

U. S. DEPARTMENT OF COMMERCE

JESSE H. JONES, Secretary

NATIONAL BUREAU OF STANDARDS

LYMAN J. BRIGGS, Director

National Bureau of Standards

APR 12 1941 **DOMESTIC BURNERS**

**FOR
PENNSYLVANIA ANTHRACITE
(UNDERFEED TYPE)**

(SECOND EDITION)

COMMERCIAL STANDARD CS48-40

(Supersedes CS48-34)

Effective date for new production from November 30, 1940



**A RECORDED VOLUNTARY STANDARD
OF THE TRADE**

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1941

PROMULGATION
of
COMMERCIAL STANDARD CS48-40
for
DOMESTIC BURNERS FOR PENNSYLVANIA
ANTHRACITE
(UNDERFEED TYPE)
(Second Edition)

On March 14, 1934, at the instance of the Anthracite Institute Laboratory and with the endorsement of the principal manufacturers of domestic underfeed burners for Pennsylvania anthracite, a general conference of representative manufacturers, installing contractors, and users adopted a recommended commercial standard, which was subsequently accepted by the industry and promulgated as Domestic Burners for Pennsylvania Anthracite (Underfeed Type), Commercial Standard CS48-34.

On recommendation of the Anthracite Industries Laboratory and with the endorsement of the standing committee, recommended revisions to bring the standard abreast of collective progress were circulated on July 24, 1940, for written acceptance. The industry has since accepted for promulgation by the United States Department of Commerce, through the National Bureau of Standards, the revised standard as shown herein.

The standard is effective for new production from November 30, 1940.

Promulgation recommended.

I. J. Fairchild,
Chief, Division of Trade Standards.

Promulgated.

Lyman J. Briggs,
Director, National Bureau of Standards.

Promulgation approved.

Jesse H. Jones,
Secretary of Commerce.

DOMESTIC BURNERS FOR PENNSYLVANIA ANTHRACITE

(UNDERFEED TYPE)

(Second Edition)

COMMERCIAL STANDARD CS48-40

PURPOSE

1. The purpose of this commercial standard is to serve as a basis for certification of quality and performance of burners covered herein.

SCOPE

2. This standard covers underfeed-type burners, using Pennsylvania anthracite as a fuel and having a normal capacity between 10 and 100 pounds of coal per hour.

CONSTRUCTION REQUIREMENTS

3. *General.*—Burners shall be of rugged construction and as simple in design as the type will permit. All parts subjected to high temperatures shall either be made of suitable heat-resistant materials or shall be effectively cooled. Proof of compliance shall consist of freedom from objectionable cracking, warping, distortion, or growth, after a test run of 300 hours at continuous maximum rate of coal feed. All parts subject to wear or corrosion shall be designed so they may readily be removed.

4. *Coal hopper.*—(a) In cases where the coal is not fed direct from the storage bin, a hopper shall be provided having a capacity not less than that shown in figure 1. For purposes of computation, no coal lying at a flatter angle than 35 degrees from the bottom outlet shall be included.

(b) The lower charging edge of regular coal hoppers of 400-pound capacity and under shall be not higher than 48 inches above the firing floor level.

(c) The burner shall include adequate means for preventing dust or gas from entering the cellar through the hopper or other external parts.

5. *Weight of metal.*—Weight of metal of hopper shall be not lighter than No. 20 U. S. Standard Gage (0.036 inch).

6. *Assembly.*—All metal parts shall be rigidly fastened. The use of "gimlet-pointed, thread-forming, metal screws" in the fan, hopper, or elsewhere will not be tolerated.

7. *Accessibility.*—Ash and coal conveyors shall provide means for the ready removal of foreign material.

8. *Protection*.—All moving parts shall be adequately protected or enclosed to prevent accidental personal injury. All moving parts shall be protected from undue strain or damage by suitable electrical or mechanical means. Overload protective devices shall be included and unless automatic, shall be accessible and so arranged that the user may reset the mechanism.

9. *Bearings*.—All important bearings on the stoker and ash-removal system shall have provision for effective lubrication, and where in contact with coal or ash shall either be properly protected

