cotton cloth for rubber and pyroxylin coating.
33–43.	Knit underwear (exclusive of rayon) (second edition).
34–31.	Bag, case, and strap leather.
35–47.	Hardwood plywood (third edition).
36–33.	Fourdrinier wire cloth (second edition).
37–31.	Steel bone plates and screws.
38–32.	Hospital rubber sheeting.
39–37.	Wool and part wool blankets (second edition), (Withdrawn as commercial standard, July 14, 1941.)
40–32.	Surgeons' rubber gloves.
41–32.	Surgeons' latex gloves.
42–43.	Structural fiber insulating board (third edition).
43–32.	Grading of sulphonated oils.
44–32.	Apple wraps.
45–47.	Douglas fir plywood (seventh edition).
46–40.	Hosiery lengths and sizes (third edition).
47–34.	Marking of gold-filled and rolled-gold-plate articles other than watchcases.
48–40.	Domestic burners for Pennsylvania anthracite (underfeed type) (second edition).
49–34.	Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.
50–34.	Binders board for bookbinding and other purposes.
51–35.	Marking articles made of silver in combination with gold.

Item

CS. No.
52-35. Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).
53-35. Colors and finishes for cast stone.
54-35. Mattresses for hospitals.
55-35. Mattresses for institutions.
56-41. Oak flooring (second edition).
57-40. Book cloths, buckrams, and impregnated fabrics for bookbinding purposes except library bindings (second edition).
58-36. Woven elastic fabrics for use in overalls (overall elastic webbing).
59-44. Textiles—testing and reporting (fourth edition).
60-48. Hardwood dimension lumber (second edition).
61-37. Wood-slat venetian blinds.
62-38. Colors for kitchen accessories.
63-38. Colors for bathroom accessories.
64-37. Walnut veneers.
65-43. Methods of analysis and of reporting fiber composition of textile products (second edition).
66-38. Marking of articles made wholly or in part of platinum.
67-38. Marking articles made of karat gold.
68-38. Liquid hypochlorite disinfectant, deodorant, and germicide.
69-38. Pine oil disinfectant.
70-41. Phenolic disinfectant (emulsifying type) (second edition) (published with CS71-41).
71-41. Phenolic disinfectant (soluble type) (second edition) (published with CS70-41).
72-38. Household insecticide (liquid spray type).
73-45. Old growth Douglas fir standard stock doors (third edition).
74-39. Solid hardwood wall paneling.
75-42. Automatic mechanical draft oil burners designed for domestic installations (second edition).
76-39. Hardwood interior trim and molding.
77-40. Sanitary cast-iron enameled ware.
78-40. Ground-and-polished lenses for sun glasses (second edition) (published with CS79-40).
79-40. Blown, drawn, and dropped lenses for sun glasses (second edition) (published with CS78-40).
80-41. Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).
81-41. Adverse-weather lamps for vehicles (after market).
82-41. Inner-controlled spotlamps for vehicles (after market).
83-41. Clearance, marker, and identification lamps for vehicles (after market).
84-41. Electric tail lamps for vehicles (after market).
85-41. Electric license-plate lamps for vehicles (after market).
86-41. Electric stop lamps for vehicles (after market).
87-41. Red electric warning lanterns.
88-41. Liquid burning flares.
89-40. Hardwood stair treads and risers.
90- . (Reserved for power shovels and cranes).
91-41. Factory-fitted Douglas fir entrance doors.
92-41. Cedar, cypress and redwood tank stock lumber.
93-41. Portable electric drills (exclusive of high frequency).
94-41. Calking lead.
95-41. Lead pipe.
96-41. Lead traps and bends.
97-42. Electric supplementary driving and passing lamps for vehicles (after market).
98-42. Artists' oil paints.

Item

CS. No.
99-42. Gas floor furnaces—gravity circulating type.
100-47. Porcelain-enameled steel utensils (third edition).
101-43. Flue-connected oil-burning space heaters equipped with vaporizing pot-type burners.
102- . (Reserved for Diesel and fuel-oil engines).
103-42. Cotton and rayon velour (jacquard and plain).
104-46. Warm-air furnaces equipped with vaporizing pot-type oil burners (second edition).
105-43. Mineral wool; loose granulated, or felted form, in low-temperature installations.
106-44. Boys' pajama sizes (woven fabrics) (second edition).
107-45. Commercial electric refrigeration condensing units (second edition). (Withdrawn as commercial standard September 4, 1947.)
108-43. Treading automobile and truck tires.
109-44. Solid-fuel-burning forced-air furnaces.
110-43. Tire repairs—vulcanized (passenger, truck, and bus tires).
111-43. Earthenware (vitreous-glazed) plumbing fixtures.
112-43. Homogeneous fiber wallboard.
113-44. Oil-burning floor furnaces equipped with vaporizing pot-type burners.
114-43. Hospital sheeting for mattress protection.
115-44. Porcelain-enameled tanks for domestic use.
116-44. Bituminized-fibre drain and sewer pipe.
117-44. Mineral wool; blankets, blocks, insulating cement, and pipe insulation for heated industrial equipment.
118-44. Marking of jewelry and novelties of silver.
(E)119-45.[1] Dial indicators (for linear measurements).
120-46. Standard stock ponderosa pine doors (second edition).
121-45. Women's slip sizes (woven fabrics).
122-45. Western hemlock plywood.
123-45. Grading of diamond powder.
(E)124-45.[1] Master disks.
125-47. Prefabricated homes (second edition).
126-45. Tank mounted air compressors.
127-45. Self-contained mechanically refrigerated drinking water coolers.
128-45. Men's sport shirt sizes—woven fabrics (other than those marked with regular neckband sizes).
129-47. Materials for safety wearing apparel (second edition).
130-46. Color materials for art education in schools.
131-46. Industrial mineral wool products, all types—testing and reporting.
132-46. Hardware cloth.
133-46. Woven wire netting.
134-46. Cast aluminum cooking utensils (metal composition).
135-46. Men's shirt sizes (exclusive of work shirts).
136-46. Blankets for hospitals (wool, and wool and cotton).
137-46. Size measurements for men's and boys' shorts (woven fabrics).
138-47. Insect wire screening.
139-47. Work gloves.
140-47. Testing and rating convectors.
141-47. Sine bars, blocks, plates, and fixtures.
142-47. Automotive lifts.
143-47. Standard strength and extra strength perforated clay pipe.
144-47. Formed metal porcelain enameled sanitary ware.
145-47. Testing and rating hand-fired hot-water-supply boilers.
146-47. Gowns for hospital patients.
147-47. Colors for molded urea plastics.

NOTICE.—Those interested in commercial standards with a view toward accepting them as a basis of everyday practice may secure copies of the above standards, while the supply lasts, by addressing the Commodity Standards Division, National Bureau of Standards, Washington 25, D. C.

[1] Where "(E)" precedes the CS number, it indicates an emergency commercial standard, drafted under war conditions with a view toward early revision.

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