U.S. Department of Commerce
National Institute of Standard and Technology
(formerly the National Bureau of Standards)

Commercial Standard CS12-48
Fuel Oils

Commercial Standard CS12-48, Fuel Oils, was withdrawn September 15, 1966 by the U.S. Department of Commerce.

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The following standard was used to replace CS12-48: ASTM D396, Standard Specification for Fuel Oils.

ASTM standards are under the direct responsibility of the ASTM Committees/Subcommittees.

For additional information on this standard, related standards and copies, please contact:

ASTM International
(formerly American Society for Testing and Materials)
100 Barr Harbor Drive, West Conshohocken PA 19428-2959
Telephone: (610) 832-9500/-9585, Fax: (610) 832-9555
Technical Committees Fax: (610) 832-9666
http://www.astm.org (to search click on standards or technical committees, etc.)

* * * * * * *

The following organizations may provide guidance and information concerning the subject, contact:

Petroleum Marketers Association of American (PMAA)
(American Oil Burners Association)
1901 North Fort Myer Drive, Suite 500, Arlington, VA 22209-1604
Telephone: (703) 351-8000, Fax: (703) 351-9160
E-mail: info@pmaa.org

American Petroleum Institute (API)
1220 L Street, NW, Washington, DC 20005-4070
Telephone: (202) 682-8000, Fax: (202) 682-8099

1-20-06

FUEL OILS

(Sixth Edition)

COMMERCIAL STANDARD CS12–48

[Supersedes CS12–40]

Effective Date for New Production From September 25, 1948

A RECORDED VOLUNTARY STANDARD

OF THE TRADE

UNITED STATES DEPARTMENT OF COMMERCE

CHARLES SAWYER, Secretary

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

COMMODITY STANDARDS

Simplified Practice Recommendations and Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division 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 FUEL OILS

On January 9, 1929, a joint conference of representative refiners, distributors, and consumers of fuel oil, manufacturers of oil burners, and general interests adopted a recommended standard for domestic and industrial fuel oils, which was accepted in writing by the industry and published as Commercial Standard CS12-29. In 1933, 1934, 1938, and 1940, upon recommendation of the standing committee to keep the standard abreast of progress, revisions were adopted and issued as CS12–33, CS12–35, CS12–38, and CS12–40, respectively.

On May 10, 1948, with the endorsement of the standing committee, a revision of CS12–40, drafted by Technical Committee E of American Society for Testing Materials Committee D–2, was circulated for acceptance. Those concerned have since accepted and approved for promulgation by the United States Department of Commerce, through the National Bureau of Standards, the revised standard as shown herein.

Project Manager: F. W. REYNOLDS, Commodity Standards Division, National Bureau of Standards.

Technical Adviser: R. C. HARDY, Heat and Power Division, National Bureau of Standards.

COMMERCIAL STANDARD CS12–48

for

FUEL OILS

(SIXTH EDITION)

SCOPE

1. These specifications cover five grades of fuel oil for various types of fuel-oil-burning equipment.

GENERAL REQUIREMENTS

2. The fuel oils herein specified shall be hydrocarbon oils free from acid, grit, and fibrous or other foreign matter likely to clog or injure the burner or valves. If required, the oil shall be strained by being drawn through filters or wire gauze of 16 meshes to the inch. (United States Standard Sieve No. 16, ASTM Designation 1,190 micron.) The clearance area through the strainers shall be at least twice the area of the suction pipe, and the strainers shall be in duplicate.

DETAIL REQUIREMENTS [1]

3. The various grades of fuel oil shall conform to the detailed requirements shown in table 1. It is the intent of these classifications that failure to meet any requirement of a given grade does not automatically place an oil in the next lower grade unless in fact it meets all requirements of the lower grade.

[1] The technical requirements of this Commercial Standard are identical in substance with Tentative specifications for fuel oils, ASTM Designation: D 396–48T.

