

**Commercial Standard**

**113-51**

SUPERSEDES CS113-44

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# **Oil-Burning Floor Furnaces Equipped With Vaporizing Pot-Type Burners**

A RECORDED VOLUNTARY STANDARD OF THE TRADE

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IN COOPERATION WITH

NATIONAL BUREAU OF STANDARDS

E. U. CONDON, DIRECTOR

# Oil-Burning Floor Furnaces Equipped With Vaporizing Pot-Type Burners

(SECOND EDITION)

[Effective February 1, 1951]

## 1. GENERAL

1.1 *Purpose*.—The purpose of this standard is (1) to establish minimum specifications for the guidance of manufacturers, distributors, and users of oil-burning floor furnaces; (2) to avoid delays and misunderstandings; and (3) to provide a uniform method for determining, designating, and guaranteeing ratings of oil-burning floor furnaces.

1.2 *Scope*.—This standard applies to oil-fired, flue-connected floor furnaces equipped with vaporizing pot-type burners with or without mechanical draft or forced circulation, either manually or automatically controlled, and includes the following sections:

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### 1.3 *Definitions*.

1.3.1 *Floor furnace*.—An oil-burning floor furnace is defined as a completely self-contained oil-burning furnace-burner unit, flue-connected, and arranged to be inserted into and suspended from the floor, having integral warm-air discharge and cold-air return, with provisions for control and operation from floor level.

1.3.2 *Vaporizing pot-type oil burner*.—A device for the combustion of fuel oil, consisting of an oil-vaporizing bowl or other receptacle to which the liquid fuel may be fed in controllable quantities, the heat of combustion being used to vaporize the fuel, with provisions for admitting air and mixing it with the oil vapor in combustible proportions.

1.3.3 *Manufacturer*.—For the purpose of this standard, the manufacturer shall be the company or organization which evidences its responsibility to the purchaser by (1) permanently affixing its name, address, and nationally registered trade-mark or trade name to the furnace; (2) printing its name, address, and nationally registered

trade-mark or trade name on the instructions; and (3) by having its name and address listed in the Underwriters' Laboratories, Inc., List of Inspected Appliances.

## 2. GENERAL REQUIREMENTS

2.1 *Safety*.—The furnace shall meet the safety requirements of Underwriters' Laboratories, Inc. Presence of the label of Underwriters' Laboratories, Inc., on the furnace shall be accepted as evidence of compliance with these requirements.

2.2 *Durability*.—The design and construction of the furnace shall be such as to insure its durability in service, as outlined in section 3 of this standard.

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

2.4 *Testing and rating*.—Each model of furnace shall be tested and rated as outlined in this standard. Ratings shall be clearly set forth in the manufacturer's catalog or literature and on the nameplate, as outlined in sections 6 and 7 of this standard.

2.5 *Over-all efficiency*.—The furnace shall be capable of meeting the minimum efficiency requirements outlined in section 4 of this standard.

2.6 *Operating instructions*.—Each furnace shall be accompanied by a complete set of operating instructions covering essential points with respect to selection of fuel, operation, and upkeep. There also shall be included, either in these instructions or separately, installation instructions outlining the conditions of installation that must be fulfilled in order that successful operation of the unit may be obtained. These installation instructions may, at the option of the manufacturer, be in sufficient detail so that installation may be made from the instructions.

## 3. DESIGN AND CONSTRUCTION

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

3.2 *Oil burners* shall be of the vaporizing pot type constructed of steel of not less than No. 20 gage (see par. 3.5), or of other suitable material of equal resistance to heat, corrosion, and fuel leakage.

3.3 *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 of not less than No. 20 gage or of other suitable materials of equal resistance to heat and corrosion. The temperature of the metal shall not exceed 1,000° F under conditions of the rating test as specified in paragraphs 5.1 to 5.7 inclusive, unless constructed of heat-resisting material suitable for the temperature encountered. Combustion chambers shall be fitted with doors or equivalent means for permitting access to interior surfaces as required for cleaning and servicing.

3.4 The *flue collar* shall be constructed of a material conforming to that specified in paragraph 3.3 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.



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

Sheet-steel gage number	Thickness (in.)
20.....	0.0359±mill tolerance.
22.....	.0299±mill tolerance.
24.....	.0239±mill tolerance.
26.....	.0179±mill tolerance.
28.....	.0149±mill tolerance.

3.6 *Oil control and lighting*.—Excepting equipments designed for self-lighting and automatic control of oil flow, each furnace shall be so designed that the burner can be lighted and the oil flow regulated from the floor level.

3.7 *Finish*.—Metal surfaces of furnace casings, grilles, and accessories shall be adequately protected against rust or corrosion and against damage during manufacture, test, shipment, and reasonable conditions of storage.

3.8 *Furnace accessories and fittings*.

3.8.1 The *control valve* or other means for oil control shall be 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 fuel feed rate, which shall not exceed by more than 5 percent the rate used in establishing the maximum published rating.

3.8.2 The *constant-level valve*, if 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 furnace and supported independently of the piping. All parts shall be made of corrosion-resistant material.

3.8.2.1 The *nameplate rating* of the constant-level valve should not exceed the average fuel rate observed during the Underwriters' Safety Test.

3.8.2.2 A *strainer* shall be placed in the fuel supply line to the constant-level valve. It shall be readily removable for cleaning.

3.8.3 An *automatic draft regulator* which meets the approval requirements of Underwriters' Laboratories, Inc., shall be furnished with each floor furnace, with adequate instructions for its use.

3.8.4 *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.

#### 4. PERFORMANCE

4.1 The furnace shall be capable of meeting the following minimum performance requirements when tested as outlined in accordance with section 5 of this standard.

4.2 *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.

4.3 *Operation of burner and controls*.

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

4.3.2 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.

4.3.3 The furnace shall operate dependably and be capable of passing the 6 percent ICHAM (Institute of Cooking and Heating Appliance Manufacturers) smoke test at high-fire operation, and at low-fire setting if the furnace has a low-fire phase of operation.

4.3.4 Thermostatically controlled burners shall be provided with dependable ignition systems. Oil pilots, if used, shall operate without excessive smoke.

4.4 *Heating capacity.*—The furnace shall be capable of delivering the test heat output or maximum output rating (item 21 on data and report sheet, page 18) when tested as outlined in section 5 of this standard.

4.5 *Operating efficiency.*—The furnace shall be capable of operating with an over-all efficiency of not less than 70 percent when tested at high-fire operation under the draft recommended by the manufacturer, but in no case shall the draft be less than 0.02 in. nor more than 0.06 in., as outlined in paragraph 5.6.

