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

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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 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.

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 burner or valves. If required, the oil shall be strained by being run 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 size of the suction pipe, and the strainers shall be in duplicate.

DETAIL REQUIREMENTS

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>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Flash point, °F</th>
<th>Pour point, °F</th>
<th>Water and sediment, %</th>
<th>Carbon residue on 10% residue, %</th>
<th>Ash, %</th>
<th>Distillation temperatures, °F</th>
<th>Viscosity</th>
<th>Gravity, °API</th>
</tr>
</thead>
</table>
| 1      | Distillate oil intended for vaporizing pot-type burners and other burners requiring this grade.  
       | min          | max            | max           | max                   | max                           | max   | 420                        | max      | min 1.4      |
|        | 100 or legal | 0              | Trace         | 0.15                 |                               | max   | 625                        | max      | max 2.2      |
| 2      | Distillate oil for general purpose domestic heating for use in burners not requiring No. 1. | 100 or legal | 20             | 0.10                  | 0.35                          |       | (1)                        | 675      | 40           |
| 4      | Oil for burner installations not equipped with preheating facilities. | 130 or legal | 20             | 0.5                  | 0.10                          |       | 125                        | 45       | (20.4)       |
| 5      | Residual-type oil for burner installations equipped with preheating facilities. | 130 or legal | 1.00           | 0.10                 |                               |       | 150                        | 40       | (32.1)       |
| 6      | Oil for use in burners equipped with preheaters permitting a high-viscosity fuel. | 150 or legal | 1.00           | 0.10                 |                               |       | 300                        | 45       | (638)        |

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

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.

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.

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.

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

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.

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Table 1. Detailed requirements for fuel oils

<table>
<thead>
<tr>
<th>Grade of fuel oil</th>
<th>Sulfur, max. percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>0.5</td>
</tr>
<tr>
<td>No. 2, 3, 4, 5, 6</td>
<td>No limit</td>
</tr>
</tbody>
</table>

* 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:

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<tr>
<td>No. 2, 3, 4, 5, 6</td>
<td>No limit</td>
</tr>
</tbody>
</table>
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


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.
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


ASH


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

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

CORROSION

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 PRESCRIBED²

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 herein-after 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
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.
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.
T. B. Stillman, Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.

Fuel Oil Distributors:
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.

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.
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 are 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.
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-Pritchard Oil Corp.—Col-Tex Refining Co., Oklahoma City, Okla.
Arrow Petroleum Co., Forest Park, Ill.
Ashland Oil & Refining Co., Ashland, Ky.
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.
Bar-Camp, Inc., Dayton, Ohio.
Baroco Oil Co., Tulsa, Okla.
Bay Petroleum Corp., The, Denver, Colo.
Berry Asphalt Co., Magnolia, Ark.
 Bethlehem Steel Co., Bethlehem, Pa.
Bettendorf Oil Burner Co., Marshalltown, Iowa.
Boege Oil Co., Sterling, Colo.

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 & Iron Co., Atlanta, Ga.
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.
Commerical Petroleum Co., Chicago, Ill.
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., Rockville, N. J.
(General support)
El Dorado Refining Co., The, El Dorado, Kans.
Electrical Testing Laboratories, Inc., New York, N. Y.
Envoy Petroleum Co., Long Beach, Calif.
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.
Faultless Oil Burner Co., St. Albans, N. Y.
Fletcher Oil Co., Wilminton, Calif.
Fuld Bros., Inc., Baltimore, Md.
General Electric Co., Schenectady, N. Y.
Golden Bear Oil Co., Los Angeles, Calif.
Greenwood Engineering Co., Inc., Baltimore, Md.
Hamman Oil & Refining Co., Houston, Tex.
Hart Refineries, 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.