TABLE 1. *Detailed requirements for fuel oils* [a]

Grade of fuel oil [b]		Flash point, °F	Pour point, °F	Water and sediment, %	Carbon residue on 10% residuum, %	Ash, %	Distillation temperatures, °F			Viscosity								Gravity, °API
										Saybolt				Kinematic centistokes at—				
										Universal at 100° F		Furol at 122° F		100° F		122° F		
Number	Description						10% point	90% point	End point									
		min	*max*	*max*	*max*	*max*	*max*	*max*	*max*	*max*	*min*	*max*	*min*	*max*	*min*	*max*	*min*	*min*
1	Distillate oil intended for vaporizing pot-type burners and other burners requiring this grade. [c]	100 or legal	0	Trace	0.15	------	420	------	625	------	------	------	------	2.2	1.4	------	------	35
2	Distillate oil for general purpose domestic heating for use in burners not requiring No. 1.	100 or legal	[d] 20	0.10	0.35	------	(e)	675	------	40	------	------	------	(4.3)	------	------	------	26
4	Oil for burner installations not equipped with preheating facilities.	130 or legal	20	.50	------	0.10	------	------	------	125	45	------	------	(26.4)	(5.8)	------	------	------
5	Residual-type oil for burner installations equipped with preheating facilities.	130 or legal	------	1.00	------	.10	------	------	------	------	150	40	------	------	(32.1)	(81)	------	------
6	Oil for use in burners equipped with preheaters permitting a high-viscosity fuel.	150 or legal	------	[f] 2.00	------	------	------	------	------	------	------	300	45	------	------	(638)	(92)	------

[a] Recognizing the necessity for low-sulfur fuel oils used in connection with heat treatment, nonferrous metal, glass and ceramic furnaces, and other special uses, a sulfur requirement may be specified in accordance with the following table:

Grade of fuel oil	Sulfur, max, percent
No. 1	0.5
No. 2	1.0
Nos. 4, 5, and 6	No limit

Other sulfur limits may be specified only by mutual agreement between the buyer and seller.

[b] It is the intent of these classifications that failure to meet any requirement of a given grade does not automatically place an oil in the next lower grade unless in fact it meets all requirements of the lower grade.

[c] No. 1 oil shall be tested for corrosion in accordance with par. 15 for 3 hours at 122° F. The exposed copper strip shall show no gray or black deposit.

[d] Lower or higher pour points may be specified whenever required by conditions of storage or use. However, these specifications shall not require a pour point lower than 0° F under any conditions.

[e] The 10-percent point may be specified at 440° F. Maximum for use in other than atomizing burners.

[f] The amount of water by distillation plus the sediment by extraction shall not exceed 2.00 percent. The amount of sediment by extraction shall not exceed 0.50 percent. A deduction in quantity shall be made for all water and sediment in excess of 1.0 percent.

METHODS OF TEST

4. The requirements enumerated in these specifications shall be determined in accordance with the following methods of testing of the American Society for Testing Materials, except as may be required under paragraph 5.

FLASH POINT

5. The flash point, instrument, and method for determining minimum flash point shall be those legally required for the locality in which the oil is sold. In absence of legal requirements the minimum flash point shall be determined in accordance with the Standard method of test for flash point by means of the Pensky-Martens closed tester, ASTM Designation: D 93–46.

POUR POINT

6. Standard method of test for cloud and pour points, ASTM Designation: D 97–47.

WATER AND SEDIMENT

7. *Water and sediment.*—(For grades 1 to 5, inclusive.) Tentative method of test for water and sediment in petroleum products by means of centrifuge, ASTM Designation: D 96–47T.

8. *Water by distillation.*—(For grade 6.) Standard method of test for water in petroleum products and other bituminous materials, ASTM Designation D 95–46.

9. *Sediment by extraction.*—(For grade 6.) Tentative method of test for sediment in fuel oil by extraction, ASTM Designation: D 473–46T.

CARBON RESIDUE

10. Standard method of test for carbon residue of petroleum products (Ramsbottom carbon residue), ASTM Designation: D 524–42.

