

CS101-43

JUN 16 1942

Heaters (space); oil-burning, flue-connected (with vaporizing pot-type burners)

U. S. DEPARTMENT OF COMMERCE

JESSE H. JONES, Secretary

NATIONAL BUREAU OF STANDARDS

LYMAN J. BRIGGS, Director

FLUE-CONNECTED OIL-BURNING
SPACE HEATERS EQUIPPED WITH
VAPORIZING POT-TYPE BURNERS

COMMERCIAL STANDARD CS101-43

Effective Date for New Production from January 1, 1943



A RECORDED VOLUNTARY STANDARD
OF THE TRADE

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1942

PROMULGATION

of

COMMERCIAL STANDARD CS101-43

for

FLUE-CONNECTED OIL-BURNING SPACE HEATERS EQUIPPED WITH VAPORIZING POT-TYPE BURNERS

On January 15, 1942, at the instance of The Institute of Cooking and Heating Appliance Manufacturers, a general conference of representative manufacturers, distributors, testing laboratories, and users of flue-connected oil-burning space heaters equipped with vaporizing pot-type burners, adopted a recommended commercial standard for this commodity. Those concerned have since accepted and approved the standard as shown herein for promulgation by the United States Department of Commerce, through the National Bureau of Standards.

The standard is effective for new production from January 1, 1943.

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.

FLUE-CONNECTED OIL-BURNING SPACE HEATERS EQUIPPED WITH VAPORIZING POT-TYPE BURNERS

COMMERCIAL STANDARD CS101-43

PURPOSE

1. This standard is provided as a basis for certification of the quality and performance of oil-fired heaters of the types covered herein, and for the guidance of manufacturers, distributors, installers, contractors, and purchasers.

SCOPE

2. This standard applies to oil-fired, flue-connected space heaters equipped with vaporizing pot-type burners, with or without mechanical draft, and includes the following sections:

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4. General requirements.....	1, 2
5. Heater design and construction.....	2, 3
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DEFINITION OF SPACE HEATER

3. A space heater is here defined as "an above the floor device for the direct heating of the space in and adjacent to that in which the device is located, without the use of external pipes or ducts as integral parts of such heating device."

GENERAL REQUIREMENTS

4.1 *Safety*.—The space heater shall meet the safety standards of Underwriters' Laboratories, Inc. Standards for Oil-Burning Stoves, Subject 896, October 1936, and subsequent revisions. Presence on the space heater of the label of the Underwriters' Laboratories, Inc. shall be accepted as evidence of compliance with these requirements.

4.2 *Durability*.—The design and construction of the heater shall be such as to insure its durability in service, as outlined in section 5 of this standard.

4.3 *Dependability*.—The heater shall be capable of functioning uniformly and reliably when installed and adjusted in accordance with the manufacturer's instructions.

4.4 *Heater testing and rating*.—Each heater model shall be tested and rated as outlined in section 7 of this standard. Heater ratings shall be clearly set forth in the manufacturer's catalog or literature and on the heater name plate as outlined in sections 8 and 9 of this standard.

4.5 *Over-all efficiency.*—The heater shall be capable of meeting the minimum efficiency requirements outlined in section 6 of this standard.

4.6 *Operating instructions.*—Each heater shall be accompanied by a complete set of instructions covering essential points with respect to selection of fuel, operation, and upkeep.

HEATER DESIGN AND CONSTRUCTION

5.1 *The outer casing*, or jacket, if used, shall be constructed of material of such strength that it is not readily damaged or dented in shipment or use.

5.2 *Oil burners* shall be of the vaporizing pot type constructed of steel, not less than No. 20 gage (see par. 5.7) or other suitable material of equal resistance to heat, corrosion, and fuel leakage.

5.3 *Combustion chambers*, radiating drums, and/or other surfaces exposed to the direct heat of the burner flame and/or to the products of combustion shall be constructed of sheet steel in accordance with the following tabulation, or of other suitable materials of equal resistance to heat and corrosion:

Rated capacity	Minimum manufacturers' standard-practice gage (see par. 5.7)
gal/24 hr	
4 to 8.....	24
8 to 11.....	22
11 up.....	20

Combustion chambers shall be fitted with doors or equivalent means for permitting access to interior surfaces of the burner and other heater surfaces as required for lighting, cleaning, servicing, etc.

5.4 *The flue collar* shall be constructed of a material conforming to that specified in par. 5.3 for the combustion chamber, and shall be rigidly attached at the flue outlet of the heater. It shall afford convenient, suitable means for attaching the smoke pipe securely to the heater.

5.5 *The fuel tank*, when furnished for use as an integral part of the heater, shall be substantially constructed of corrosion-resisting metal or metal suitably coated to resist corrosion, having minimum thicknesses as follows: 3-gallon capacity, 26 gage; 3.1 to 6 gallons, 24 gage; 6.1 to 10 gallons, 22 gage (see par. 5.7 for table of gage thicknesses); joints shall be brazed, welded, riveted, or of the lockseam type, and when not continuously brazed or welded, the joints shall be sweated with solder. The tank shall be so constructed as to assure its being rigidly mounted on the heater in its proper position. It shall have ample filler opening. The fuel tank, when furnished for use as an integral part of the heater, shall be equipped with a valve for stopping the flow of oil at the tank when removing the tank from the heater or servicing the constant-level valve.

5.6 *Baffles* used to deflect heat from the outer casing, the fuel-supply tank or the floor, shall be constructed of not less than 28-gage sheet steel or equal and be securely attached.

5.7 *Sheet-steel gages*.—All sheet-steel gages specified in this standard shall be interpreted as indicated below:

Manufacturers' standard-practice gage number	Thickness
20.....	0.0359, plus or minus mill tolerance.
22.....	.0299, plus or minus mill tolerance.
24.....	.0239, plus or minus mill tolerance.
26.....	.0179, plus or minus mill tolerance.
28.....	.0149, plus or minus mill tolerance.

5.8 *Finish*.—Outside metal surfaces of heater casings, grilles, tanks, and accessories shall be adequately protected against rust or corrosion and against damage during manufacture, test, shipment, and reasonable conditions of storage.

5.9 *Heater accessories and fittings*.

5.91 *The oil-control valve* shall be of substantial construction of corrosion-resistant parts and be rigidly attached to the heater, or it may be furnished integral with a constant-level valve or sump. The control valve shall be easily accessible for operation and servicing and shall have means for (a) controlling the desired oil flow, (b) indicating the approximate high- and low-fire settings, and (c) restricting the maximum setting.