## 5. LABORATORY TEST CODE

5.1 The purpose of this code is to provide a uniform standard method for ascertaining the test heat output (maximum output rating), in Btu per hour, of flue-connected oil-burning floor furnaces of the type covered by this standard when operating under approximately normal service conditions.

### 5.2 *Principle.*

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

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

$$C/A=E,$$

in which  $E$  is the efficiency.

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

### 5.3 *Furnace test set-up.*

5.3.1 The furnace shall be installed, in accordance with the instructions of the manufacturer, in a standard test platform (see fig. 1, A and B) in a room free from drafts, with flue connections, accessories, and draft regulator, as shown in figures 1 and 2 of this standard. If the furnace is equipped with integral draft regulator, it shall be sealed for the tests.

5.3.2 Provision shall be made for the draft recommended by the manufacturer for high-fire operation of the furnace, also for maintaining at least 70° F observed room temperature.

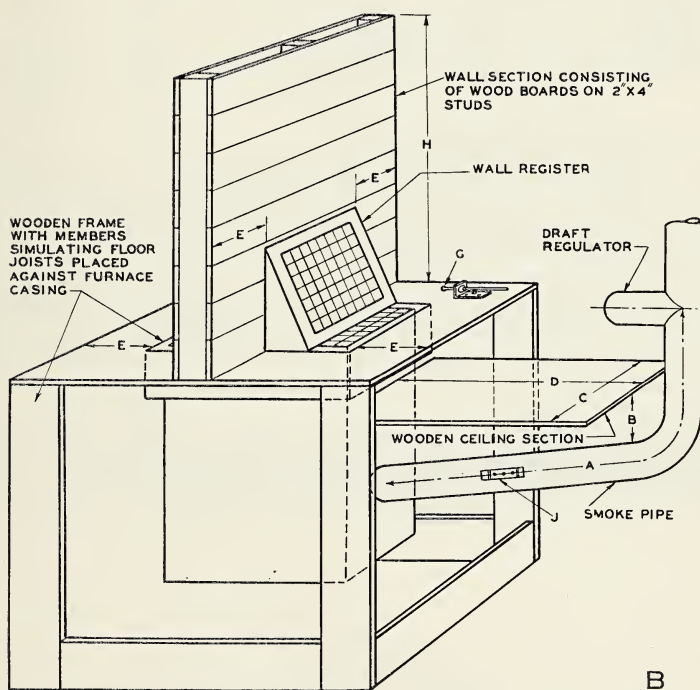
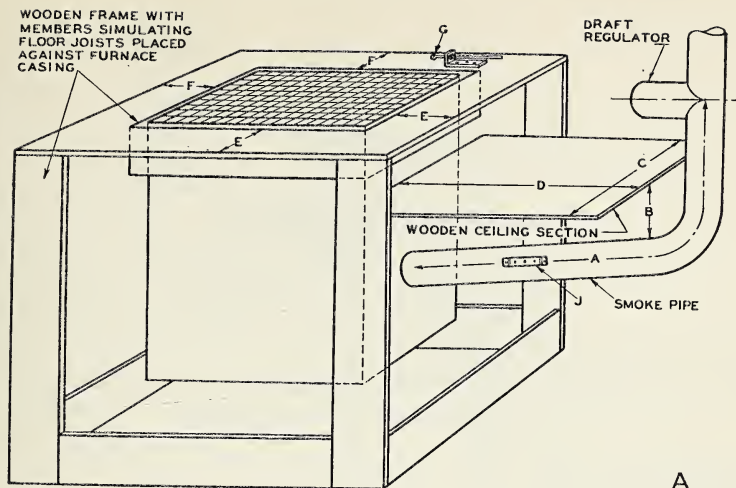


FIGURE 1. *Test set-ups for floor furnaces.*

A, Test set-up for floor-register type floor furnaces: A, Minimum of 6 ft of smoke pipe between furnace and draft regulator; B, 9 in.; C, smoke pipe diameter, plus 2 ft (minimum); D, 3½ ft minimum; E, 1 ft minimum; F, minimum spacing recommended by manufacturer; G, thermometer, placed 6 in. from outside of register adjacent to cold-air return and 1 in. above register level; J, support bracket (see fig. 3).

B, Test set-up for wall-register type floor furnaces: *A*, Minimum of 6 ft of smoke pipe between furnace and draft regulator; *B*, 9 in.; *C*, smoke-pipe diameter, plus 2 ft (minimum); *D*, 3½ ft minimum; *E*, 1 ft minimum; *G*, thermometer, placed 6 in. from outside of register adjacent to cold-air return and 1 in. above register level; *H*, 4 ft minimum; *J*, support bracket (see fig. 3).

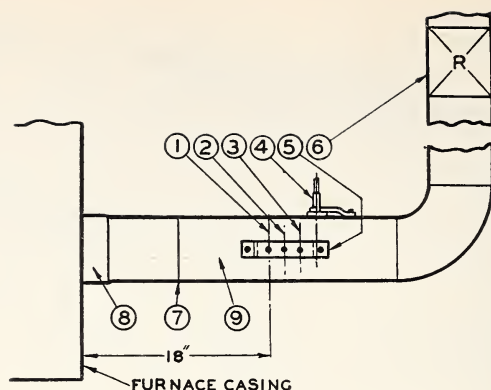


FIGURE 2. *Furnace flue connections.*

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

#### 5.4 *Instruments and their location.*

5.4.1 A calibrated laboratory-type thermometer for taking air temperature shall be located as shown in figure 1, A and B.

5.4.2 A draft gage with an accuracy of  $\pm 0.0025$  in. of water column shall be connected as shown in figure 3.

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

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

5.4.5 Gas-analysis apparatus, preferably of the Orsat type, capable of determining  $\text{CO}_2$ ,  $\text{O}_2$ , and  $\text{CO}$  values with an accuracy of  $\pm \frac{1}{2}$  of 1 percent or better.