ASH

11. Standard method of test for ash content of petroleum oils, ASTM Designation: D 482–46.

DISTILLATION

12. Distillation of grade 1 oil shall be made in accordance with the Standard method of test for distillation of gasoline, naphtha, kerosene, and similar petroleum products, ASTM Designation: D 86–46; and of grade 2 in accordance with the Standard method of test for distillation of gas oil and similar distillate fuel oils, ASTM Designation: D 158–41.

VISCOSITY

13. *Kinematic viscosity.*—(For grade 1.) Tentative method of test for kinematic viscosity, ASTM Designation: D 445–46T.

Saybolt viscosity.—(For grades 2, 4, 5, and 6.) Standard method of test for viscosity by means of the Saybolt viscosimeter, ASTM Designation: D 88–44.

GRAVITY

14. Standard method of test for gravity of petroleum and petroleum products by means of the hydrometer (ASTM Designation: D 287–39).

CORROSION

15. Standard method of test for detection of free sulfur and corrosive sulfur compounds in gasoline, ASTM Designation: D 130–30 (except for interpretation of exposed copper strip).

REFERENCES

16. Complete information regarding the procedure for making the tests specified, but not included in the above text, is to be found in the publications of the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

SIGNIFICANCE OF TESTS PRESCRIBED[2]

FLASH POINT

17. The flash point of a product may be defined as the temperature to which it must be heated in order to give off sufficient vapor to form a flammable mixture with air. This temperature varies with the apparatus and procedure employed, and consequently both must be specified when the flash point of an oil is stated.

18. The minimum flash point of oils used for fuel is usually controlled by law. When there are no legal requirements, the minimum values in the table are to be employed.

POUR POINT

19. The pour point of an oil is the lowest temperature at which it will flow when cooled and tested under prescribed conditions. Pour point specifications are included in order that oil may be secured which will not cause difficulty in handling or in use at the lowest temperatures to which it may normally be subjected.

WATER AND SEDIMENT

20. Water and sediment are impurities that are almost entirely excluded in fuel oils Nos. 1 and 2, and which are permitted in somewhat larger quantities in fuel oils Nos. 4, 5, and 6. It is difficult to eliminate them entirely from this latter group of oils, and the advantage is not sufficient to justify the cost. Water and sediment are determined together by the centrifuge, except for grade 6.

[2] For a more comprehensive description of the significance of tests on petroleum products, see The Significance of Tests of Petroleum Products, latest revised edition, published by the American Society for Testing Materials.

CARBON RESIDUE

21. The carbon residue test when considered in connection with other tests and the use for which the oil is intended furnishes pertinent information and throws some light on the relative carbon-forming qualities of an oil. Values for carbon residue that are abnormally high in relation to other properties of the oil may indicate the presence of heavy residual products due to unsuitable refinery methods or contamination.

ASH

22. The ash test is used to determine the amount of noncombustible impurities in the oil. These impurities come principally from the natural salts present in the crude oil, or from the chemicals that may be used in refinery operations, although they may also come from scale and dirt picked up from containers and pipes. Some ash-producing impurities in fuel oils cause rapid deterioration of refractory materials in the combustion chamber, particularly at high temperatures; some are abrasive and destructive to pumps, valves, control equipment, and other burner parts. Ash specifications are included in order to minimize these operating difficulties as far as practicable.

DISTILLATION

23. Laboratory distillation of a sample under prescribed conditions gives an index of the volatility of the oil. The 10- and 90-percent points represent, respectively, the temperatures at which 10 and 90 percent of the sample are distilled. The end point is the maximum temperature recorded by the distillation thermometer at the end of the distillation.

24. The 10-percent point serves as an index of the ease of ignition of the oil; the 90-percent point and the end point are specified to make sure that the oil will volatilize and burn completely and produce a minimum amount of carbon.

VISCOSITY

25. The viscosity of an oil is the measure of its resistance to flow. Maximum limits are placed on this property because of its effect upon the rate at which oil will flow through pipe lines and upon the degree of atomization that may be secured in any given equipment.