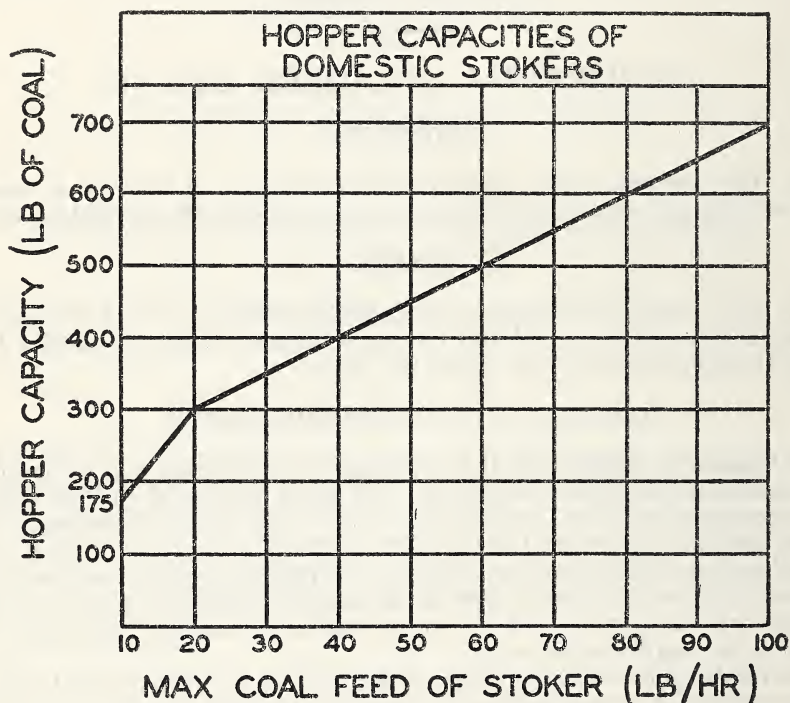


FIGURE 1.—Minimum hopper capacities;

from dust and moisture infiltration, or shall be made of corrosive and abrasive-resistant materials. Proof of compliance shall consist of an inspection and a micrometer or caliper check of all important bearings after 300 hours of operation under fire at the continuous maximum rate of coal feed. Lubrication places shall be convenient, conspicuous, and obvious.

10. *Ash removal system*.—(a) The ash receptacles, whether they take the form of cans outside the furnace or a space beneath the furnace, shall have at least sufficient capacity to receive the ashes from 15 hours' operation at maximum rated capacity.

(b) The ash receptacles, whether of the space or can type, shall be effectively covered to prevent the emission of dust or infiltration of cold air.

(c) All parts of the ash-removing mechanism shall be constructed of materials which can be shown by experience and test to be capable of reasonably withstanding the abrasions of ash and clinker, and shall be designed in such a manner that they may be readily renewed. Proof of compliance shall be embodied in an inspection of such parts after 300 hours of operation at maximum rate of coal feed. In addition, wherever possible, a stoker or stokers of design similar to that under test, which have been in actual field use for 1 year or more, shall be examined internally.

11. *Coal-conveying systems.*—Coal-conveying worms, plungers, or other devices shall be constructed of corrosion-resisting material or shall be of such construction as to provide for reasonable life.

12. *Motor.*—The stoker as submitted for approval shall be equipped with a long-hour-duty motor, and tests shall be run at the maximum load conditions to which this particular burner model may be adjusted. The results of these tests shall indicate that the maximum motor loading is in accordance with NEMA requirements for a long-hour-duty motor. The motor shall be free from radio interference.

13. *Fan.*—The entire air feed draft system shall be designed so as to maintain as nearly a constant-volume flow of air at a fixed setting of air control as may be practicable. In the event a fan is used, the fan runner shall be so constructed, balanced, and operated as to insure quiet operation. The casing and intake shall be designed in such a manner as to eliminate excessive "spill." The use of poorly balanced paddles or paddles which can be readily bent out of place shall not be tolerated.

14. *Siftings.*—The burner air passages shall either include mechanical or automatic means for removing siftings from air passages, or shall demonstrate by actual test that siftings will not interfere with operation.

15. *Appearance.*—The appearance and painting shall be satisfactory.

16. *Proof of durability and construction.*—Where certain metals or types of construction are specified herein for the purpose of insuring durability and long life, a demonstration that the material or construction method has resulted in satisfactory operation in the field for a continuous unrepaired period of 2 full heating seasons, and on at least 12 units, shall be accepted as conclusive evidence of acceptable design.

17. *Limit controls.*—(a) The control systems of all burners shall include reliable means for effectually checking the fire so as to keep the operating conditions of the heating system within safe limits at all times.

(b) In steam systems, the limit control shall be set so that the boiler pressure will not exceed that allowed by the ASME Boiler Code for the type of boiler in question, and preferably shall be limited to at least 5 pounds per square inch below the setting of the safety valve.

(c) In ordinary vapor systems, the limit control shall meet the conditions for steam boilers, and in addition shall preferably be calibrated in ounces instead of pounds and be sufficiently sensitive to function on less than 1-pound-per-square-inch pressure. In those vapor systems wherein excess pressure disturbs the normal venting or sealing of the system, this control shall be set to prevent the pres-

sure from exceeding the maximum specified by the manufacturer of the heating system.

(d) In hot-water systems, the limit control shall function so as to prevent the formation of steam.

(e) In warm-air systems, the limit control shall function so as to limit the temperature of the air entering the circulation system to a maximum of 250° F; that is, the maximum setting to which the limit control can be set shall not exceed 250° F. A setting of 175° F or under, where practicable, is recommended for comfort of occupants.