5.92 *The constant-level valve*, when used, shall be of the manual reset, float, and trip type permitting air escapement, or otherwise be so constructed as to prevent excessive accumulations of oil in the valve. It shall be rigidly mounted on the heater and supported independently of the piping. All parts shall be made of corrosion-resistant material.

5.93 *The barometric feed device*, when used, shall be durably constructed of corrosion-resistant material. The sump shall be rigidly mounted on the heater, supported independently of the piping, and of ample size and proper design. Construction shall be such as to prevent the spillage of oil during the removal or replacement of the tank or the operation of the heater and shall insure the maintenance of the correct head of oil for the proper operation of the burner.

5.94 *An automatic draft regulator* shall be furnished with each oil heater designed for setting in a stationary location. It may be furnished integral with the heater, or with complete instructions for its installation.

5.95 *Gaskets*, where required for fuel-handling parts, shall be of soft copper, copper asbestos, hard lead, or approved equivalent for screwed joints, and of Underwriters' listed sheet packing or its equivalent for bolted joints.

PERFORMANCE

6.0 The heater shall be capable of meeting the following minimum performance requirements, when tested as outlined in section 7 of this standard:

6.1 *Lighting and warming up burner*.—Adequate provision shall be made to insure ease of lighting, and to insure against the burner flame

being extinguished after lighting and before the burner has become thoroughly heated.

6.2 *Operation of burner and controls.*

6.21 Controls for fuel and draft shall function easily and reliably.

6.22 The burner shall be capable of functioning uniformly and reliably without excessive carbonization or other phenomena which would impair its safe and proper operation on the grades of fuel recommended by the manufacturer for use therein.

6.23 The heater, if manually operated, shall be capable of passing the 6-percent ICHAM smoke test (as required for high-fire operation in par. 7.64) when operating at lowered fire setting as follows: Draft—as recommended by the manufacturer for this lowered fuel-feed rate. Fuel-feed rate—not in excess of 0.7 pound per hour or not in excess of 25 percent of that used for the commercial standard rating test, whichever is the greater of the two.

6.24 The heater, if thermostatically operated, shall be capable of passing the 6-percent ICHAM smoke test when operated at the pilot rate recommended by the manufacturer.

6.3 *Heating capacity.*

6.31 The heater shall be capable of delivering heat to a room as claimed by the manufacturer when tested as outlined in section 7 of this standard.

6.4 *Operating efficiency.*

6.41 The heater shall be capable of operating with an over-all efficiency of not less than 70 percent when tested at 0.06-inch draft as outlined in section 7 of this standard.

6.42 In cases where the manufacturer recommends less than 0.06-inch draft for the high-fire operation of the heater, the "maximum recommended draft" may be substituted for the 0.06-inch draft specified in paragraph 6.41.

LABORATORY TEST CODE

7.1 The purpose of this code is to provide a uniform standard method for ascertaining the maximum practical heat output in Btu per hour of flue-connected oil-burning space heaters of the types covered by this standard when operating under approximately normal service conditions.

7.2 *Principle.*

7.21 Since no simple and accurate method is known for measuring the heat output of an oil heater, directly, a heat-loss calculation must be relied upon.

7.22 This method is based on the principle that A , the total heat of the fuel used, minus B , the heat lost in the flue gases, equals C , the net heat delivered to the room. Then

$$C/A = E, \text{ efficiency}$$

7.23 Care must be used in setting up and adjusting the heater, as well as in selecting, calibrating, and accurately reading the instruments used for rating tests.

7.3 Heater test setup.

7.31 The heater shall be installed in accordance with the instructions of the manufacturer, in a standard Underwriters' booth or black corner in a room free from drafts, with flue connections, accessories, and draft regulator as shown in figures 1 to 6 of this standard.

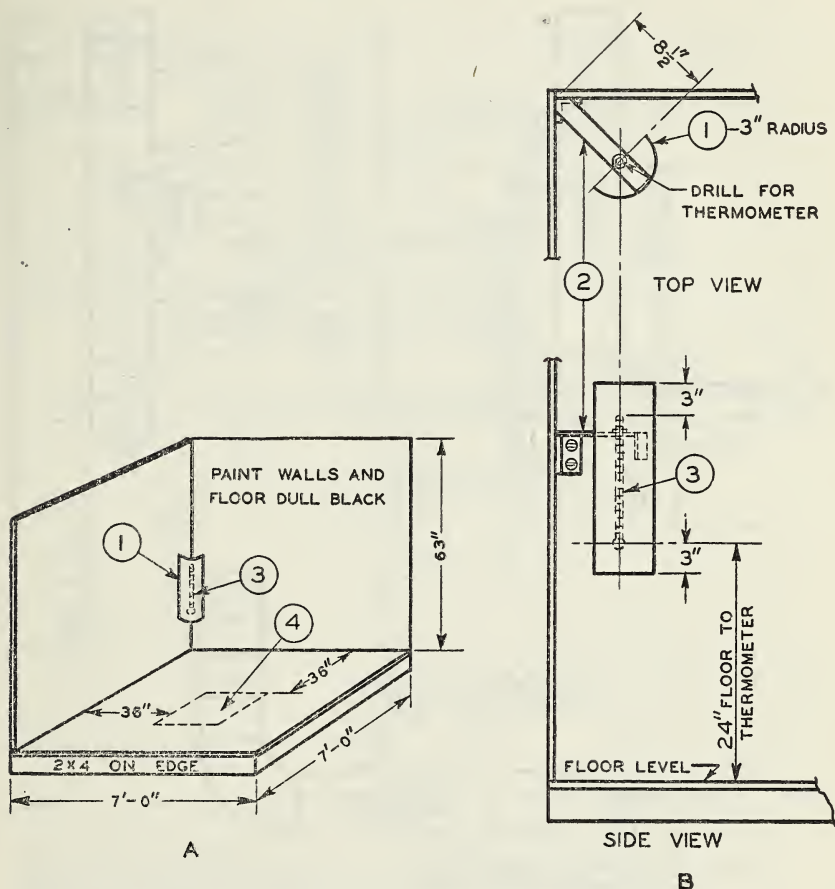


FIGURE 1.—Standard Underwriters' booth, or black corner.

1. Bright-aluminum baffle (No. 24 gage) 6 inches longer than item 3.
2. Bracket material $\frac{1}{8}$ -by 1- by 3-inch angle and $\frac{1}{8}$ -by 1- by 15-inch strap iron.
3. Thermometer, supported by bracket.
4. Location of heater on platform.