26. Viscosity is measured as the time in seconds required for a definite volume of oil to pass through a small tube of specified dimensions at a definite temperature. Viscosity decreases rapidly as temperature increases, and preheating makes possible the use of oils of relatively high viscosity. The kinematic and Saybolt universal viscosimeters are used for fuel oils of fairly low viscosity and the Saybolt furol viscosimeter for more viscous oils.

IDENTIFICATION

27. In order that purchasers of fuel oil may become familiar with the significance of grading of fuel oils and purchase fuels for the various types of burners with confidence, it is recommended that the following statement be used on invoices, contracts, sales literature, etc.:

> This fuel oil complies with all requirements for Grade ------ as specified in Commercial Standard CS12–48, developed by the trade under the procedure of the National Bureau of Standards, and issued by the United States Department of Commerce.

EFFECTIVE DATE

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 United States Department of Commerce, effective from September 25, 1948.

EDWIN W. ELY,
Chief, Commodity Standards Division.

HISTORY OF PROJECT

General conference.—The manufacturers of oil burners and many petroleum refiners had long felt the need of uniform specifications for fuel oils. The American Oil Burner Association assumed the initiative in this matter and developed specifications for six grades of fuel oils with the cooperation of the American Society for Testing Materials and the American Petroleum Institute.

In order to bring these specifications into broader use the cooperation of the National Bureau of Standards was requested. Anticipating the benefits to be derived from a commonly understood basis of quality, all interests of the industry freely participated in a well-attended general conference held in New York City, January 9, 1929, and upon recommendation of this conference the standard was accepted as an everyday guide for the production, sale, and use of fuel oils. The standard was published as Domestic and Industrial Fuel Oils, Commercial Standard CS12–29, effective July 15, 1929, and it was reaffirmed on December 10, 1930, and again on December 29, 1931.

First revision.—On June 21, 1932, a meeting of the standing committee, which had been broadening to coincide exactly with section 1 of Technical Committee C of American Society for Testing Materials Committee D–2, and representing the producers, distributors, users of fuel oils, and general interests, was held to discuss the need for revising the commercial standard. The committee approved a revision which was formally submitted to letter ballot. The revision embodied a number of minor changes to bring it in line with current practice in the industry, and included a table showing the permissible sulfur content for each grade when the oils are to be used for special purposes.

The revised standard was endorsed by practically all of the larger refiners, by many oil distributors and consumers, as well as by the manufacturers of oil burners. It was published as Fuel Oils (second

edition), Commercial Standard CS12–33, and became effective May 1, 1933.

Second revision.—As a result of improvements in oil burners and a need for limitations which would eliminate as far as practicable overlapping of oil grades, the standing committee on June 25, 1934, approved for submission to letter ballot a revised draft which set maximum as well as minimum limits for certain characteristics, inserted requirements for carbon residue and ash, and increased the viscosity for grades 3 and 4. Following acceptance by a satisfactory majority, the success of the revision was announced on December 14, 1934, and the standard became effective 60 days later as CS12–35.

Third revision.—A general demand by the industry for a reduction in the number of grades to be stocked by refiners and distributors led the standing committee to recommend the adoption of a revision, drafted by Technical Committee E of American Society for Testing Materials Committee D–2, which reduced the number of grades to five by the elimination of grade 4. Accompanying adjustments were made in the characteristics of the remaining grades, principally in the direction of greater volatility and fluidity. This recommended revision was circulated to the industry for acceptance on February 25, 1938, and the establishment of the revision was announced on May 31, 1938, becoming effective with the announcement.

Fourth revision.—On June 27, 1939, a meeting of Technical Committee E of ASTM Committee D–2 proposed a revision of the standard which it subsequently adopted. This revision was submitted to the standing committee on September 2, 1939, and upon recommendation of the majority it was submitted to the industry for written acceptance on September 30, 1939. Upon acceptance by a satisfactory majority of the industry the establishment of the revision was announced.

Fifth revision.—On March 3, 1948, a revision of the standard developed by Technical Committee E of ASTM D–2 was submitted to the standing committee. Upon recommendation of the majority it was submitted to the industry for written acceptance on May 10, 1948. Upon acceptance by a satisfactory majority of the industry the establishment of the revision was announced.