INSTALLATION REQUIREMENTS

18. *Capacity*.—A measurement of the standing radiation in the building, or in lieu of this, a heat-loss computation reduced to equivalent radiation will be required, to which an allowance of 25 percent shall be added to care for mains and risers and pick-up and a further allowance for any service water load as required by paragraph 20. The total thus secured must be less than the approved maximum rating granted to the burner, as described in paragraph 33 (a), and this total shall be within the capacity of the boiler. The capacity of the boiler shall be construed to mean the actual output which the boiler manufacturer will certify as having been obtained under a standard test such as that prescribed under Code No. 3 of the American Society of Heating and Ventilating Engineers. Accepted methods based on square inches of leader area, Btu outputs at design temperatures, or heat-loss computations shall be used with warm-air systems and shall conform to the intent of this paragraph.

19. *Ash clearance*.—In the case of burners which do not have a positive means of forcing ash into the ashpit, the following minimum open spaces shall be left on all sides of the tuyeres:

Maximum rate of coal feed of 30 pounds per hour or under, 3 inches minimum clearance.

Maximum rate of coal feed of 31 to 50 pounds per hour, 3½ inches minimum clearance.

Maximum rate of coal feed of 51 to 100 pounds per hour, 4½ inches minimum clearance.

20. *Indirect water heating loads*.—In the event that an indirect coil for storage service water is attached to the boiler, a load equivalent to 1 square foot of gross steam radiation for each gallon of total water storage tank capacity shall be added to the measured radiation and considered a part of the radiation load. The rated capacity of the burner must thus exceed the sum of the measured radiation plus 25 percent mains and risers allowance, plus service water load as obtained by the above method.

21. *Relation of steam and water radiation*.—Steam radiation is considered to require 240 Btu per hour per square foot of direct radiation surface. Gravity hot-water radiation is considered to require 150 Btu. Forced hot-water radiation or special systems are calculated as designed.

22. *Quietness of operation*.—The burner shall be so installed as to insure quiet operation.

23. *Electrical connection.*—All electrical wiring and equipment shall be installed in accordance with the National Electrical Code and any modifications or amendments to that code required by local regulations or ordinances.

24. *Workmanship.*—All work shall be finished and painted. All doors shall be made to fit tightly, and all other openings shall be sealed so that there will be no gas or dust leakage.

25. *Chimneys and flues.*—Reasonable care shall be exercised that chimneys and flues at the time of installation are of suitable design, height, size, and condition to insure a negative pressure in the heater under expected conditions of weather and firing.

26. *Smoke breeching.*—It shall be the duty of the installing contractor to check smoke breeching and stovepipe to see that they are in a safe and satisfactory operating condition at the time of installation.

27. *Coal storage.*—It is recommended that the coal bin or closet be constructed so as to be dustproof.

OPERATING REQUIREMENTS

28. *Efficiency.*—The over-all efficiency of the unit at all points above 50 percent of maximum rate of coal feed shall be above 50 percent when installed in a round sectional cast-iron boiler having three intermediate sections and $1\frac{1}{2}$ inches of asbestos insulation or its equivalent in good condition of repair, operating at 50 percent or more of the boiler capacity. The efficiency, as herein defined, shall be maintained for any continuous period of 4 hours during any test or observation run.

29. *Ash loss.*—Combustible in ash shall not exceed $7\frac{1}{2}$ percent of the Btu content of the coal as fired at any rate of coal feed above 50 percent of maximum, using anthracite conforming to the specifications of paragraph 33 (b).

30. *Clinker.*—Ash-removing systems must at all times be capable of disposing of any clinker which may be formed under any conditions of operation with the coals prescribed in paragraph 33 (b).

31. *Combustion rate.*—A combustion rate of at least 13 pounds per square foot of horizontal projected area of fire pot, including ash ring, per hour must be continuously maintained for at least 9 hours with the above conditions of efficiency, ash, and clinker.

32. *Flue gas.*—Flue gas shall be not below $7\frac{1}{2}$ percent in carbon dioxide content with a reasonably tight heater at any rate of operation above 50 percent of maximum rate of coal feed.

33. *Maximum rating.*—(a) The maximum rating, in terms of gross square feet of water or steam radiation which the burner will supply, when intended for installation in the average existing cast-iron boiler, shall be 90 percent of the maximum steam produced in a round cast-iron boiler in good repair having three intermediate sections and the equivalent of $1\frac{1}{2}$ inches of asbestos insulation. However, in no case shall the maximum rating be greater than 29 square feet of gross steam radiation for each pound of coal fired per hour, and in no case shall ratings be based upon efficiency figures below 50 percent.