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

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

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



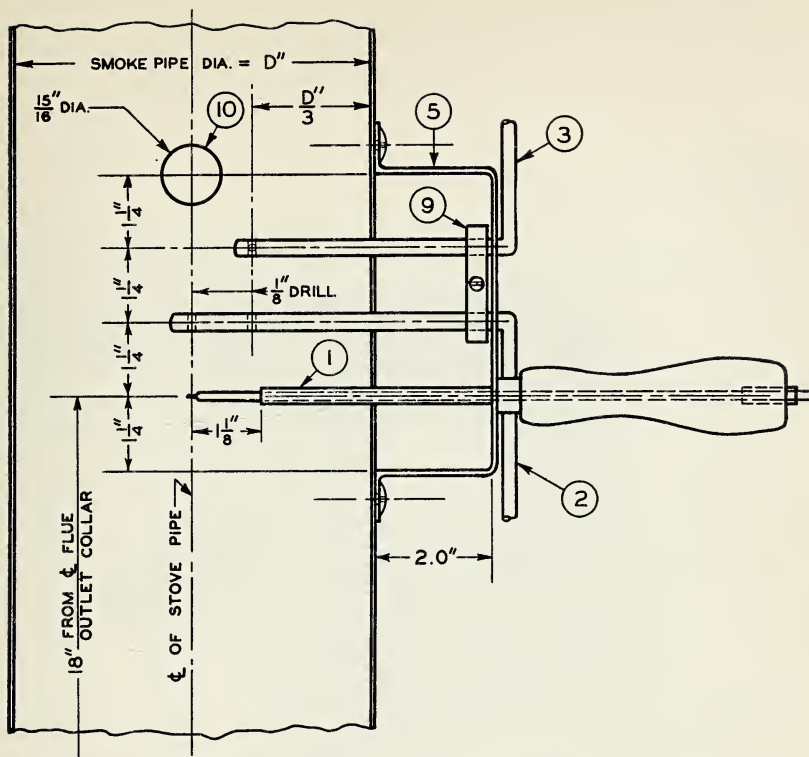


FIGURE 3. Gas-sampling and draft tubes, thermocouple, and support bracket assembly.

1, Thermocouple (see fig. 4); 2, 3, gas-sampling and draft tubes ( $\frac{1}{4}$  in. by approx. 0.032-in. wall, yellow brass or steel); 5, 9, support bracket and tube clamp ( $\frac{1}{2}$ -in. by 0.093-in. half-hard flat steel wire); 10, hole in smoke pipe for glass rod.

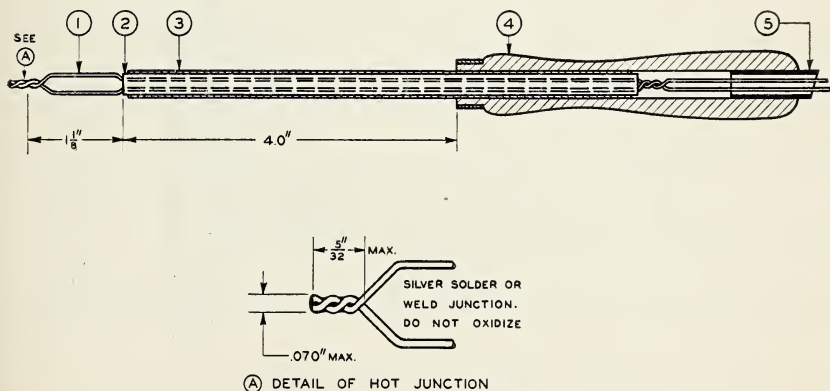


FIGURE 4. Standard thermocouple for flue-gas temperature measurement.

1, Ten-foot No. 20 B&S gage iron-constantan asbestos or woven glass covered thermocouple wires extending from hot junction to potentiometer or reference junction; 2, Leeds & Northrup standard 714B, or equal,  $\frac{1}{4}$ -in. O. D. 2-hole porcelain insulator, cut 6.0 in. long and ends beveled on two sides; 3,  $\frac{5}{16}$ -in. O. D. by 0.032-in. wall half-hard yellow-brass tubing cut  $5\frac{7}{8}$  in. long. Ream, if necessary, to fit over insulator, then crimp ends over beveled ends of insulator; 4, small wooden handle; 5, piece of rubber tubing,  $\frac{5}{16}$  by  $\frac{3}{32}$  by 2 in. long. Detail of hot junction: Silver solder or weld junction. Do not oxidize.

$\frac{5}{16} \times \frac{3}{16} \times \frac{1}{16}$  BRASS  
BUSHING ON  $\frac{3}{16}$  STOVE BOLT

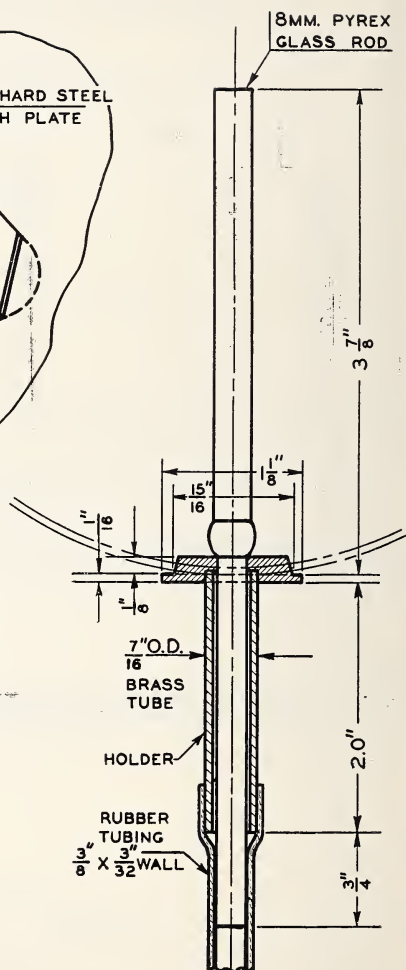
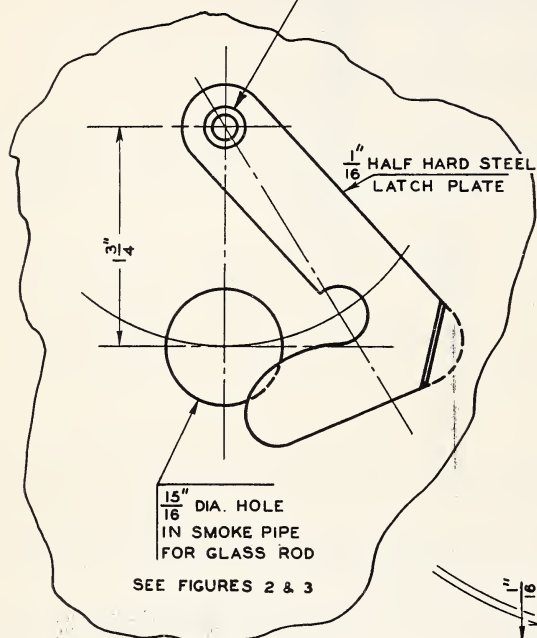


FIGURE 5. Glass rod, rod holder, and latch plate.