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. Each organization nominated its own representative. 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.

Producers and Distributors:

J. L. MINNER (chairman), Shell Oil Co., Inc., 50 West 50th St., New York, N. Y.
R. M. BARTLETT, Gulf Oil Corp., Gulf Bldg., Pittsburgh, Pa.
K. E. DEROSAY, Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
S. H. HULSE, Standard Oil Development Co., P. O. Box 246, Elizabeth, N. J.

Burner Manufacturers:

C. E. SMITH, Delco Appliance Division, General Motors Corp., P. O. Box 230, Rochester 1, N. Y.
M. A. POWERS, Timken Silent Automatic Div., Timken Detroit Axle Co., Jackson, Mich.
T. B. STILLMAN, Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.

Fuel Oil Distributors:

F. E. SPENCER, Burning Oil Distributors Association, c/o Spencer Petroleum Co., 616 So. Michigan Ave., Chicago, Ill.
ERNEST STUDERUS, Studerus Oil Co., Kearny, N. J. (Representing Fuel Oil Distributors Association of New Jersey).
CARL SHIELDS, Petroleum Heat & Power Co., 511 Fifth Ave., New York, N. Y.
W. H. BUTLER, Coastal Oil Co., 60 Park Place, Newark 2, N. J.

Users:

M. W. MERRILL, United States Metals Refining Co., Carteret, N. J. (Representing National Association of Purchasing Agents).
Mrs. CARL WEBER ILLIG, JR., 7 Union St., Onset, Mass. (Representing National Council of Women).

Consumer Safety:

J. H. WITTE, Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill.

Secretary:

F. W. REYNOLDS, Commodity Standards Division, National Bureau of Standards, Washington 25, D. C.

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 CS12-48 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 fuel oils. We reserve the right to depart from it as we deem advisable.

(Cut on this line)

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 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 acceptances 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

The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, testing, or purchase of fuel oils. 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 Institute of Laundering, Joliet, Ill.
American Specification Institute, Chicago, Ill.
Burning Oil Distributors Association, Chicago, Ill.
Consumers Cooperative Association, Kansas City, Mo.
Dairymen's League Co-Operative Association, Inc., New York, N. Y.
Indiana Farm Bureau Cooperative Association, Inc., Mount Vernon, Ind.
Limited Price Variety Stores Association, Inc., New York, N. Y.
National Association of Purchasing Agents, New York, N. Y.
National Warm Air Heating & Air Conditioning Association, Cleveland, Ohio.
Oil-Heat Institute of America, Inc., New York, N. Y
Western Petroleum Refiners Association, Tulsa, Okla.