7.32 Provision shall be made for the draft recommended by the manufacturer for high-fire operation of the heater with draft fluctuations not to exceed plus or minus 0.005-inch of water column, also for maintaining at least 70° F observed room temperature.

7.4 Instruments and their location.

7.41 A calibrated laboratory-type thermometer shall be located behind the shield in the Underwriters' black corner, as shown in figure 1, A and B, to measure room temperature.

7.42 A draft gage with an accuracy of plus or minus 0.0025-inch of water column shall be connected as shown in figure 3.

7.43 A potentiometer (suggested range 0° to $1,200^{\circ}$ F or equal).

7.44 A No. 20 gage iron-constantan thermocouple or equivalent thermocouple with holder, as shown in figures 3 and 4.

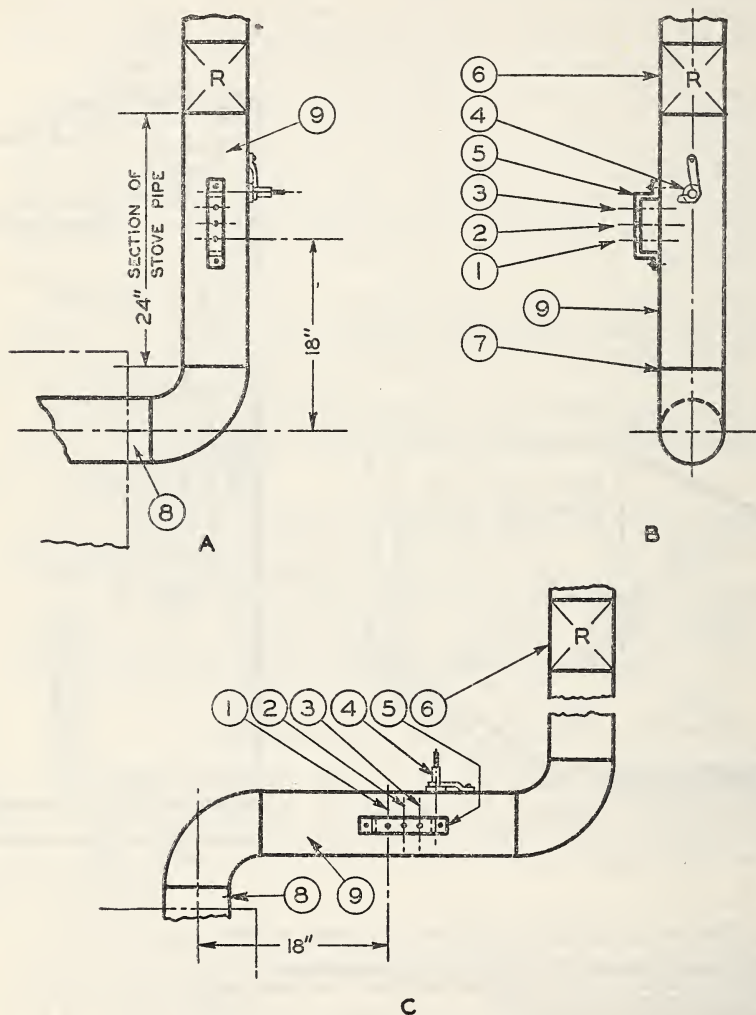


FIGURE 2.—Heater flue connections.

1. Center line of thermocouple, see figures 3 and 4.
2. Gas-sampling tube, see figure 3.
3. Draft tube, see figure 3.
4. 8-mm clear-glass rod and holder, see figure 5.
5. Support bracket, see figure 3.
6. Draft regulator.
7. Seal all openings in stove pipe below gas-sampling tube.
8. Heater flue collar.
9. Section of stove pipe, same nominal diameter as heater flue collar.

7.45 Gas-analysis apparatus, preferably of the orsat type, capable of determining CO_2 and O_2 and CO values with an accuracy of plus or minus one-fourth of 1 percent or better.

7.46 Suitable means for measuring the flow of oil to the heater (measurement by weight preferred).

7.47 An ICHAM smoke meter (see figs. 5 and 6).

7.48 A stop watch (an interval timer for smoke test is also desirable).

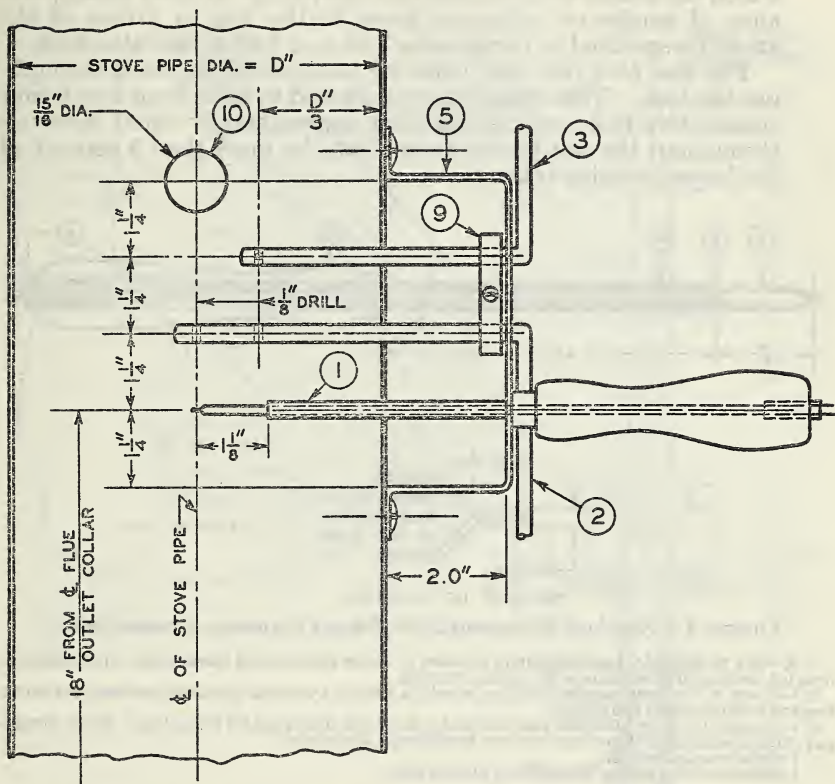


FIGURE 3.—Gas-sampling and draft tubes, thermocouple and support bracket assembly.