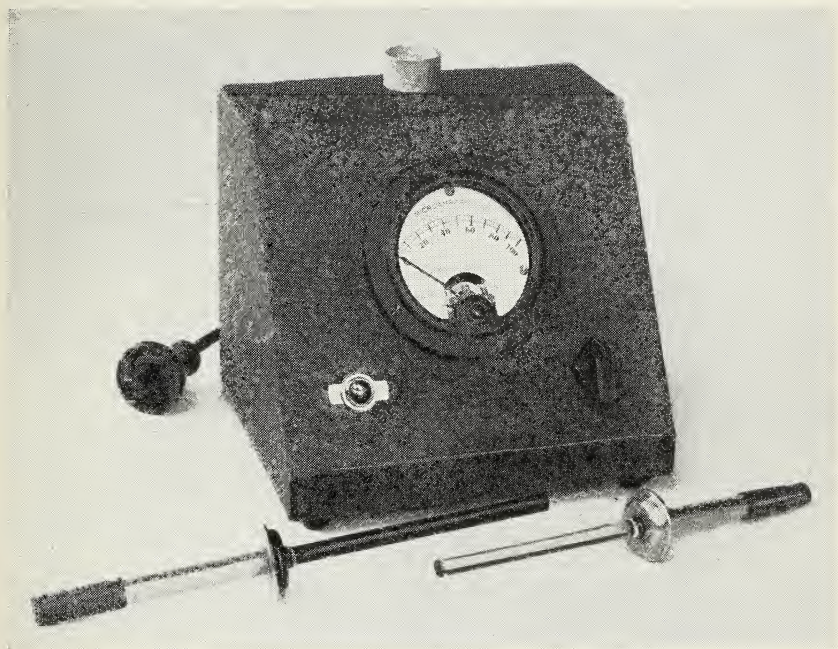


FIGURE 6. *ICHAM smoke meter.*

*Principle of operation.*—The smoke meter shown 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 line voltage fluctuates objectionably. The over-all size of the meter is approximately  $5\frac{1}{2}$  by  $5\frac{1}{2}$  by  $6\frac{1}{2}$  in. Weight, approximately 4 lb 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.

### 5.5 Fuel oil.

5.5.1 *Selection and heating value of fuel oil.*—The fuel used for furnace rating tests shall be not heavier than “Commercial Standard grade No. 1” (CS12–48 or latest revision thereof), and shall be assumed to have a gross heating value of 19,750 Btu/lb, except in the case of additional rating tests as provided for in paragraph 5.5.2.

5.5.2 *When grades of oil heavier than No. 1 are recommended by the manufacturer,* additional rating tests shall be conducted using these heavier fuels. The gross heating value of such fuel shall be assumed to be as given in the following table:

Gravity	Density	Calorific values <sup>1</sup>	
<i>Degrees API at 60° F</i>	<i>lb/gal</i>	<i>Btu/lb</i>	<i>Ptu/gal</i>
30	7.305	19,420	141,800
31	7.260	19,450	141,200
32	7.215	19,490	140,600
33	7.171	19,520	140,000
34	7.128	19,560	139,400
35	7.085	19,590	138,800
36	7.043	19,620	138,200
37	7.001	19,650	137,600
38	6.960	19,680	137,000
39	6.920	19,720	136,400
40	6.879	19,750	135,800
41	6.839	19,780	135,200
42	6.799	19,810	134,700
43	6.760	19,830	134,100
44	6.722	19,860	133,500
45	6.684	19,890	132,900

<sup>1</sup> The above figures are taken from Miscellaneous Publication M97 (table 6) of the National Bureau of Standards.

### 5.5.3 Correction to standard API gravity at 60° F.<sup>1</sup>

Observed temperature of oil	Observed gravity (degrees API)				
	30	33	36	39	42
° F					
50	30.7	33.7	36.7	39.8	42.8
60	30.0	33.0	36.0	39.0	42.0
70	29.3	32.3	35.3	38.2	41.2
80	28.7	31.6	34.6	37.5	40.4
90	28.0	30.9	33.8	36.7	39.6
100	27.4	30.3	33.2	36.1	38.9

<sup>1</sup> The above figures are from “National Standard Petroleum Oil Tables,” Circular C410 (March 4, 1936) of the National Bureau of Standards.

### 5.6 Test procedure.

5.6.1 The furnace shall be operated under rating-test conditions until equilibrium conditions of room temperature, fuel flow rate, and flue-gas temperature have been established, followed by a rating test of at least 1 hour's duration. If the floor furnace is equipped with a limit control or other device for reducing the oil input when a pre-determined grille air temperature is attained, such limit control or device shall be rendered inoperative during this test; furthermore, the fuel input shall not exceed the rate determined in accordance with the tests described in paragraphs 5.6.2 and 5.6.3.

5.6.2 The temperature of the limit control sensing element at



which the limit control functions shall be determined by means of a thermocouple attached to the sensing element at its midpoint. If necessary, regulate fuel input or restrict warm-air outlet to obtain that value. (If it is found that the fuel rate cannot be increased sufficiently to operate the limit control, then restrict the warm-air outlet.)

5.6.3 Make the limit control inoperative but allow the sensing element to remain in its normal position. Operate the furnace at rated draft and at rated high-fire input. The temperatures of the sensing element and of the outlet air shall not exceed the values indicated below:

$$Tb2 \leq Tb1 + (Tr - 60).$$

$Tb1$  = Temperature, °F, of limit control sensing element required for limit control to function.

$Tb2$  = Temperature, °F, of limit control sensing element obtained during test.

$Tr$  = Room temperature, °F, measured by thermometer placed 6 in. from outside of register adjacent to cold-air return and 1 in. above register level.

60 = Assumed maximum room temperature at floor level under conditions requiring continuous operation at high fire.

5.6.4 *Fluctuation of draft.*—The maximum fluctuation in draft from the recorded average during the tests shall not exceed  $\pm 0.005$  in. of water column.

5.6.5 *High fire—draft.*—The average draft during the high-fire test shall be that recommended by the manufacturer, but in no case less than 0.02 in. nor more than 0.06 in. of water column.

5.6.6 *High fire—fuel feed rate.*—The fuel feed rate shall be slowly increased to the desired rate for high-fire operation, but in no case shall it exceed the rate at which the furnace will pass the smoke test and the unburned-fuel-gases test, nor shall it exceed the average rate secured during the Underwriters' Safety Test.<sup>1</sup> (Also see par. 3.3, covering temperature of metal surfaces.)

The fuel-feed rate shall then be maintained constant throughout the test. This condition is regarded as met if four consecutive fuel readings taken at approximately equal intervals throughout the test period do not deviate by more than  $\pm 2\frac{1}{2}$  percent from the average of the four readings.

5.6.7 *High fire—start of smoke test.*—For high-fire operation the smoke test shall begin after equilibrium conditions have been established.

5.6.8 *Low fire—draft.*—When operated at low-fire setting, (1) the fire shall not snuff out at the draft recommended by the manufacturer for high-fire operation but not to exceed 0.06 in. of water column; and (2) the smoke test shall be run at a draft of 0.02 in. of water column. The draft regulator shall be free to operate in the low-fire test for snuff out.