(b) The requirements of paragraphs 28, 29, 30, 31, 32, and 33 (a) shall be based upon combustion of Pennsylvania anthracite having a proximate analysis within the following limits:

Volatile matter $3\frac{1}{2}$ to 8 percent; ash content not to exceed 12 percent; sulfur content under 1 percent; ash fusing temperature $2,750^{\circ}$ F or above (volatile, ash and sulfur content on dry basis in accordance with ASTM method D271-37); B. t. u. content (dry basis) 13,000 or above; properly sized as follows; A No. 1 buckwheat should pass through a round-mesh screen having $\frac{1}{16}$ -inch holes and over a similar screen having $\frac{1}{8}$ -inch holes. The undersizing should not exceed 15 percent, and the oversizings should not exceed 10 percent. No. 2 buckwheat (rice) should pass through a round-mesh screen having holes $\frac{1}{16}$ inch in diameter and over a like screen having holes of $\frac{3}{16}$ inch in diameter. The undersizing should not exceed 15 percent, and the oversizing should not exceed 10 percent.

34. *Electrical consumption.*—The electrical consumption shall not exceed 18 kilowatt hours per 2,000-pound units of coal burned at any rate of coal feed above 59 percent of the maximum.

35. *Operation upon other sizes of coal.*—The foregoing specifications have been drafted for operating upon the No. 1 buckwheat and No. 2 buckwheat (rice) sizes of anthracite. In the event that other sizes are recommended, ratings shall be based upon the same efficiency and ash-loss requirements.

36. *Banking.*—The burner shall be so constructed or controlled as to maintain a fire during an indefinite banking period.

37. *Acceleration.*—When the burner resumes operation after a 12-hour banking period, the time required for the stack temperature to reach a normal maximum shall not exceed 60 minutes.

38. Following installation of the burner, a "Manufacturer's Certificate" and an "Installer's Certificate" shall be placed with each anthracite burner installation. These certificates shall record certain data and test results pertinent to the particular installation involved.

MANUFACTURER'S CERTIFICATE

DOMESTIC ANTHRACITE BURNER

(Name of manufacturer)

(Address)

Manufacturer of ----- domestic anthracite burner guarantees model -----
serial No -----

THIS SPACE FOR MANUFACTURER'S ENTIRE WARRANTY

This burner is approved for use with -----
(Fuel and size)

This burner is certified to conform to all the requirements of Commercial
Standard CS48-40 for Domestic Burners for Pennsylvania Anthracite (Under-
feed Type) issued by the United States Department of Commerce.

This burner has been approved by -----
(Name of laboratory)

Laboratory as a result of tests upon a burner of similar design and type.

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INSTALLER OR CONTRACTOR'S CERTIFICATE

DOMESTIC ANTHRACITE BURNER

The burner installed in Boiler { Name _____
No _____
Furnace { Name _____
No _____
with _____ square feet of standing
steam _____ radiation plus _____
square feet of additional connected load; or hot water _____
with _____ square inches cross-sectional area of warm-air supply pipes measured
at the furnace take-off.
Other special data: _____
at _____ and has been installed by
(Address)

(Name of installer and address)

in accordance with specifications in manufacturer's instruction manual. This burner installation is certified by the installing contractor to conform to all the requirements of Commercial Standard CS48-40 for Domestic Burners for Pennsylvania Anthracite (Underfeed Type) issued by the United States Department of Commerce. The installation of the burner has been carefully checked as follows:

1. All controls have been checked for proper operation. _____
2. The burner has been tested by actual jamming and protective provisions were all found to be in proper working order. _____
3. The retort has been checked and found to be level. _____
4. Ash clearances have been checked and at no point on the circumference of the burner are they less than the minimum requirements of the code. _____
5. The heater, flue connections, and chimney have been carefully inspected, and all leaks have been repaired. _____
6. With the burner in maximum operation, the furnace draft has been adjusted to _____ inches of water. _____

The above test results are certified to be true.

(Company)

Per _____
(Signature)

Date _____
(Company)

Per _____
(Signature)

Telephone _____

EFFECTIVE DATE

The standard is effective for new production from November 30, 1940.

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 representatives. Comment concerning the standard and suggestions for revision, may be addressed to any member of the committee or to the Division of Trade Standards, National Bureau of Standards, which acts as secretary for the committee.

Manufacturers:

- E. L. BULLER (chairman), Electric Furnace-Man, Inc., 101 Park Avenue, New York, N. Y.
FRED L. HILDER, Electric Furnace-Man, Inc., 101 Park Avenue, New York, N. Y.
H. B. EVANS, Iron Fireman Corporation, Graybar Building, 420 Lexington Avenue, New York, N. Y.
H. L. SIEGMUND, Motorstoker Division, Hershey Machine & Foundry Co., Manheim, Pa.
MILTON S. YOUNG, Dickson Coal Co., Inc., 17 Battery Place, New York, N. Y.
J. E. MARTIN, Link-Belt Co., 2410 W. 18th Street, Chicago, Ill.
C. H. HALL, Fairbanks, Morse & Co., Three Rivers, Mich.
HAROLD A. COOPER, Cooper & Cooper, Inc., 37 Fenn Street, Pittsfield, Mass.
H. J. WILSON, Schwitzer-Cummins Co., 153 Poplar Street, Bridgeport, Conn.
W. A. RIDDELL, Frederick Iron & Steel Co., Frederick, Md.
R. E. CHLOUPEK, General Stokers Inc., 2925 N. Broad Street, Philadelphia, Pa.
C. O. FIELDS, Muncie Gear Works, Inc., Muncie, Ind.