MATERIALS

1. Thermocouple, see figure 5.
- 2 and 3. Gas-sampling and draft tubes ($\frac{1}{4}$ -by approx. 0.032-inch wall, yellow brass or steel).
- 5 and 9. Support bracket and tube clamp ($\frac{1}{2}$ -by 0.093-inch half-hard flat steel wire).
10. Hole in stove pipe for glass rod.

7.5 Selection and heating value of fuel oil.—The fuel used for heater-rating tests shall be not heavier than Commercial Standard Grade No. 1 (CS12-40 or latest revision thereof) and shall be assumed to have a gross heating value of 19,750 Btu per pound.

7.6 Test procedure.

7.61¹ The heater shall be operated under rating-test conditions until equilibrium conditions of room temperature, fuel-flow rate, and flue-gas temperature have been established.

7.62 The average draft during the test shall be that recommended by the manufacturer for high-fire operation of the heater. In no

case shall the draft be less than 0.02 inch nor more than 0.08-inch of water column. The maximum fluctuation in draft during the test shall not exceed plus or minus 0.005 inch of water column.

7.63 *The fuel-feed rate* shall be slowly increased to the desired rate, but in no case shall that rate exceed the maximum rate at which the heater will burn the fuel completely without the appearance of smoke or unburned gases in the flue in excess of the amounts specified in paragraphs 7.64 and 7.65 of this standard.

The fuel feed rate shall then be maintained constant throughout the test. This condition may be said to have been met if four consecutive fuel readings taken at approximately equal intervals throughout the test period do not vary by more than 5 percent of the largest reading taken.

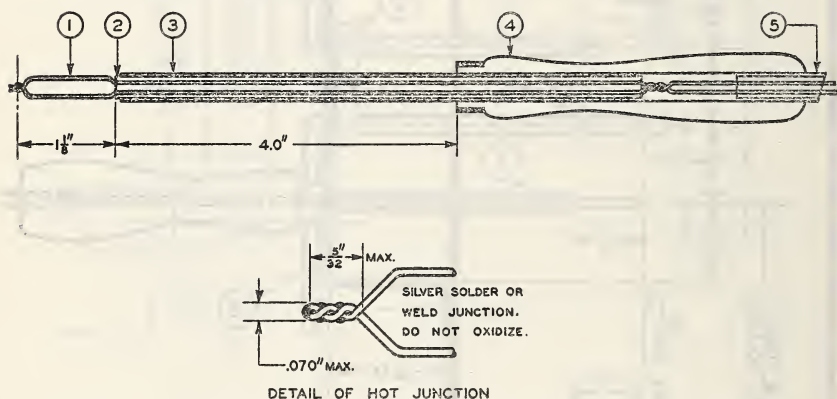


FIGURE 4.—Standard thermocouple for flue-gas temperature measurement.

1. 10'—No. 20 B&S gage iron-constantan, asbestos, or woven glass-covered thermocouple wires extending from hot junction to potentiometer or reference junction.
2. 1—Leeds & Northrup standard 714B, or equal, $\frac{1}{4}$ inch O. D.—2-hole porcelain insulator cut 6.0 in. long and ends beveled on two sides.
3. 1— $\frac{3}{16}$ -inch O. D. by 0.032-inch wall half-hard yellow-brass tubing cut $5\frac{7}{8}$ inches long. Ream, if necessary, to fit over insulator then crimp ends over beveled ends of insulator.
4. 1—Small wooden handle.
5. 1—Piece of rubber tubing, $\frac{5}{16}$ by $\frac{3}{32}$ by 2 inches long.]

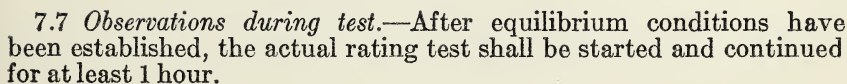
7.64 *The amount of smoke* in the flue gas shall not exceed that indicated by a 6-percent ICHAM smoke-meter reading on a glass rod after 20 minutes of exposure in the flue pipe at the point indicated in figures 2 and 3 of this standard.

7.65 *Unburned fuel gases* shall not occur in the flue products in sufficient quantities:

7.651 To be measurable by recognized methods of gas analysis as unburned fuel gas or vapors in excess of 0.2 percent by volume, or

7.652 To result in failure of the observed CO_2 and O_2 values to check at the ultimate by more than 0.3 percent O_2 on the check chart, figure 7, of this standard.

7.66 *Stack temperature* shall not exceed 920° F. above room temperature.



7.71 The following observations shall be made and recorded at the start of the test and at three approximately equal intervals throughout the test. The form of data sheet shown on page 11 is recommended for recording the test data.

7.711 Draft in flue pipe.

7.712 Room temperature.

7.713 Rate of flow of oil to heater.

7.714 Flue-gas temperature (read immediately before taking flue-gas sample).

7.715 Percentage of CO_2 , percentage of O_2 , and percentage of CO in the flue gas.

NOTE.—Flue gases which cannot be absorbed in the CO_2 or O_2 pipettes, but which can be absorbed in the CO pipette of the orsat, shall be included as CO and corrected for as shown on the check chart, figure 7, of this standard.

7.716 Smoke-meter reading.

7.717 The barometric pressure shall be read at least once during the test.

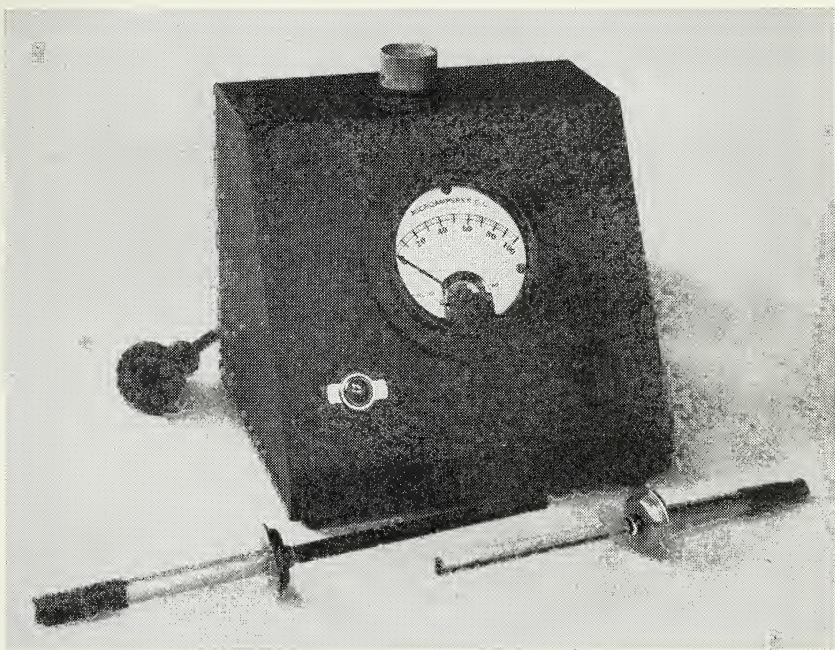


FIGURE 6.—Institute of Cooking & Heating Appliance Manufacturers smoke meter.