5.6.9 *Low fire—fuel feed rate.*—The fuel feed rate for low-fire operation shall be that recommended by the manufacturers, but not in excess of 25 percent of the high-fire-test rate.

<sup>1</sup> In the Underwriters' Safety Test the furnace is operated with the valve at its maximum high-fire valve setting. The average fuel-feed rate may be obtained from Underwriters' Laboratories, Inc.

5.6.10 *Low fire—start of smoke test.*—For low-fire operation the smoke test shall begin after equilibrium conditions have been established.

5.6.11 *Smoke test.*—The amount of smoke in the flue gas at each rate of fire required for tests 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.

5.6.12 Unburned fuel gases shall not occur in the flue products in sufficient quantities

- (a) to be measurable by recognized methods of gas analysis as unburned fuel gas or vapors in excess of 0.2 percent by volume; or
- (b) to result in failure of the observed  $\text{CO}_2$  and  $\text{O}_2$  values to check at the ultimate by more than 0.3 percent of  $\text{O}_2$  on the check chart, figure 7 of this standard.

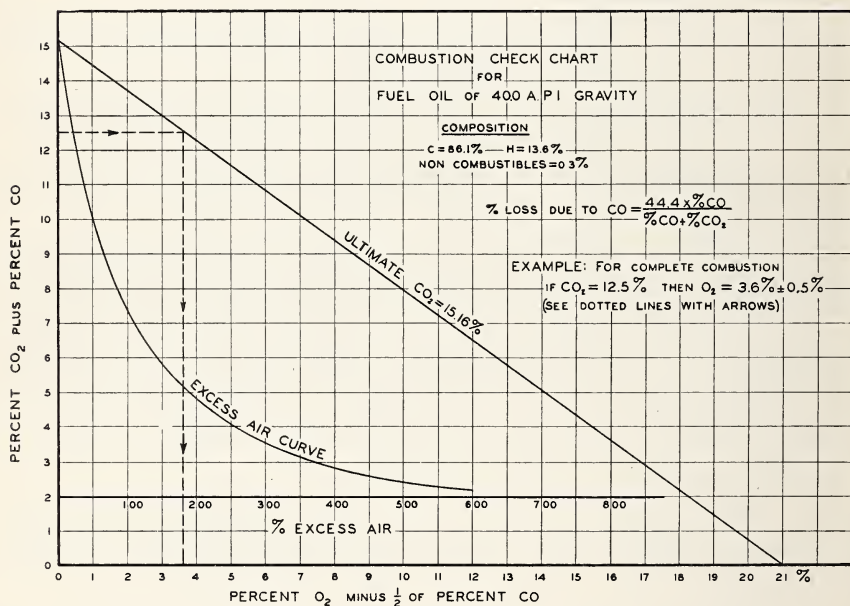


FIGURE 7. Combustion check chart.

5.6.13 *Stack temperature and minimum  $\text{CO}_2$  for high-fire operation.*—The observed flue-gas temperature at maximum-output rating shall not be less than  $300^\circ \text{F}$  nor more than  $780^\circ \text{F}$  above room temperature, and the percentage of  $\text{CO}_2$  in the stack gases shall be not less than 10. It will be noted in figure 8 that compliance with the performance requirements for flue-gas temperature and percentage of  $\text{CO}_2$  will result in an efficiency of more than 70 percent.

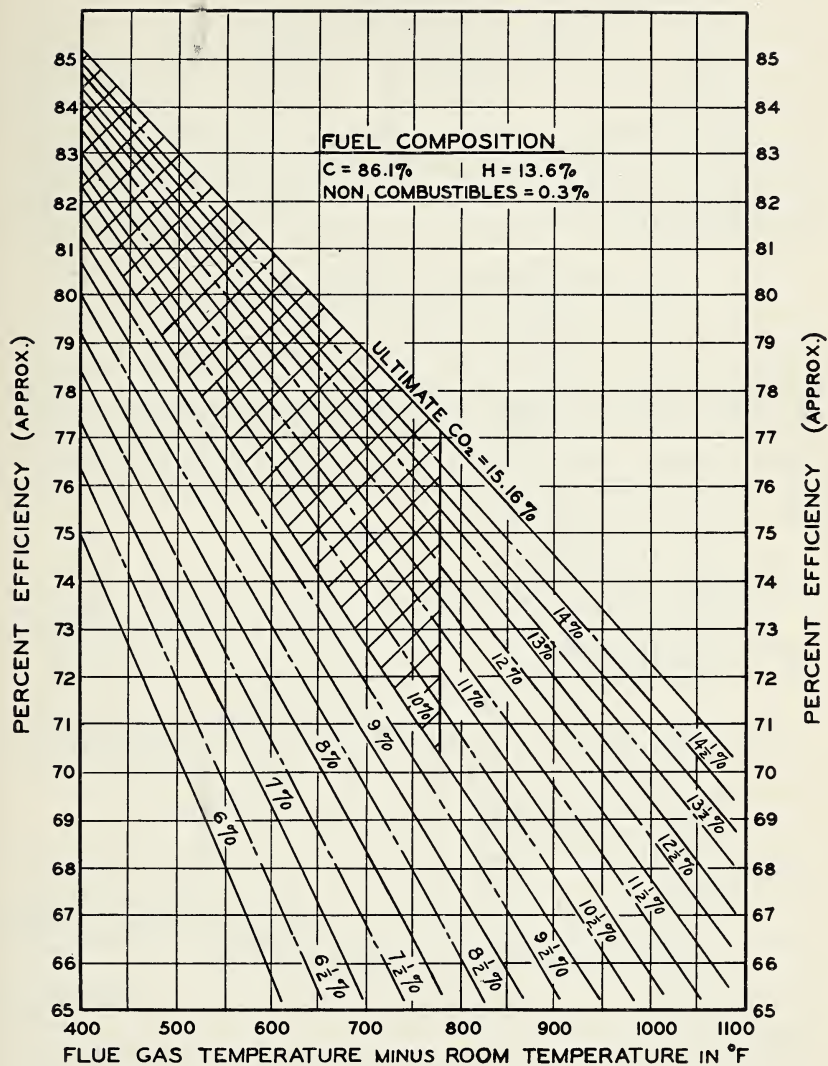


FIGURE 8. Enlarged efficiency chart for furnaces equipped with vaporizing pot-type burners.

NOTE.—Cross-hatched portion shows area of acceptable performance for high-fire operation (par. 5.6.13).