Distributors:

- R. W. DAVIS, R. A. Davis Coal Co., 24 Scott Street, Wilkes Barre, Pa.
THOS. H. RUSSELL, R. H. Russell Coal Co., 103 N. Clinton Street, Poughkeepsie, N. Y.
FRANK DONOVAN, Rutter Coal Co., 1246 Melrose St., Chicago, Ill. Representing American Retail Coal Association.
CARL F. BODEY, W. L. Bodey Co., 129 Penn Street, Reading, Pa.
A. H. ARMERDING, New Jersey Stoker Corp., 1153 Broad Street, Newark, N. J.

Users:

- THOMAS H. URDAHL, 726 Jackson Place, NW., Washington, D. C.
P. A. CRONEY, Technical Division, U. S. Housing Authority, Old Interior Bldg., Washington, D. C.
H. T. COATES, Dairymen's League Cooperative Association, Inc., 11 W. 42nd Street, New York, N. Y. Representing National Association of Purchasing Agents.
R. K. THULMAN, Federal Housing Administration, Washington, D. C.
R. S. DILL, National Bureau of Standards, Washington, D. C.
Dr. JOSEPHINE L. PEIRCE, Division of Consumer Information, General Federation of Women's Clubs, 1006 Cook Tower, Lima, Ohio.
J. F. BARKLEY, Bureau of Mines, Department of the Interior, Washington, D. C. American Institute of Architects. (Invited to name representative.)
R. E. FERRY, The Institute of Boiler and Radiator Manufacturers, 60 East 42d St., New York, N. Y.

Laboratory:

- ALLEN J. JOHNSON, Anthracite Industries Laboratory, Primos, Delaware County, Pa.

HISTORY OF PROJECT

In response to a request from the Anthracite Institute Laboratory and the desire of a number of manufacturers of domestic underfeed anthracite burners that a commercial standard for their product be established, several preliminary conferences were held at which a proposed standard was drafted, based upon a test code used by the Anthracite Institute Laboratory for approval of burners. After consideration of the proposed standard at a general conference at the Hotel McAlpin, New York City, on March 14, 1934, attended by representative users, installing contractors, and manufacturers, it was adopted by the conference, with a few final modifications, and accepted by the industry for promulgation as CS48-34, to become effective for new production of burners on August 1, 1934.

On recommendation of the Anthracite Industries Laboratory and with the endorsement of the standing committee, the recommended revision to bring the standard abreast of collective progress was circulated for written acceptance on July 24, 1940. The changes included a chart of minimum hopper capacities; requirements on bearings and their lubrication; an increase in the allowance for mains, risers, and pick-up; and the wording of the manufacturer's certificate and the installer's certificate of compliance with the standard, which certificates are to be placed with each anthracite burner installation. Following acceptance by a satisfactory majority of production volume and in the absence of active, valid opposition, the revised standard was promulgated as shown herein.

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 _____

Division of Trade Standards,
National Bureau of Standards,
Washington, D. C.

Gentlemen:

Having considered the statements on the reverse side of this sheet, we accept the Commercial Standard CS48-40 as our standard of practice in the

Production ¹

Distribution ¹

Use ¹

of domestic burners for Pennsylvania anthracite.

We will assist in securing its general recognition and use and will cooperate with the standing committee to effect revisions of the standard when necessary.

Signature of individual 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 and State _____

¹ Please designate which group you represent by drawing lines through the other two. Please file separate acceptances for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade papers, colleges, etc., desiring to record their general approval, the words "In principle" 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

The organizations and individuals listed below have accepted these specifications as their standard of practice in the production, distribution, and use of domestic burners for Pennsylvania anthracite (under-feed type). Such endorsement does not signify that they may not find it necessary to deviate from the standard, nor that producers so listed guarantee all of their products in this field to conform with the requirements of this standard. Therefore, specific evidence of conformity should be obtained where required.

ASSOCIATIONS

- American Association of Engineers, Chicago, Ill. (In principle.)
 American Retail Coal Association, Inc., Chicago, Ill.
 Architects League of Northern New Jersey, Cliffside Park, N. J.
 Building Officials Conference, Inc., New Britain, Conn.
 Dairymen's League Co-operative Association, Inc., New York, N. Y.
 Denver Coal Merchants Association, Denver, Colo. (In principle.)
 Household Science Institute, Chicago, Ill.
 Indiana Coal Merchants Association, Indianapolis, Ind. (In principle.)
 National Council of Women of the United States, Inc., New York, N. Y.
 Saginaw Association of Master Plumbers, Saginaw, Mich.
 Saint Louis Stoker Association, Saint Louis, Mo.
 Solid Fuel Institute of Milwaukee, Milwaukee, Wis.
 Structural Service Bureau, Philadelphia, Pa.
 Winston-Salem Retail Coal Merchants Association, Inc., Winston-Salem, N. C.