Principle of Operation.—The smoke meter shown above is better described as a photoelectric soot-density comparator. Its operation and use are based on the principles that:

1. A Pyrex-glass rod placed across a stream of flue gas containing oil smoke will collect a deposit of soot on the surface of the rod.
2. Under specified exposure conditions, the amount or depth of soot deposit on the glass rod will be a function of the smoke density, or the proportion of smoke in the flue products.
3. The depth or amount of this smoke deposit can be measured or evaluated in terms of the extent to which it will interfere with the passage of a beam of light through the glass rod onto a photoelectric cell.

Description.—The meter consists of means for supporting a glass or metal rod and means for passing a beam of light through the glass rod onto a photoelectric cell connected to an electric meter. A constant-voltage transformer should be used if the line voltage fluctuates objectionably. The over-all size of the meter is approximately $5\frac{1}{2}$ by $5\frac{1}{2}$ by $6\frac{1}{2}$ inches. Weight approximately 4 pounds without transformer.

Operation.—The meter is adjusted for a "zero" reading with a dull-black, opaque rod and for a 100 reading with a clean glass rod. The glass rod is then exposed to the smoke in the flue pipe and placed in the meter to give a reduced meter reading (percentage of light transmitted).

For further information regarding the ICHAM smoke meter write to the Institute of Cooking & Heating Appliance Manufacturers, Shoreham Hotel, Washington, D. C.

STANDARD OIL-HEATER RATING TEST

DATA AND REPORT SHEET

Mfrs. test No.

Oil heater
(Make) (Model, type, or No.) (Number and size of burners)Fuel used for the test
(Brand) (API gravity No. at 60° F)

Date of test Tested by

Test data	Four sets of readings at equal intervals not less than 20 minutes apart				Average
1. Draft..... (in. of water)					
2. Room temperature..... (°F)					
3. Smoke-meter readings..... (%)					
4. Fuel-temperature readings..... (°F)					
5. Time intervals used for fuel readings.....					
6. Fuel input readings (specify units used).....					
7. Fuel-oil input rate..... (lb/hr avg)					
8. Barometric pressure..... (in. of mercury)					
9. Factor to correct fuel-oil input to sea level (see par. 7.82)					
10. Fuel-oil input (corrected to sea level)..... (lb/hr avg)					
<hr/>					
11. Gross heating value of oil..... (Btu/lb)					
12. Gross heat input (corrected to sea level)..... (Btu/hr)					
<hr/>					
13. Flue-gas temperature..... (°F)					
14. Flue-gas temp. rise above room temp..... (°F)					
15. CO ₂ in dry flue gas..... (°F)					
16. O ₂ in dry flue gas..... (%)					
17. Unburned gases expressed as CO..... (%)					
18. Efficiency for complete combustion from charts (figs. 8 and 9)..... (%)					
<hr/>					
19. Heat losses due to incomplete combustion (from formula fig. 7)..... (%)					
20. Over-all heater efficiency equals (item 18 minus item 19)					
21. Heat output to room equals item 12 times item 20..... (Btu/hr avg)					
<hr/>					
22. Fuel-input rate for low-fire smoke test (CS101-43, par. 6.23) (lb/hr)					
<hr/>					
23. ICHAM smoke-meter readings at 20-min. intervals..... (%)					

We hereby certify that the above is a true and accurate copy of the data obtained when the above heater was tested in strict accordance with section 7 of Flue-Connected Oil-Burning Space Heaters Equipped with Vaporizing Pot-Type Burners, Commercial Standard CS101-43.

For

Address

By

Date

7.8 Corrections for altitude.

7.81 The appropriate correction factor from the following table may be used for converting the fuel-oil input rate at the smoke point at higher altitudes to the corresponding fuel-input rate at sea level. (In no case, however, shall the corrected fuel-input rate used for heater rating purposes exceed the maximum fuel flow rate obtainable at high-fire valve setting with recommended fuels.)

7.82 Table of altitude correction factors.

Approximate altitude	Barometric pressure	Correction factor
ft	in. of Hg	
0	30.0	1.00
500	29.5	1.02
1,000	29.0	1.04
1,500	28.5	1.06
2,000	28.0	1.08
2,500	27.5	1.10
3,000	27.0	1.12
3,500	26.5	1.14
4,000	26.0	1.16
4,500	25.5	1.18
5,000	25.0	1.20
5,500	24.5	1.22
6,000	24.0	1.24
6,500	23.5	1.26
7,000	23.0	1.28

NOTE.—The effective heater-output rating at the draft recommended by the manufacturer for regions higher than sea level may be estimated by dividing the rated hourly heat output at sea level by the correction factor corresponding to the higher altitude indicated in the above table.

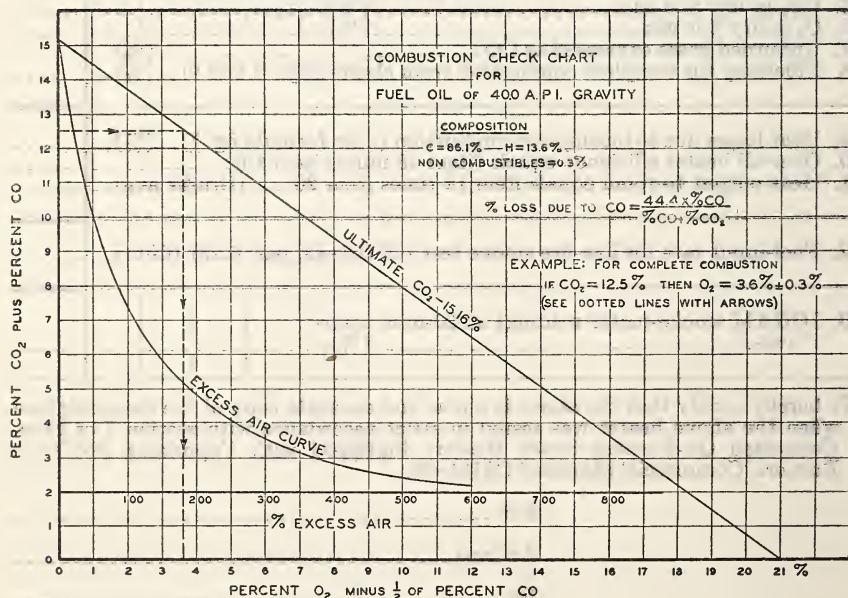


FIGURE 7.—Combustion check chart.