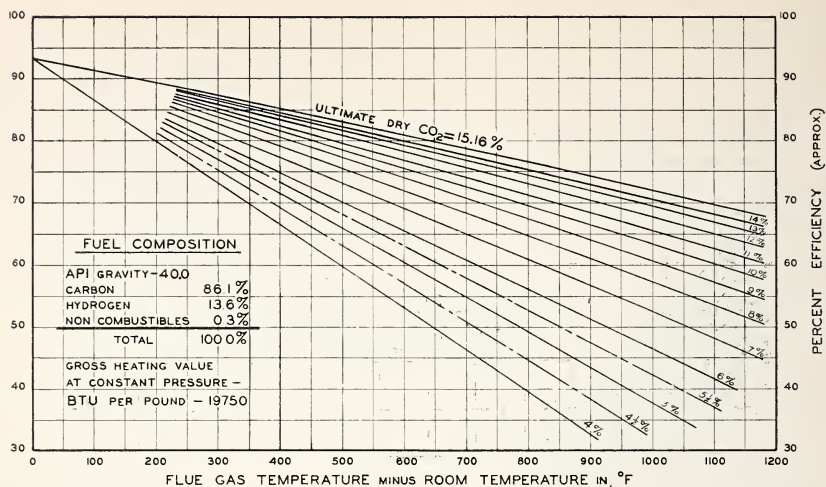


FIGURE 9. Efficiency chart for furnaces equipped with vaporizing pot-type burners.

5.7 *Observations during test.*—After equilibrium conditions have been established, the actual rating test shall be started and continued for at least 1 hour. The following observations shall be made and recorded at the start of the test and at three approximately equal intervals throughout the test:

- Draft in flue pipe.
- Room temperature.
- Rate of flow of oil to heater.
- Flue-gas temperature (read immediately before taking flue-gas sample).
- Percentage of  $\text{CO}_2$ ,  $\text{O}_2$  and CO in flue gas.

NOTE.—Flue gases which cannot be absorbed in the  $\text{CO}_2$  and  $\text{O}_2$  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.

- Smoke meter reading.
- The barometric pressure shall be read at least once during the test.
- The absence of visible red spots on the combustion chamber will be accepted as evidence of compliance with the temperature requirements of paragraph 3.3.

5.8 *Calculation of furnace efficiencies, ratings, etc.*—The calculation of results on all combustion data shall be based on figures 7, 8, and 9 (on which allowances have been made for heat losses in the flue gas):

5.9 *Corrections for altitude.*—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 furnace rating purposes exceed the average rate secured during the Underwriters' Safety Test.)



### 5.9.1 Altitude-correction factors.

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

<sup>1</sup> The effective furnace output rating for regions higher than sea level may be estimated by dividing the rated hourly heat output at sea level by the conversion factor corresponding to the higher altitude indicated above. If provisions are made for assuring correct air supply for high altitude work in accordance with the above table, this correction in output is not required. Such units as are intended for high altitude work shall be plainly marked, adjacent to the manufacturer's rating nameplate, with the altitude range for which they are designed.

## 6. PUBLICATION OF FURNACE RATINGS

6.1 No published, listed, or labeled rating shall be based on efficiencies of less than 70 percent, nor on fuel oil heavier than the heaviest grade for which the furnace is approved by Underwriters' Laboratories. All such ratings shall be determined as outlined in section 5 and shall be expressed thus:

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

## 7. INFORMATIVE LABELING

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

Model No.....Commercial Standard 113-51.

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

(Ratings with any heavier oils recommended.)

Manufacturer's name and address.....

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

## 8. WARRANTY AND INSTALLER'S CERTIFICATE

8.1 *Warranty*.—The manufacturer's guarantee or warranty shall accompany each furnace or be published in the manufacturer's printed literature, or both.

8.2 *Installer's certificate*.—The following certificate, supplied by the manufacturer, shall be placed with each individual installation by the installer:

This ..... floor furnace has  
(Brand or company name)  
been installed in strict compliance with the requirements of Commercial Standard CS113-51, as developed by the industry under the procedure of the Commodity Standards Division, and issued by the U. S. Department of Commerce.

-----  
(Date)

-----  
(Signature of installer)

# OIL-BURNING FLOOR FURNACE RATING TEST—DATA AND REPORT SHEET

Manufacturer's Test No. \_\_\_\_\_

Floor furnace \_\_\_\_\_

Make \_\_\_\_\_ Model, type, or No. \_\_\_\_\_ Number and size of burners \_\_\_\_\_

Fuel used for test \_\_\_\_\_

CS12-48 Grade \_\_\_\_\_ API gravity at 60° F \_\_\_\_\_

Date of test \_\_\_\_\_ Tested by \_\_\_\_\_

Test data		Readings at equal intervals				Average
1. Draft	(in. water)					
2. Room temperature	(°F)					
3. Smoke-meter readings	(%)					
4. Fuel-temperature readings	(°F)					
5. Time intervals used for readings	(min)	20	20	20	20	
6. Fuel-input readings	(lb)					
7. Fuel-oil input rate	(lb/hr, avg)					
8. Barometric pressure	(in. mercury)					
9. Factor to correct fuel-oil input to sea level (see par. 5.9.1)						
10. Gross heating value of oil	(Btu/lb)					
11. Fuel-oil input corrected to sea level or to average rate secured during Underwriters' Safety Test, whichever is less	(lb/hr, avg)					
12. Gross heat input corrected to sea level or to average rate secured during Underwriters' Safety Test, whichever is less	(Btu/hr)					
13. Flue-gas temperature	(°F)					
14. Flue-gas temperature rise above room temperature	(°F)					
15. CO <sub>2</sub> in dry flue gas	(%)					
16. O <sub>2</sub> in dry flue gas	(%)					
17. Unburned gases expressed as CO	(%)					
18. Efficiency for complete combustion (from chart, fig. 8 or 9)	(%)					

## READINGS AT EQUAL INTERVALS

19. Heat losses due to incomplete combustion (from formula fig. 7)	(%)	Average
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)		
22. Fuel-input rate for low-fire smoke test (par. 5.6.9)	(lb)	
23. Low-fire smoke-meter readings at 20-min intervals	(%)	
24. Low-fire snuff-out test at 0.06 in. draft		

We hereby certify that the above is a true and accurate copy of the data obtained when the above furnace was tested in strict accordance with section 5 (Laboratory Test Code) of Commercial Standard 113-51, Oil-Burning Floor Furnaces Equipped With Vaporizing Pot-Type Burners.

For \_\_\_\_\_  
(Name of testing agency)

Address \_\_\_\_\_

By \_\_\_\_\_

(Date)

## 9. GENERAL INSTALLATION REQUIREMENTS

### 9.1 SIZING.

9.1.1 *Heat loss.*—The heat loss may be based on a formula established by the American Society of Heating & Ventilating Engineers. Base calculations for residences on 70° F inside all the rooms to be heated when outside temperature is at design temperature. For other types of buildings the inside design temperatures shall be as recommended by the ASHVE Guide. Simplified formulas are generally used by oil floor furnace manufacturers, and the use of any one of these formulas is permissible provided the result is not less than that obtained from the ASHVE current method.