FIRMS AND OTHER INTERESTS

Ace Engineering Co., Chicago, Ill.
Acme Oil Burner Co., Inc., Cedar Rapids, Iowa.
Aetna Oil Co., Louisville, Ky.
Aldrich Co., Wyoming, Ill.
Allied Oil Co., Inc., Cleveland, Ohio.
Almont Oil & Gas Co., Almont, Mich.
American Bitumuls Co., San Francisco, Calif.
American Car & Foundry Co., Berwick, Pa.
American Hardware Corp., The, New Britain, Conn.
American Liberty Oil Co., Mount Pleasant, Tex.
American Mineral Spirits Co., New York, N. Y.
American Mohawk Co., Inc., New York, N. Y.
American Oil Co., Baltimore, Md.
American Stove Co., Lorain Division, Lorain, Ohio.
Anchor Oil Co., Houston, Tex.
Anchor Post Products, Inc., Baltimore, Md.
Anderson-Prichard Oil Corp.—Col-Tex Refining Co., Oklahoma City, Okla.
Arrow Petroleum Co., Forest Park, Ill.
Ashland Oil & Refining Co., Ashland, Ky.
Atlantic Refining Co., The, Philadelphia, Pa.
Atlas Oil & Refining Corp., Shreveport, La.
Automatic Burner Corp., Chicago, Ill.
Automatic Combustion Equipment Co., Inc., Rochester, N. Y.
Babcock & Wilcox Co., The, New York, N. Y.
Ballard Oil Co. of Hartford, Inc., Hartford, Conn.
Barber, W. H., Co., Minneapolis, Minn.
Bar-Camp, Inc., Dayton, Ohio.
Bareco Oil Co., Tulsa, Okla.
Bay Petroleum Corp., The, Denver, Colo.
Bay Refining Corp., Saginaw, Mich.
Berry Asphalt Co., Magnolia, Ark.
Bethlehem Foundry & Machine Co., Bethlehem, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bettendorf Oil Burner Co., Marshalltown, Iowa.
Boggs Oil Co., Sterling, Colo.
Borg-Warner Corp., Norge Division, Muskegon Heights, Mich.
Brown Shoe Co., Inc., St. Louis, Mo.
Buckley & Scott Utilities, Inc., Watertown, Mass.
Calumet Refining Co., Chicago, Ill.
Canfield Oil Co., Cleveland, Ohio.
Carolina Coal & Ice Co., Asheville, N. C.
Carson Petroleum Co., Chicago, Ill.
Century Engineering Corp., Cedar Rapids, Iowa. (General support.)
Chalmette Petroleum Corp., Chalmette, La.
Citro Oil Burners Corp., Pompton Lakes, N. J. (General support.)
Clack, H. Earl, Co., Havre, Mont.
Coastal Oil Co., Newark, N. J.
Coleman Co., Inc., The, Wichita, Kans.
Combustion Equipment Co., Kansas City, Mo.
Commerce Petroleum Co., Chicago, Ill.
Conwell, E. L., & Co., Philadelphia, Pa.
Cosden Petroleum Corp., Big Spring, Tex.
Cross, Henry H., Co., Chicago, Ill.
Crown Central Petroleum Corp., Baltimore, Md.
Deep Rock Oil Corp., Chicago, Ill.
Derby Oil Co., The, Wichita, Kans.
Detroit Lubricator Co., Detroit, Mich.
Eastman Kodak Co., Rochester, N. Y.
Eckhart Manufacturing Co., Roselle, N. J. (General support.)
El Dorado Refining Co., The, El Dorado, Kans.
Electrical Testing Laboratories, Inc., New York, N. Y.
Elk Refining Co., Charleston, W. Va.
Envoy Petroleum Co., Long Beach, Calif.
Erie Railroad Co., Meadville, Pa.
Esso Export Corp., New York, N. Y.
Esso Standard Oil Co., New York, N. Y.
Esso Standard Oil Co. of Pennsylvania, New York, N. Y.
Estate Heatrola, Division of Noma Electric Corp., Hamilton, Ohio.
Eureka Williams Corp., Bloomington, Ill.
Evans Products Co., Plymouth, Mich.
Faultless Oil Burner Co., St. Albans, N. Y.
Fletcher Oil Co., Wilmington, Calif.
Fuld Bros., Inc., Baltimore, Md.
General Electric Co., Schenectady, N. Y.
Gilbert & Barker Manufacturing Co., West Springfield, Mass.
Golden Bear Oil Co., Los Angeles, Calif.
Greenwood Engineering Co., Inc., Baltimore, Md.
Gulf Oil Corp., Pittsburgh, Pa.
Gulf Refining Co., Pittsburgh, Pa.
Gulf Research & Development Co., Pittsburgh, Pa.
Hamman Oil & Refining Co., Houston, Tex.
Hart Refinery, Missoula, Mont.
Hauck Manufacturing Co., Brooklyn, N. Y.
Heil Co., The, Milwaukee, Wis. (General support.)
Herco Oil Burner Corp., Lancaster, Pa.
Hollingshead, R. M., Corp., Camden, N. J.
Hospital Bureau of Standards and Supplies, Inc., New York, N. Y.
Hubbard, Lawless & Blakeley, New Haven, Conn.
Humble Oil & Refining Co., Houston, Tex.