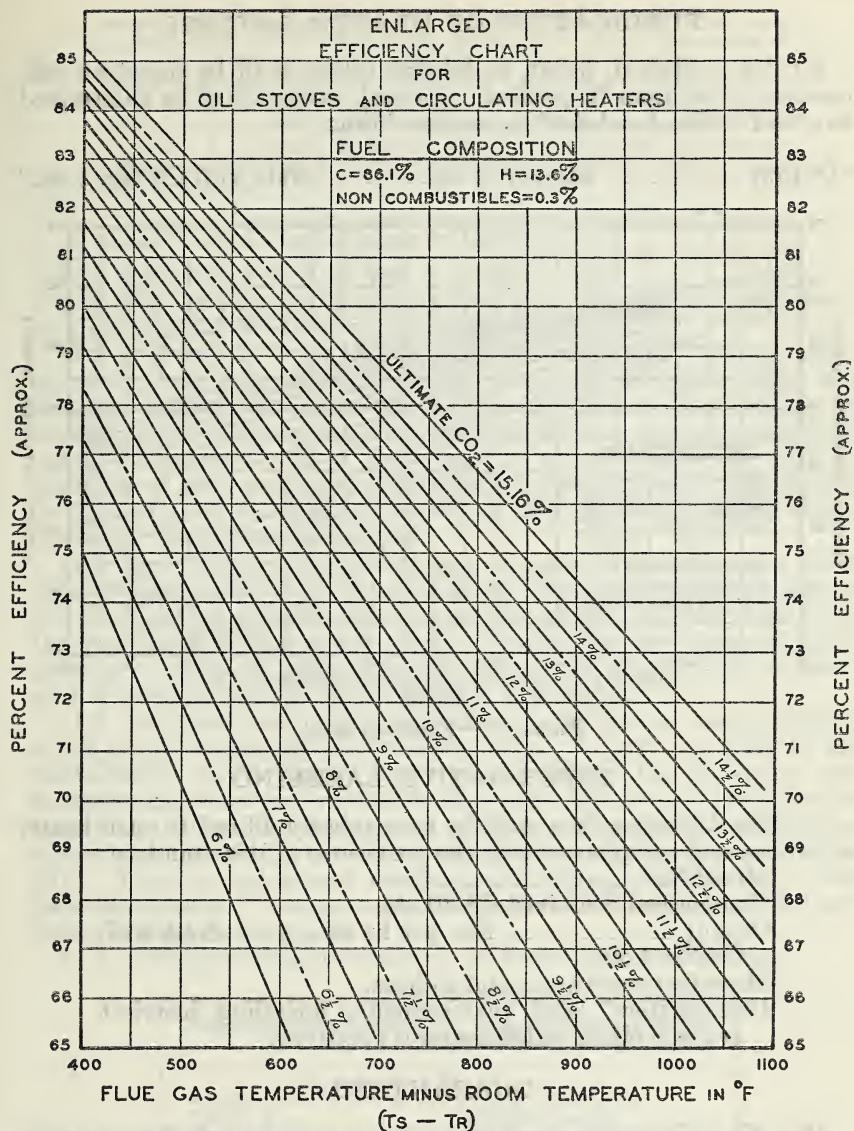


FIGURE 8.—Enlarged efficiency chart.

7.9 Calculation of heater efficiencies, ratings, etc.

7.91 The calculation of results on all combustion data shall be based on figures 7, 8, and 9 of this standard (on which allowances have been made for heat losses in the flue gas).

PUBLICATION OF HEATER RATINGS

8.1 No published, listed, or labeled rating shall be based on efficiencies of less than 70 percent. All such ratings shall be determined as above outlined and shall be expressed thus:

"Output ----- Btu per hr at ----- draft with CS No. 1 oil."

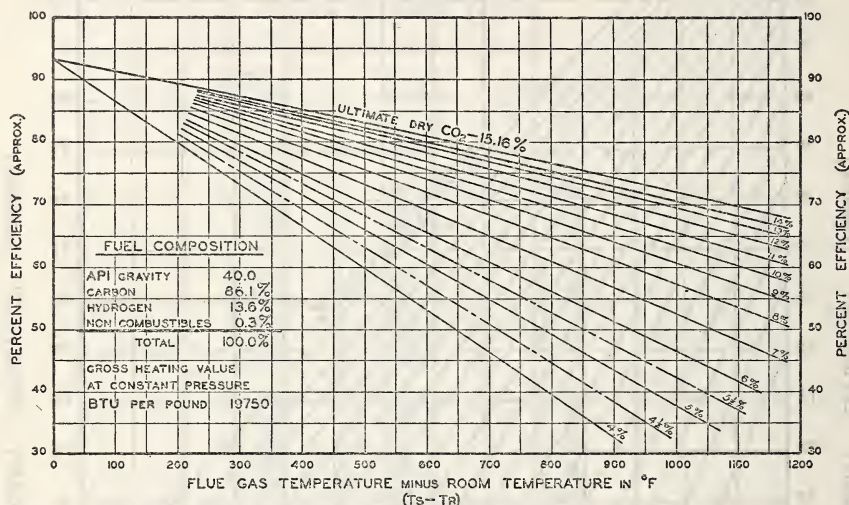


FIGURE 9.—Efficiency chart.

INFORMATIVE LABELING

9.1 The following data shall be permanently affixed to each heater as evidence of compliance with the provisions of this standard:

Model No. -----

Commercial Standard CS101-43.

Output ----- Btu per hr at ----- draft with
CS No. 1 oil.

Manufacturer's name and address.

Underwriters' label requirements, including heaviest
grade of oil for which heater is approved.

GUARANTEES

10.1 The following uniform guarantee or warranty shall accompany each heater or be published in the manufacturer's printed literature, or both:

The ----- Company warrants all oil-burning space heaters manufactured by it and bearing Commercial Standard CS101-43, to be free from defects in material and workmanship. If any part of the equipment herein described and sold by the company proves to be defective in workmanship or material, and if such part is within 12 months from date of shipment from the company's factory returned to such factory, transportation charges prepaid, and if the same is found by the company to be defective in workmanship or material, it will be replaced or repaired free of charges, f. o. b. factory. The company assumes no liability for

consequential damages of any kind, and the purchaser by acceptance of this equipment will assume all liability for the consequences of its use or misuse by the purchaser, his employees, or others. A defect in the meaning of this warranty in any part of said equipment shall not, when such part is capable of being renewed, repaired, or replaced, operate to condemn such equipment. This warranty is expressly in lieu of all other warranties, guarantees, obligations, or liabilities expressed or implied by the company or its representatives.