9.1.2 *Size.*—After determining the correct heat loss, a pick-up factor of not less than 10 percent shall be added. The minimum size furnace or furnaces can then be selected. When selecting the proper size of furnace, the output rating of a furnace or the combined output ratings of the furnaces shall be not less than the computed maximum hourly heat loss, including the pick-up factor.

### 9.2 PLACEMENT.

9.2.1 *General.*—After selecting the proper size of furnace or furnaces, the next important consideration is the placement of the furnace or furnaces. The following are requirements that will serve in properly placing the furnace or furnaces to serve one-story buildings.

9.2.2 *Distance.*—To meet varying conditions of climate and usage, it is recommended that the furnace be so located that for residences the maximum distance, center to center, between the furnace and any room to be heated by it, measured through intervening openings, should be as short as possible, preferably not to exceed 15 ft.

9.2.3 *Doorways.*—The furnace or furnaces shall be so placed that any single path of air circulating to and from the furnace does not pass through more than one doorway and one arch.

9.2.4 *Walls and corners.*—With the exception of wall-register models, a floor furnace shall not be placed closer than 6 in. to the nearest wall, and wall-register models shall not be placed closer than 6 in. from a corner.

9.2.5 *Drapes.*—The furnace or furnaces shall be so placed that a door drape or similar object cannot be nearer than 12 in. to any portion of the register of the furnace.

9.2.6 *Bathroom.*—Any dual-wall register furnace installed between bathroom and adjoining room shall not recirculate air from the bathroom.

9.2.7 *Exposure.*—In case there is a choice of locations, the furnace shall be nearer the sides of the house exposed to the prevailing winter winds.

9.2.8 *Central location.*—Generally speaking, the more central the location the better, favoring slightly the sides exposed to the prevailing winter winds.

9.2.9 *Floor levels.*—The floor immediately surrounding the floor furnace shall be reasonably level. When heating two rooms having different floor levels, the furnace shall be installed in the room having the lower floor. It is also well to locate the furnace near the steps, if possible. Where a dual-wall register furnace is installed between rooms having different floor levels, the furnace shall be installed at



the lower floor level with an approved vertical extension to the upper floor level.

9.2.10 *Bracing*.—The floor around the furnace shall be braced and headed with framework of material not lighter than the joists. The inside dimensions of the framework shall be approximately  $\frac{1}{2}$  in. longer and wider than the furnace to be installed.

9.2.11 *Combustion air*.—Fixed ventilation shall be provided to any confined space which encloses the floor furnace, if combustion air is taken from this space, by means of a duct or grille arranged to supply air from a permanently ventilated attic or under-floor space; the duct or grille to be screened and to have a free area at least twice the free area of the vent collar of the floor furnace, and to be installed in such a manner as to insure proper combustion.

9.2.12 *Seepage pan*.—Whenever the excavation for clearance from the ground exceeds 12 in., or water seepage is apparent under the house, a watertight copper pan, concrete pit, or watertight barrier of other suitable material shall be used. A copper pan shall be made of not less than 16-oz. per sq. ft. sheet copper. The pan shall be anchored in place, and the walls shall extend at least 4 in. above the ground level, with a 12-in. clearance from furnace casing on all sides, except the control side, which shall have an 18-in. clearance.

9.2.13 *Access*.—Adequate provision shall be made for easy access to the furnace under the house by means of an opening in the foundation wall, or through a trap door of at least 18 by 24 in., located at some convenient point in the house, and by a clear and unobstructed passageway to the furnace at least 18 in. high by 24 in. wide.

9.2.14 *Appliance alterations*.—All floor furnaces, including those having single or dual-wall register outlets, shall be installed as approved under this standard without alterations, extensions, or changes of any kind in the furnace.

### 9.3 CHIMNEYS, FLUES AND BREECHINGS.

9.3.1 *General*.—The combustion gases from each floor furnace shall be properly discharged to the outer air. Paragraphs 9.3.2 to 9.3.7 specify requirements covering the proper discharge of combustion gases from a floor furnace to the outer air. In the discharge of combustion gases sufficient draft shall be created to develop the maximum output rating of the floor furnace.

9.3.2 *Draft regulator*.—A draft regulator which meets the approval requirements of Underwriters' Laboratories, Inc., shall be made a part of the breeching connecting the floor furnace and the vertical chimney or flue.

9.3.3 *Damper*.—A damper or similar device shall never be installed in the breeching.

9.3.4 *Chimney or flue construction*.—In case a prefabricated chimney or flue (not a conventional masonry chimney) is used, it shall be listed by the Underwriters' Laboratories, Inc., for use with oil as the fuel, and the installation shall comply with the conditions of the listing. When a conventional masonry chimney is used it shall be lined with a terra cotta or comparable flue lining. In addition, the construction of the chimneys or flues shall comply with applicable building codes. If the floor furnace is not equipped with a mechanical-draft burner, it is recommended that it be connected to an individual flue in the vertical chimney or flue.



9.3.5 *Breeching*.—The breeching connecting the floor furnace and the vertical chimney or flue shall be made as short as practicable. The length of the breeching shall not exceed 50 percent of the vertical height of the portion of the chimney or flue above the breeching inlet when the floor furnace contains a natural-draft burner, or 75 percent when the floor furnace contains a mechanical-draft burner, and shall be limited in either case to a maximum length of 10 ft. The breeching shall have an upward slope from the floor furnace of not less than  $\frac{1}{4}$  in. per foot of length and shall not project into the free area of the vertical chimney or flue.

9.3.6 *Cross-over or offset*.—It is recommended that cross-overs or offsets not be used in the vertical chimney or flue. In no case shall the angle of a cross-over or offset be less than  $60^\circ$  to the horizontal.

9.3.7 *Holes*.—Both the breeching and the vertical chimney or flue shall be clear and free from any stoppage, and, other than for the draft regulator opening, shall be free from any holes that would restrict draft.

## 10. EFFECTIVE DATE

10.1 Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this commercial standard was issued by the United States Department of Commerce, effective from February 1, 1951.

EDWIN W. ELY,  
*Chief, Commodity Standards Division.*

## HISTORY OF PROJECT

*First edition*.—Pursuant to a request dated February 19, 1942, from the Standards Section, Consumer Division, Office of Price Administration, there was developed by the interested manufacturers, in cooperation with the National Bureau of Standards, a proposed commercial standard for oil-burning floor furnaces. This was adjusted at a manufacturers' conference in Chicago and again revised after circulation to leading distributors, testing laboratories, Government agencies, and other users.