FIRMS

- Anthracite Industries Laboratory, Primos, Pa.
 Associated Factory Mutual Fire Insurance Co., Boston, Mass. (In principle.)
 Auler, Jensen & Brown, Oshkosh, Wis.
 Automatic Heating & Cooling Systems, Inc., Baltimore, Md.
 Balch & Lippert, Madison, Wis.
 Beacham & Le Grand, Greenville, S. C.
 Bennett, W. Burr, Honesdale, Pa.
 Blake, Edgar Ovet, Evanston, Ill.
 Blithe, Wesley Leshner, Philadelphia, Pa.
 Bodey Co., W. L., Reading, Pa.
 Bogner, Harry, Milwaukee, Wis.
 Boice-Runyon Co., Plainfield, N. J.
 Brainerd, Harry B., New York, N. Y. (In principle.)
 Brazer, Clarence W., New York, N. Y.
 Briggs Co., L. W., Worcester, Mass.
 Brown, Floyd W., Minneapolis, Minn.
 Brust & Brust, Milwaukee, Wis.
 Buechner & Orth, Saint Paul, Minn. (In principle.)
 Butler Manufacturing Co., Kansas City, Mo.
 Camlet, J. Thomas, Clifton, N. J.
 Candela, Rosario, New York, N. Y.
 Cannon & Mullen, Salt Lake City, Utah.
 Catskill Metal Works, Inc., Catskill, N. Y.
 Chew-Bittel Co., Philadelphia, Pa.
 Child, Harry Charles, Sayre, Pa.
 Coal-Heat, Chicago, Ill. (In principle.)
 Coal Merchants Credit Bureau, Utica, N. Y.
 Coit, E., New York, N. Y.
 Conrad & Cummings, Binghamton, N. Y.
 Coolidge, Shepley, Bulfinch & Abbott, Boston, Mass.
 Co-op. Community Builders, Inc., Wauwatosa, Wis.
 Cooper & Cooper, Inc., Pittsfield, Mass.
 Coxe Stoker Engineering Co., Hazleton, Pa.
 Cram & Ferguson, Boston, Mass.
 Crowell & Lancaster, Bangor, Maine.
 Cuthbert & Cuthbert, Ann Arbor, Mich.
 Dallas, Inc., Better Business Bureau of, Dallas, Tex. (In principle.)
 Davis Coal & Ice, R. A., Iron Fireman Division, Wilkes-Barre, Pa.
 De Jarnette, Charles Wagner, Des Moines, Iowa.
 Dickson Coal Co., Inc., New York, N. Y.
 Dodge & Morrison, New York, N. Y.
 Duklauer, Inc., Eugene, New York, N. Y.
 East Bear Ridge Colliery Co., Scranton, Pa.