FIRMS AND OTHER INTERESTS

Ace Engineering Co., Chicago, III.
Acme Oil Burner Co., Inc., Cedar Rapids, Iowa.
Aetna Oil Co., Louisville, Ky.
Aldrich Co., Wyoming, Ill.
Allied Oil Co., Inc., Cleveland, Ohio.
Almoat Oil & Gas Co., Almoet, Mich.
American Oil & Refining Co., San Francisco, Calif.
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-Pritchard Oil Corp.—Col-Tex Refining Co., Oklahoma City, Okla.
Arrow Petroleum Co., Forest Park, Ill.
Ashland Oil & Refining Co., Ashland, Ky.
Atlas Oil & Refining Corp., Shreveport, La.
Automatic Burner Corp., Chicago, Ill.
Automatic Combustion Equipment Co., Inc., Rochester, N. Y.
Baechtold, Wilcox Co., The, New York, N. Y.
Ballard Oil Co. of Hartford, Inc., Hartford, Conn.
Bar-Camp, Inc., Dayton, Ohio.
Baroco Oil Co., Tulsa, Okla.
Bay Petroleum Corp., The, Denver, Colo.
Berry Asphalt Co., Magnolia, Ark.
Bethlehem Steel Co., Bethlehem, Pa.
Bettenhorf Oil Burner Co., Marshalltown, Iowa.
Boege Oil Co., Sterling, Colo.
Husky Oil & Refining Co., Cody, Wyo.
Hunting Oil Co. & Refining Co., Houston, Tex.
International Oil Burner Co., St. Louis, Mo.
Johnson Oil Refining Co., Cleveland, Ohio.
Jones, Paul, & Co., Inc., Baltimore, Md.
Kanotex Refining Co., St. Paul, Minn.
Kline Refining, Inc., Chicago, Ill.
Kresky-Stamn Manufacturing Co., Inc., Palisades Park, N. J.
Laco Oil Burner Co., Inc., Griswald, Iowa. (General support.)
Lennox Furnace Co., Marshalltown, Iowa; Columbus, Ohio; and Syracuse, N. Y.
Lorval Oil Co., El Paso, Tex.
Louisville Refining Co., Louisville, Ky.
Lynn Products Co., Lynn, Mass.
M. F. A. Oil Co., Columbus, Mo., and Chanute, Kansas.
Magnolia Petroleum Co., Dallas, Tex.
Makomb Steel Products Co., Division of Globe American Corp., Macomb, Ill.
Malleable Iron Fittings Co., Cranford, Conn.
Malleable Iron Range Co., Beaver Dam, Wis.
Mann Oil Company, Houston, Tex.
McBride Refining Co., Edinburg, Tex.
McNutt Oil & Refining Co., Inc., El Paso, Tex.
Mexican Petroleum Corp., Baltimore, Md.
Mexican Furnace Co., Peoria, Ill.
Mid-Continent Petroleum Corp., Tulsa, Okla.
Monarch Refiners, Inc., Oklahoma City, Okla.
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.
Northland Wheel 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., Arkansa City, Mich.
Oscoda Refining Co., Inc., Reed City, Mich.
Pacific States Oil Co., Wilmington, Calif.
Pana American Refining Co., New York, N. Y.
Pana Refining Co., Fana, 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.
Perkins Corp., Millwaukee, Wis. (General support.)
Petro Products Co., Milwaukee, Wis.
Petrol Corp., The, Los Angeles, Calif.
Petrofex Utilities Co., Inc., Chicago, Nebr.
Pioneer Oil & Refining Co., San Antonio, Texas.
Porter, Geo., H., Steel Treating Co., The, Cleveland, Ohio.
Producers Refining, Inc., West Branch, Mich.
Pure Oil Co. & Refining Co., Chicago, Ill.
Quaker Manufacturing Co., Chicago, Ill.
Quaker State Oil Refining Corp., Emleton, Pa.
Quiet Heat Oil Burner Co., Inc., Brooklyn, N. Y.
Richfield Oil Corp., San Francisco, Calif.
Richfield Oil Corp. of New York, New York, N. Y.
Robillard G., Ltd., Montreal, Quebec, Canada.
Rock Island Refining Corp., Indianopolis, Ind.
Sawyer Heating Co., Detroit, Mich.
Scott, Roebuck & Co., Chicago, Ill.
Seaside Oil Co., Santa Barbara, Calif.
Shallow Water Refining Co., Garden City, Kansas.
Shanrock Oil & Gas Corp., The, Amarillo, Tex.
Shell Oil Co., Inc., New York, N. Y.
Silent Sioux Oil Burner Corp., Orange City, Iowa.
Simplex Oil Refining Co., 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.
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.
Stahl Oil Refining Co., Tulsa, Okla.
Stoller Oil Refining Co., Louisville, Ky.
Sylvestre Oil Co., Inc., Mount Vernon, N. Y.
Tay Oil Refining Co. of, Taylor, Tex.
Thatcher Furnace Co., Garwood, N. J.
Tide Water Associated Oil Co., San Francisco, Calif.
Tolleson Oil Refining Co., Phoenix, Ariz.
Tomlinson Division, Timken Detroit Axle Co., Jackson, Mich.
Toribishef Division, Cleveland Steel Products Corp., Cleveland, Ohio.
Torrington Manufacturing Co., Torrington, Conn.
Tru-Heat Co., Trenton, N. J.
Underwriters' Laboratories, Inc., Chicago, Ill.
United Oil Co., California, Los Angeles, Calif.
United States Testing Co., Inc., Hoboken, N. J.
Vickers Petroleum Co., Inc., The, Wichita, Kansas.
Viking Manufacturing Corp., Cleveland, Ohio.
Warren Petroleum Corp., Tulsa, Okla.
Washash Oil Co., Salt Lake City, Utah.
Wayne Oil Refining Co., The, Pittsburgh, Pa.
Weatherall Engineers, Inc., Providence, R. I. (General support.)
Wickett Refining Co., Wickett, Tex. (General support.)
Wilcox Oil Co., Tulsa, Okla.
Wiltos Oil Co., Southsfield, Neb.
Wood River Oil & Refining Co., Inc., Hartford, Ill.