Husky Oil & Refining Co., Cody, Wyo.
HuTex Oil & Refining Co., Houston, Tex.
International Oil Burner Co., St. Louis, Mo.
Johnson Oil Refining Co., Cleveland, Okla.
Jones, Paul, & Co., Inc., Baltimore, Md.
Kanotex Refining Co., Arkansas City, Kans.
K. C. S. and L. & A. Ry. Cos., Kansas City, Mo.
Kendall Refining Co., Bradford, Pa.
Kleen-Heet, Inc., Chicago, Ill.
Kresky Manufacturing Co., Inc., Petaluma, Calif.
Kresno-Stamm Manufacturing Co., Inc., Palisades Park, N. J.
Laco Oil Burner Co., Inc., Griswold, Iowa. (General support.)
Lakeside Refining Co., Kalamazoo, Mich.
Lennox Furnace Co., Marshalltown, Iowa; Columbus, Ohio; and Syracuse, N. Y.
Leonard Refineries, Inc., Alma, Mich.
Lion Oil Co., El Dorado, Ark.
Louisville Refining Co., Louisville, Ky.
Lynn Products Co., Lynn, Mass.
M. F. A. Oil Co., Columbia, Mo., and Chanute, Kans.
Macmillan Petroleum Corp., Norphlet, Ark.
Magnolia Petroleum Co., Dallas, Tex.
Makomb Steel Products Co., Division of Globe American Corp., Macomb, Ill.
Malleable Iron Fittings Co., Branford, Conn.
Malleable Iron Range Co., Beaver Dam, Wis.
Maritime Oil Co., Houston, Tex.
McBride Refining Co., Edinburg, Tex.
McNutt Oil & Refining Co., Inc., El Paso, Tex.
Mexican Petroleum Corp., Baltimore, Md.
Meyer Furnace Co., Peoria, Ill.
Mid-Continent Petroleum Corp., Tulsa, Okla.
Monarch Refineries, Inc., Oklahoma City, Okla.
Motor Wheel Corp., Lansing, Mich.
Mueller, L. J., Furnace Co., Milwaukee, Wis.
National Radiator Co., The, Johnstown, Pa.
New Jersey, State of, Purchase Division, Trenton, N. J.
Newark College of Engineering, Newark, N. J.
Newhall Refining Co., Newhall, Calif.
North Dakota, State of, Laboratories Dept., Bismarck, N. Dak.
Norton Co., Worcester, Mass.
Norwalk Co., The, Los Angeles, Calif.
Nu-Way Corp., The, Rock Island, Ill.
Ohio Oil Co., The, Findlay, Ohio.
Oil Electric Co., Minneapolis, Minn.
Old Dutch Refining Co., Muskegon, Mich.
Osceola Refining Co., Inc., Reed City, Mich.
Pacific States Oil Co., Wilmington, Calif.
Pan American Refining Corp., New York, N. Y.
Pana Refining Co., Pana, Ill.
Panhandle Producing & Refining Co., Wichita Falls, Tex.
Paragon Oil Co., Inc., Brooklyn, N. Y.
Pathfinder Petroleum Co., Los Angeles, Calif.
Perfection Stove Co., Cleveland, Ohio.
Perfex Corp., Milwaukee, Wis. (General support.)
Petro Products, Inc., Milwaukee, Wis.
Petrol Corp., The, Los Angeles, Calif.
Petroleum Utilities Co., Inc., Chadron, Nebr.
Pioneer Oil & Refining Co., San Antonio, Tex.
Porter, Geo. H., Steel Treating Co., The, Cleveland, Ohio.
Producers Refining, Inc., West Branch, Mich.
Pure Oil Co., The, Chicago, Ill.
Quaker Manufacturing Co., Chicago, Ill.
Quaker State Oil Refining Corp., Emlenton, Pa.
Quiet Heet Oil Burner Co., Inc., Brooklyn, N. Y.
Ray Oil Burner Co., San Francisco, Calif.
Richfield Oil Corp. of New York, New York, N. Y.
Robillard G., Ltd., Montreal, Quebec, Canada.
Rock Island Oil & Refining Co., Inc., Duncan, Okla.
Rock Island Refining Corp., Indianapolis, Ind.
Sawyer Heating Co., Detroit, Mich.
Sears, Roebuck & Co., Chicago, Ill.
Seaside Oil Co., Santa Barbara, Calif.
Shallow Water Refining Co., Garden City, Kans.
Shamrock Oil & Gas Corp., The, Amarillo, Tex.
Shell Oil Co., Inc., New York, N. Y.
Silent Sioux Oil Burner Corp., Orange City, Iowa.
Simplex Oil Heating Corp., New York, N. Y.
Sinclair Refining Co., New York, N. Y.
Skelly Oil Co., Tulsa, Okla.
Smoke Brothers, Detroit, Mich.
Socal Oil & Refining Co., Huntington Beach, Calif.
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Southern Oil Service, Nashville, Tenn.
Standard Oil Co. of California, San Francisco, Calif.
Standard Oil Co., Inc., in Kentucky, Louisville, Ky.
Standard Oil Co. (Ohio), The, Cleveland, Ohio.
Standard Oil Co. of Texas, El Paso, Tex.
Stanolind Oil & Gas Co., Tulsa, Okla.
Stoll Oil Refining Co., Louisville, Ky.
Sun Oil Co., Philadelphia, Pa.
Sylvestre Oil Co., Inc., Mount Vernon, N. Y.
Taylor Refining Co., Taylor, Tex.
Thatcher Furnace Co., Garwood, N. J.
Tide Water Associated Oil Co., San Francisco, Calif.
Timken Silent Automatic Division, Timken Detroit Axle Co., Jackson, Mich.
Toridheet Division, Cleveland Steel Products Corp., Cleveland, Ohio.
Torrington Manufacturing Co., Torrington, Conn.
Tru-Heet Co., Trenton, N. J.
Underwriters' Laboratories, Inc., Chicago, Ill.
Union Oil Co. of California, Los Angles, Calif.
United Refining Co., Warren, Pa.
United States Testing Co., Inc., Hoboken, N. J.
Vickers Petroleum Co., Inc., The, Wichita, Kans.
Viking Manufacturing Corp., Cleveland, Ohio.
Warren Petroleum Corp., Tulsa, Okla.
Wasatch Oil Co., Salt Lake City, Utah.
Waverly Oil Works Co., The, Pittsburgh, Pa.
Weatherall Engineers, Inc., Providence, R. I. (General support.)
White Fuel Corp., South Boston, Mass.
Wickett Refining Co., Wickett, Tex. (General support.)
Wilcox Oil Co., Tulsa, Okla.
Witschy Oil Co., Scottsbluff, Nebr.
Wood River Oil & Refining Co., Inc., Hartford, Ill.