[NOTE.—The industry voted to name the Underwriters' Laboratories, Inc. as the testing agency for this standard.]

11.0 *Suggestions for field tests of installed heaters.*

11.1 For the purpose of making field tests, the following minimum equipment and procedure are recommended.

11.2 *Instruments required.* (1) A mercury-type flue-gas thermometer, long enough to reach the center of the stove pipe, and accurate within plus or minus 5° F. (2) Apparatus suitable for measuring the CO₂ content of the flue gas with an accuracy of plus or minus 0.5 percent. (3) A draft gage of suitable capacity, with an accuracy of plus or minus 0.005-inch of water column. (4) Means for accurately measuring the flow rate of oil to the heater, either during the test or as adjusted for the test.

11.3 *Test Setup.*—(1) Provide one or more openings in the stove pipe 18 inches from the flue outlet elbow (see fig. 2) on the heater, for the flue-gas thermometer, the gas-sampling tube, and the draft tube. Do not insulate the stove pipe. (2) Provide for chimney draft slightly in excess of that shown on the heater name plate to insure proper operation of the draft regulator and heater.

11.4 *Test procedure.*—Light and warm up the heater, using the grade of oil recommended by the manufacturer. Adjust the draft to the value shown on the heater name plate. Adjust the fuel-input rate to the maximum recommended by the manufacturer, and operate the heater at this rate for at least 15 minutes. Take draft and flue-gas temperature readings, then take and analyze the flue-gas sample for CO₂. Take several sets of readings and average the results. Compare the observed flue-gas temperature and CO₂ readings with those shown in the following table.

11.5 *Table for checking results of oil-heater-performance tests.*

Observed flue-gas temperature	Acceptable corresponding CO ₂ values from flue-gas analysis
Above 1,000° F-----	Heater fails test.
1,000° F-----	9½% or better.
900° to 999° F-----	8½% or better.
800° to 899° F-----	7¼% or better.
700° to 799° F-----	6% or better.
600° to 699° F-----	5% or better.

Example: If a field test shows a flue-gas temperature of 950° F and a CO₂ reading of 8½ percent or better, the heater is performing satisfactorily.

11.6 *Interpretation of field-test results.*—Results of tests which are not conducted under the above conditions will not be recognized.

EFFECTIVE DATE

The standard is effective for new production from January 1, 1943.

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. 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:

ROSCOE N. ST. JOHN (chairman), The Institute of Cooking & Heating Appliance Manufacturers, Shoreham Hotel, Washington, D. C.
MARC RESEK, Perfection Stove Co., 7609 Platt Ave., Cleveland, Ohio.
M. F. COTES, Duo-Therm Division, Motor Wheel Corporation, Lansing, Mich.
ROY OHNIMUS, Hammer-Bray Co., Oakland, Calif.
STANLEY PERRY, Oil Devices, 341 East Ohio St., Chicago, Ill.
DEAN OLDS, Coleman Lamp & Stove Co., Wichita, Kans.

Distributors:

RIVERS PETERSON, National Retail Hardware Association, 333 North Pennsylvania St., Indianapolis, Ind.
National Retail Furniture Association, invited to name representative.
B. J. WEINBERG, Sears, Roebuck & Co., Chicago, Ill.
GERALD C. MACDONALD, Montgomery Ward & Co., Chicago, Ill.
F. C. FERBER, Southern Wholesalers, Inc., 1519 L St., N. W., Washington, D. C.
Marshall-Wells Co., Duluth, Minn., invited to name representative.

Consumers:

R. K. THULMAN, Federal Housing Administration, National Housing Agency, Washington, D. C.
MORRIS SHAPIRO, Federal Public Housing Authority, National Housing Agency, Washington, D. C.
JOHN W. SCHULZ, consultant, 5 Oscar St., Bay Shore, N. Y. Representing Consumer Division, Office of Price Administration.
National Council of Women, invited to name representative.
EDNA VAN HORN, American Home Economics Association, 620 Mills Building, Washington, D. C.
General Federation of Women's Clubs, invited to name representative.

Testing Laboratories:

J. H. WITTE, Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill.
RICHARD S. DILL, National Bureau of Standards, Washington, D. C.

HISTORY OF PROJECT

Pursuant to a request on April 29, 1941, from The Institute of Cooking & Heating Appliance Manufacturers for the cooperation of the National Bureau of Standards in the establishment of a commercial standard for oil-burning space heaters, a preliminary conference of interested manufacturers was held in Cincinnati, Ohio, on June 14, 1941, in order to adjust the draft to suit the consensus of producers.

The proposed standard as adjusted by the preliminary manufacturers' conference was then submitted to a number of National organizations of distributors, consumers, testing laboratories, and to several Federal agencies for advance consideration and recommendations. Following the receipt of these recommendations, the draft was adjusted in line therewith at a conference in Cincinnati, Ohio, December 6, 1941. A general conference was held in Chicago, Ill., January 15, 1942, to which all interested producers, distributors, users, and testing laboratories were invited. The adjusted draft as adopted by the general conference was circulated to all concerned on February 2, 1942, for written acceptance.

Upon receipt of written acceptances from a preponderant majority, announcement was issued on April 3, 1942, that the standard would become effective for new production from January 1, 1943. -

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 CS101-43 as our standard of practice in the

Production ¹ Distribution ¹ Use ¹ Testing ¹

of flue-connected oil-burning space heaters equipped with vaporizing pot-type burners.

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 three. 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 this commercial standard as their standard of practice in the production, distribution, testing, and use of flue-connected, oil-burning space heaters equipped with vaporizing pot-type burners. 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.
American Specification Institute,
Chicago, Ill.
Burning Oil Distributors Association,
Chicago, Ill. (In principle.)
Fuel Oil Distributors Association of
New Jersey, Newark, N. J.
National Council of Women of the
U. S., Inc., New York, N. Y.
Stove Mounters International Union of
North America, St. Louis, Mo.