UNITED STATES GOVERNMENT

Agriculture, U. S. Department of, Division of Purchases, Sales and Traffic, Washington, D. C.
Army, Department of the, Standards Branch, Logistics Division, Washington, D. C.

COMMERCIAL STANDARDS

<table>
<thead>
<tr>
<th>CS No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-30.</td>
<td>Mopsticks.</td>
</tr>
<tr>
<td>4-29.</td>
<td>Staple porcelain (all-clay) plumbing fixtures.</td>
</tr>
<tr>
<td>5-46.</td>
<td>Pipe nipples; brass, copper, steel, and chlorinated-iron (second edition).</td>
</tr>
<tr>
<td>7-29.</td>
<td>Standard weight malleable iron or steel screwed unions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CS No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>14-40.</td>
<td>Boys' button-on waists, shirts, junior and sports shirts (made from woven fabrics) (third edition).</td>
</tr>
<tr>
<td>16-29.</td>
<td>Wall paper.</td>
</tr>
<tr>
<td>18-44.</td>
<td>Button-on golf shafts.</td>
</tr>
</tbody>
</table>
Fuel Oils

CS No.  Item
23-30. Feldspar.
24-43. Screw threads and tap-drill sizes.
26-30. Aromatic red cedar closet lining.
30-31. Colors for sanitary ware. (Withdrawn as commercial standard March 15, 1948.)
32-31. Cotton cloth for rubber and pyroxylon coating.
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)
39-34. Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.
40-34. Binders board for bookbinding and other purposes.
41-35. Marking articles made of silver in combination with gold.
42-33. Mohair pile fabrics (100 percent mohair plain velvet, 100 percent mohair plain frieze, and 50 percent mohair plain frieze).
43-35. Colors and finishes for cast stone.
44-35. Mattresses for hospitals.
45-33. Mattresses for institutions.
47-40. Book cloths, buckrams, and impregnated fabrics, factory bookbinding purposes except library bindings (second edition).
50-44. Textiles—testing and reporting (fourth edition).
61-37. Wood-slat venetian blinds.
63-38. Colors for bathroom accessories.
64-37. Walnut veneers.
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.
72-38. Household insecticide (liquid spray type).

1 Where "(E)" precedes the CS number, it indicates an emergency commercial standard, drafted under war conditions with a view toward early revision.
<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>121-45</td>
<td>Women's slip sizes (woven fabrics).</td>
</tr>
<tr>
<td>122-45</td>
<td>Western hemlock plywood.</td>
</tr>
<tr>
<td>123-45</td>
<td>Grading of diamond powder. (E) 124-45.1 Master disks.</td>
</tr>
<tr>
<td>127-45</td>
<td>Tank-mounted air compressors.</td>
</tr>
<tr>
<td>128-45</td>
<td>Self-contained, mechanically refrigerated drinking-water coolers.</td>
</tr>
<tr>
<td>129-47</td>
<td>Men's and boys' shorts (woven fabrics).</td>
</tr>
<tr>
<td>130-46</td>
<td>Color materials for art education in schools.</td>
</tr>
<tr>
<td>131-46</td>
<td>Industrial mineral wool products, all types—testing and reporting.</td>
</tr>
<tr>
<td>132-46</td>
<td>Cast-aluminum cooking utensils (metal composition).</td>
</tr>
<tr>
<td>133-46</td>
<td>Men's shirt sizes (exclusive of work shirts).</td>
</tr>
<tr>
<td>134-46</td>
<td>Blankets for hospitals (wool, and wool and cotton).</td>
</tr>
</tbody>
</table>

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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.