- Eastern Coal & Oil Co., Providence, R. I.
 Edison Anthracite Coal Co., Scranton, Pa.
 Eichenlaub, Geo. I., Erie, Pa.
 Eldridge, Charles Wm., Oswego, N. Y.
 Electric Furnace-Man, Inc., New York, N. Y.
 Fairbanks, Morse & Co., Three Rivers, Mich.
 Flanigan Coal Co., Chas., Schenectady, N. Y.
 Flannagan, Eric G., Henderson, N. C.
 Foltz & Son, Herbert, Indianapolis, Ind.
 Frederick Iron & Steel Co., The, Frederick, Md.
 Freed Heater & Manufacturing Co., Collegeville, Pa.
 Frey Bros., York, Pa.
 Fuller Engineering Co., E. F., Nashotah, Wis.
 Gaertner, Otto, New York, N. Y.
 Gall, Harry L. C., New York, N. Y.
 General Stokers, Inc., Philadelphia, Pa.
 Goodwin, Harold, Jr., Wyncote, Pa.
 Hannaford & Sons, Samuel, Cincinnati, Ohio.
 Harper & West, Boston, Mass.
 Hasness, C. D., Harrisburg, Pa.
 Hausman, N. W., Glen Cove, N. Y.
 Heating Enterprise, Inc., New York, N. Y.
 Helfensteller, Hirsch & Watson, St. Louis, Mo.
 Hershey Machine & Foundry Co., Manheim, Pa.
 Higgins, Charles H., New York, N. Y.
 Hodgdon & Son, Charles, Chicago, Ill.
 Hoefler, Arthur A., Jr., N. Plainfield, N. J.
 Holland Furnace Co., Holland, Mich.
 Hopkins, Albert Hart, Buffalo, N. Y.
 Hudson Coal Co., The, Scranton, Pa.
 Industrial Specialty Co., Corning, N. Y.
 International Heater Co., Utica, N. Y.
 Jokel-Coy-Thal, Toledo, Ohio.
 Karcher, Walter T., & Livingston Smith, Philadelphia, Pa.
 Kewanee Boiler Corporation, Kewanee, Ill. (In principle.)
 Kirchhoff & Rose, The Office of, Milwaukee, Wis.
 Koalamatic Combustion Co., Philadelphia, Pa.
 Kohn, Robert D., & Chas. Butler, New York, N. Y.
 Kruckemeyer & Strong, Cincinnati, Ohio.
 Kyle, Herbert S., Charleston, W. Va. (In principle.)
 Laclede Stoker Co., Saint Louis, Mo. (In principle.)
 Larrick, Thomas, Athens, Ohio.
 Levy, Will, Saint Louis, Mo.
 Link-Belt Co., Chicago, Ill.
 Lockhart International, Inc., New York, N. Y. (In principle.)
 Loeb, Laurence M., White Plains, N. Y.
 Mason & Co., George D., Detroit, Mich.
 Massena & duPont, Wilmington, Del.
 Mauran, Russell, Crowell & Mullgardt, Saint Louis, Mo.
 McKenna Bros., Westbury, N. Y.
 Millard, Julian, Harrisburg, Pa.
 Miller & Yeager, Terre Haute, Ind.
 Montgomery Ward & Co., Inc., Chicago, Ill.
 Mooser, William, San Francisco, Calif.
 Mueller Furnace Co., L. J., Milwaukee, Wis.
 Muhlenberg Bros., Reading, Pa.
 Muhlenberg, Yerkes & Mulhenberg, Reading, Pa.
 Muncie Gear Works, Inc., Muncie, Ind.
 Mundie, Jensen, Bourke & Havens, Chicago, Ill.
 New Jersey Stoker Corporation, Newark, N. J.
 New Orleans, Inc., Better Business Bureau of, New Orleans, La. (In principle.)
 North Western Fuel Co., Saint Paul, Minn.
 Pancoast, Russell T., Miami Beach, Fla.
 Pepper, George W., Jr., Philadelphia, Pa.
 Philadelphia & Reading Coal & Iron Co., Philadelphia, Pa.
 Proudfoot Rawson-Brooks & Borg, Des Moines, Iowa.
 Provine, L. H., Urbana, Ill. (In principle.)
 Purves, Cope & Stewart, Philadelphia, Pa.
 Reid, William H., Jr., Billings, Mont.
 Richardson & Boynton Co., New York, N. Y.
 Russell Coal Co., R. H., Poughkeepsie, N. Y.
 Schaeffler, Joseph C., New York, N. Y.
 Schirmer, Robert F., Woodhaven, N. Y.
 Schoeppe, Edward, Philadelphia, Pa.
 Schwab Safe Co., Lafayette, Ind.
 Schwitzer-Cummins Co., Indianapolis, Ind.
 Scranton Better Business Bureau, Scranton, Pa. (In principle.)
 Sears, Roebuck & Co., Chicago, Ill.
 Shaver, Chas. W., Salina, Kans.
 Sidells, Arthur F., & Ellis M. Keppel, Warren, Ohio.
 Sirrine & Co., J. E., Greenville, S. C.
 South-Western Bell Telephone Co., Saint Louis, Mo.
 Spear Stove & Heater Co., James, Philadelphia, Pa.
 Specification Record, Chicago, Ill.
 Staub, John F., Houston, Tex.
 Swarthmore Heating Service, Swarthmore, Pa.
 Taylor, Ellery K., Philadelphia, Pa.
 Taylor, Henry L., Saint Petersburg, Fla.
 Thorne, Henry Calder, Ithaca, N. Y.

Turner, Chas. E., Chevy Chase, Md.
 United States Testing Co., Inc., Hoboken, N. J. (In principle.)
 Urdahl, T. H., Washington, D. C.
 Virginia Polytechnic Institute, Blacksburg, Va.
 Vogel, Willis A., Toledo, Ohio.
 Wachter, Harry W. & Horace W., Toledo, Ohio.
 Washington, D. C., Inc., Better Business Bureau of, Washington, D. C.
 Welch, Carroll E., Huntington, N. Y.
 Wilson Co., E. A., Lowell, Mass.
 Wischmeyer, Wm. F., Saint Louis, Mo.
 Wood & Son, Associates, Edward J., Clarksburg, W. Va.
 Wright, Frank H., Detroit, Mich. (In principle.)

Zoller & Muller, New York, N. Y.

U. S. GOVERNMENT

Agriculture, U. S. Department of, Washington, D. C. (In principle.)
 Federal Housing Administration, Washington, D. C. (In principle.)
 Federal Works Agency, Public Buildings Administration, Washington, D. C. (In principle.)
 National Park Service, Branch of Plans & Design, Omaha, Nebr. (In principle.)
 Treasury Department, Washington, D. C.
 Veterans' Administration, Washington, D. C.
 War Department, Washington, D. C.