FIRMS

Allen Manufacturing Co., Nashville,
Tenn.
American Gas Machine Co., Albert
Lea, Minn.
American Stove Co., Lorain, Ohio.
Automatic Products Co., Milwaukee,
Wis.
Baltimore, Bureau of Plans and Surveys
of, Architectural Division, Baltimore,
Md.
Borg-Warner Corporation, Norge Divi-
sion, Detroit, Mich.
Central Co-operative Wholesale,
Superior, Wis.
Chicago Mail Order Co., Chicago, Ill.
Cincinnati, City of, Department of
Purchasing, Cincinnati, Ohio.
Coleman Lamp & Stove Co., The,
Wichita, Kans.
Cole's Hot Blast Manufacturing Co.,
Chicago, Ill.
Consumers Petroleum Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
Estate Stove Co., The, Hamilton, Ohio.
Evans Products Co., Detroit, Mich.

Factory Mutual Laboratories, Boston,
Mass. (In principle.)
Florence Stove Co., Kankakee, Ill., and
Gardner, Mass.
Globe Machine & Stamping Co., The,
Cleveland, Ohio.
Gray & Dudley Co., Nashville, Tenn.
Guiberson Oil Heater Co., Dallas, Tex.
Hammer-Bray Co., Ltd., Oakland,
Calif.
Integrity Supply, Inc., New York, N. Y.
International Oil Burner Co., St.
Louis, Mo.
Kresky Manufacturing Co., Inc.,
Petaluma, Calif.
Laco Oil Burner Co., Griswold, Iowa.
Little Burner Co., Inc., H. C., San
Rafael, Calif.
Lonergan Manufacturing Co., The,
Albion, Mich.
Lynn Products Co., Inc., Lynn, Mass.
Malleable Iron Range Co., Beaver Dam,
Wis.
Miller Co., The, Meriden, Conn.
Montgomery Ward & Co., Chicago, Ill.
Moore Corporation, The, Joliet, Ill.
Motor Wheel Corporation, Duo-Therm
Division, Lansing, Mich.
New Orleans, Inc., Better Business
Bureau of, New Orleans, La. (In
principle.)
Oil Devices, Appliance Engineering
Division, Chicago, Ill.
Perfection Stove Co., Cleveland, Ohio.
Prentiss Wabers Products Co., Wis-
consin Rapids, Wis.
Quaker Manufacturing Co., Chicago,
Ill.
Quincy Stove Manufacturing Co., The,
Quincy, Ill.
Renown Stove Co., Owosso, Mich.

Sacramento, Better Business Bureau of, Sacramento, Calif. (In principle.)	Washington Stove Works, Inc., Everett, Wash.
Sears, Roebuck & Co., Chicago, Ill.	Wiley Radio & Electric Shop, Milford, Ohio.
Shell Oil Co., Inc., New York, N. Y. (In principle.)	
Siegler Enamel Range Co., Centralia, Ill.	U. S. GOVERNMENT
Silent Glow Oil Burner Corporation, The, Hartford, Conn.	Agriculture, Department of, Washing- ton, D. C.
Silent Sioux Oil Burner Corporation, Orange City, Iowa.	Federal Housing Administration, Wash- ington, D. C.
Spencer Petroleum Co., Chicago, Ill.	Office of Price Administration, Wash- ington, D. C. (In principle.)
Underwriters' Laboratories, Inc., Chicago, Ill.	Public Buildings Administration, Wash- ington, D. C.
United States Testing Co., Inc., Hoboken, N. J.	U. S. Housing Authority, Washington, D. C.
Viking Manufacturing Corporation, Dayton, Ohio.	War Department, 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.
5-40.	Pipe nipples; brass, copper, steel, and wrought iron.
6-31.	Wrought-iron pipe nipples (second edition). Superseded by CS5-40.
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 CS5-40.
11-41.	Moisture regains of cotton yarns (second edition).
12-40.	Fuel oils (fifth edition).
13-39.	Dress patterns (second edition).
14-39.	Boys' button-on waists, shirts, junior and polo shirts (made from woven fabrics) (second edition).
15-29.	Men's pajamas.
16-29.	Wall paper.
17-42.	Diamond core drill fittings (third edition).
18-29.	Hickory golf shafts.
19-32.	Foundry patterns of wood (second edition).
20-36.	Staple vitreous china plumbing fixtures (second edition).
21-39.	Interchangeable ground-glass joints, stopcocks, and stoppers (fourth edition).
22-40.	Builders' hardware (nontemplate) (second edition).
23-30.	Feldspar.
24-30.	Standard screw threads.
25-30.	Special screw threads.
26-30.	Aromatic red cedar closet lining.
27-36.	Mirrors (second edition).
28-32.	Cotton fabric tents, tarpaulins, and covers.
29-31.	Staple seats for water-closet bowls.
30-31.	Colors for sanitary ware.
31-38.	Wood shingles (fourth edition).
32-31.	Cotton cloth for rubber and pyroxylin coating.
33-32.	Knit underwear (exclusive of rayon).
34-31.	Bag, case, and strap leather.
35-31.	Plywood (hardwood and eastern red cedar).
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.
42-35.	Fiber insulating board (second edition).
43-32.	Grading of sulfonated 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.
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).

CS No.	Item
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 (overalls elastic webbing).
59-41.	Woven textile fabrics—testing and reporting (third edition).
60-36.	Hardwood dimension lumber.
61-37.	Wood-slat venetian blinds.
62-38.	Colors for kitchen accessories.
63-38.	Colors for bathroom accessories.
64-37.	Walnut veneers.
65-38.	Wool and part-wool fabrics.
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).
73-38.	Old growth Douglas fir standard stock doors.
74-39.	Solid hardwood wall paneling.
75-42.	Automatic mechanical draft oil burners designed for domestic installations (second edition).
76-39.	Hardwood interior trim and molding.
77-40.	Sanitary cast-iron enameled ware.
78-40.	Ground-and-polished lenses for sun glasses (second edition) (published with CS79-40).
79-40.	Blown, drawn, and dropped lenses for sun glasses (second edition) (published with CS78-40).
80-41.	Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).
81-41.	Adverse-weather lamps for vehicles (after market).
82-41.	Inner-controlled spotlamps for vehicles (after market).
83-41.	Clearance, marker, and identification lamps for vehicles (after market).
84-41.	Electric tail lamps for vehicles (after market).
85-41.	Electric license-plate lamps for vehicles (after market).
86-41.	Electric stop lamps for vehicles (aftermarket).
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.
100-42.	Multiple-coated, porcelain-enameled steel utensils.
101-43.	Flue-connected oil-burning space heaters equipped with vaporizing pot-type burners.

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.