UNITED STATES GOVERNMENT

Agriculture, U. S. Department of, Division of Purchase, Sales and Traffic, Washington, D. C.
Army, Department of the, Standards Branch, Logistics Division, 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).
12–48.	Fuel oils (sixth 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).

CS No.	Item
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. (Withdrawn as commercial standard March 15, 1948.)
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.
45-48.	Douglas fir plywood eighth 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.
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).
73-48.	Old growth Douglas fir, Sitka spruce, and Western hemlock standard stock doors (fourth 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.
77-48.	Enameled cast-iron plumbing fixtures (second edition).
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.
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).
103-48.	Rayon jacquard velour (with or without other decorative yarn) (second edition).
104-46.	Warm-air furnaces equipped with vaporizing pot-type oil burners (second edition).
105-48.	Mineral wool insulation—for low temperatures (second edition).
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).

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

CS No.	Item
120–48.	Standard stock ponderosa pine doors (third 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.
148–48.	Men's circular flat and rib knit rayon underwear.
149–48.	Utility-type house-dress sizes.
150–48.	Hot-rolled rail steel bars (produced from tee-section rails).
151–48.	Body measurements for the sizing of apparel for infants, babies, toddlers, and children (for the knit-underwear industry).
152–48.	Copper naphthenate wood preservative.

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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.

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