COMMERCIAL STANDARDS

CS No.	Item	CS No.	Item
0-40.	Commercial standards and their value to business (third edition).	50-34.	Binders' board for bookbinding and other purposes.
1-32.	Clinical thermometers (second edition).	51-35.	Marking articles made of silver in combination with gold.
2-30.	Mopsticks.	52-35.	Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).
3-40.	Stoddard solvent (third edition).	53-35.	Colors and finishes for cast stone.
4-29.	Staple porcelain (all-clay) plumbing fixtures.	54-35.	Mattresses for hospitals.
5-40.	Pipe nipples; brass, copper, steel, and wrought iron.	55-35.	Mattresses for institutions.
6-31.	Wrought-iron pipe nipples (second edition). Superseded by CS5-40.	56-41.	Oak flooring (second edition).
7-29.	Standard weight malleable iron or steel screwed unions.	57-40.	Book cloths, buckrams, and impregnated fabrics for bookbinding purposes except library bindings (second edition).
8-41.	Gage blanks (third edition).	58-36.	Woven elastic fabrics for use in overalls (overall elastic webbing).
9-33.	Builders' template hardware (second edition).	59-39.	Woven dress fabrics—testing and reporting (second edition).
10-29.	Brass pipe nipples. Superseded by CS5-40.	60-36.	Hardwood dimension lumber.
11-29.	Regain of mercerized cotton yarns.	61-37.	Wood-slat venetian blinds.
12-40.	Fuel oils (fifth edition).	62-38.	Colors for kitchen accessories.
13-39.	Dress patterns (second edition).	63-38.	Colors for bathroom accessories.
14-39.	Boys' button-on waists, shirts, junior and polo shirts (made from woven fabrics) (second edition).	64-37.	Walnut veneers.
15-29.	Men's pajamas.	65-38.	Wool and part-wool fabrics.
16-29.	Wall paper.	66-38.	Marking of articles made wholly or in part of platinum.
17-32.	Diamond core drill fittings (second edition).	67-38.	Marking articles made of karat gold.
18-29.	Hickory golf shafts.	68-38.	Liquid hypochlorite disinfectant, deodorant, and germicide.
19-32.	Foundry patterns of wood (second edition).	69-38.	Pine oil disinfectant.
20-36.	Staple vitreous china plumbing fixtures (second edition).	70-41.	Phenolic disinfectant (emulsifying type) (second edition) (published with CS71-41).
21-39.	Interchangeable ground-glass joints, stopcocks, and stoppers (fourth edition).	71-41.	Phenolic disinfectant (soluble type) (second edition) (published with CS70-41).
22-40.	Builders' hardware (nontemplate) (second edition).	72-38.	Household insecticide (liquid spray type).
23-30.	Feldspar.	73-38.	Old growth Douglas fir standard stock doors.
24-30.	Standard screw threads.	74-39.	Sold hardwood wall paneling.
25-30.	Special screw threads.	75-39.	Automatic mechanical draft oil burners.
26-30.	Aromatic red cedar closet lining.	76-39.	Hardwood interior trim and molding.
27-36.	Mirrors (second edition).	77-40.	Sanitary cast-iron enameled ware.
28-32.	Cotton fabric tents, tarpaulins, and covers.	78-40.	Ground-and-polished lenses for sun glasses (second edition) (published with CS79-40).
29-31.	Staple seats for water-closet bowls.	79-40.	Blown, drawn, and dropped lenses for sun glasses (second edition) (published with CS78-40).
30-31.	Colors for sanitary ware.	80-41.	Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).
31-38.	Wood shingles (fourth edition).	81-41.	Adverse-weather lamps for vehicles (after market).
32-31.	Cotton cloth for rubber and pyroxylin coating.	82-41.	Inner-controlled spotlamps for vehicles (after market).
33-32.	Knit underwear (exclusive of rayon).	83-41.	Clearance, marker, and identification lamps for vehicles (after market).
34-31.	Bag, case, and strap leather.	84-41.	Electric tail lamps for vehicles (after market).
35-31.	Plywood (hardwood and eastern red cedar).	85-41.	Electric license-plate lamps for vehicles (after market).
36-33.	Fourdrinier wire cloth (second edition).	86-41.	Electric stop lamps for vehicles (after market).
37-31.	Steel bone plates and screws.	87-41.	Red electric warning lanterns.
38-32.	Hospital rubber sheeting.	88-41.	Liquid-burning flares.
39-37.	Wool and part wool blankets (second edition).	89-40.	Hardwood stair treads and risers.
40-32.	Surgeons' rubber gloves.	90—.	(Reserved for power shovels and cranes.)
41-32.	Surgeons' latex gloves.	91-41.	Factory-fitted Douglas fir entrance doors.
42-35.	Fiber insulating board (second edition).		
43-32.	Grading of sulphonated oils.		
44-32.	Apple wraps.		
45-40.	Douglas fir plywood (domestic grades) (fourth edition).		
46-40.	Hosiery lengths and sizes (third edition).		
47-34.	Marking of gold-filled and rolled-gold-plate articles other than watch cases.		
48-40.	Domestic burners for Pennsylvania anthracite (underfeed type) (second edition).		
49-34.	Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.		

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 Division of Trade Standards, National Bureau of Standards, Washington, D. C.