On July 6, 1943, the recommended commercial standard was circulated to the entire trade for written acceptance. Following acceptance by a satisfactory majority, and in the absence of active opposition, an announcement was issued on October 20, 1943, that the standard, designated CS113-44, would become effective for new production from February 17, 1944.

*First revision*.—On July 3, 1946, at the instance of one of the manufacturers, a proposed revision of CS113-44 was circulated to all manufacturers of record for advance comment. After adjustment, the revised draft was referred to the standing committee on January 16, 1948. Upon recommendation of the majority, it was submitted to the industry for written acceptance on June 1, 1950.

Following acceptance by a satisfactory majority, and in the absence of active, valid opposition, an announcement was issued on January 2, 1951, that the revised standard had been accepted as the recorded

voluntary standard of the trade, effective for new production from February 1, 1951.

Project Manager: H. A. Bonnet, Commodity Standards Division, Office of Industry and Commerce.

Technical Adviser: P. R. Achenbach, Building Technology Division, National Bureau of Standards.

### 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 Commodity Standards Division, Office of Industry and Commerce, U. S. Department of Commerce, which acts as secretary for the committee.

STANLEY PERRY (chairman), Breese Burners, Inc., 341 East Ohio Street, Chicago 11, Ill.

J. C. HEMINGWAY, H. C. Little Burner Co., Inc., San Rafael, Calif.

GEO. M. SCHUEDER, Evanoil Division, Evans Products Co., Detroit 27, Mich.

A. D. OLDS, The Coleman Co., Inc., Wichita 1, Kans.

SID J. HEIMAN, International Oil Burner Co., Inc., 3800 Park Avenue, St. Louis 10, Mo.

SAM ZUERCHER, Yungmeyer Hardware Co., 518 East Douglas Avenue, Wichita, Kans. (representing Western Retail Implement & Hardware Association).

J. W. ESSOCK, Dept. 642, Sears, Roebuck & Co., Homan & Arthington Streets, Chicago 7, Ill.

T. W. McALLISTER, Southern Hardware Jobbers Association, 1020 Grant Building, Atlanta 3, Ga.

PAUL R. CUNLIFFE, Chicago Laboratories, Montgomery Ward & Co., Chicago 7, Ill.

DON SUTHERLAND, T. D. Farrington & Co., 95 Connecticut Street, Seattle 4, Wash.

MILLARD W. MERRILL, United States Metals Refining Co., Carteret, N. J. (representing National Association of Purchasing Agents).

MRS. CHARLOTTE PAYNE, National Council of Women, 501 Madison Avenue, New York 22, N. Y.

LEONARD ASHEIM, 211 State Street, Bridgeport, Conn. (representing the American Institute of Architects).

R. K. THULMAN, Housing & Home Finance Agency, Washington 25, D. C.

J. H. WITTE, Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago 11, Ill.

WILLIAM T. MILLER, Heating & Ventilating Department, Purdue University, Lafayette, Ind.

P. R. ACHENBACH, 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,  
Office of Industry and Commerce,  
United States Department of Commerce,  
Washington 25, D. C.

Gentlemen:

We believe that the Commercial Standard 113-51 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

Production <sup>1</sup>      Distribution <sup>1</sup>      Purchase <sup>1</sup>      Testing <sup>1</sup>  
of oil-burning floor furnaces equipped with vaporizing pot-type burners.

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 \_\_\_\_\_

<sup>1</sup> Underscore which one. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

## TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard, where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of 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 oil-burning floor furnaces equipped with vaporizing pot-type burners. In accepting the standard they reserved the right to depart from it as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

### ASSOCIATIONS

(General Support)

American Association of Engineers, Chicago, Ill.  
American Specification Institute, Chicago, Ill.  
Central Supply Association, Chicago, Ill.  
Fuel Oil Distributors Association of New Jersey,  
Newark, N. J.

### FIRMS AND OTHER INTERESTS

Aiken, Hector H., Tucson, Ariz.  
American Hardware Supply Co., Pittsburgh, Pa.  
Borg-Warner Corp., Ingersoll Steel Division, Kalamazoo, Mich.  
Borg-Warner Corp., Norge Heat Division, Detroit, Mich.  
Breese Burners, Inc., Santa Fe, N. Mex.  
Buffalo Testing Laboratories, Inc., Buffalo, N. Y.  
Carroll, Bechtel and Langtry Division of Commercial Testing & Engineering Co., Chicago, Ill.  
Central of Georgia Railway Co., Savannah, Ga.  
Century Engineering Corp., Cedar Rapids, Iowa.  
Chicago Little Burner Co., Chicago, Ill.  
Cincinnati, City of, Cincinnati, Ohio.  
Clarkson College of Technology, Potsdam, N. Y.  
Cleveland Steel Products Corp., Cleveland, Ohio.  
Coleman Co., Inc., The, Wichita, Kans.  
Colladay, Frank, Hardware Co., The, Hutchinson, Kans.  
Consumers Petroleum Co., Chicago, Ill.  
Conwell, E. L., & Co., Philadelphia, Pa.  
Corriveaux, F., Home & Industrial Service, Schenectady, N. Y.  
Demmler Bros. Co., Pittsburgh, Pa.  
Detroit Lubricator Co., Detroit, Mich.  
Detroit Testing Laboratory, Inc., The, Detroit, Mich.  
Duo-Therm Division of Motor Wheel Corp., Lansing, Mich. (General support.)  
Electrical Testing Laboratories, Inc., New York, N. Y.  
Fletcher-Thompson, Inc., Bridgeport, Conn.  
Herlan-Patterson, Inc., Buffalo, N. Y.  
Holland Furnace Co., Holland, Mich.  
Hunt, Robert W., Co., Chicago, Ill.  
International Oil Burner Co., St. Louis, Mo.

Kleer Kleen Manufacturing Co., Oakland, Calif.  
Kresky Manufacturing Co., Inc., Petaluma, Calif.  
Little, H. C., Burner Co., Inc., San Rafael, Calif.  
Lonergan Manufacturing Co., Albion, Mich.  
Marshall Wells Co., Spokane, Wash.  
McMahill Heating Service, Omaha, Nebr.  
McPherson Furnace & Equipment Co., Seattle, Wash.  
New York Testing Laboratories, Inc., New York, N. Y.  
O'Hair, P. E., & Co., San Francisco, Calif.  
Patzig Testing Laboratories, Des Moines, Iowa.  
Perfect Air Conditioning Co., Washington, D. C.  
Rearick Bros. Heating & Supply Co., Gary, Ind.  
Richmond Hardware Co., Richmond, Va.  
Rightway Appliance Co., Lodi, Wis.  
Sawyer Heating Co., Detroit, Mich.  
Schulz, John W., Ramsey, N. J.  
Sears, Roebuck & Co., Chicago, Ill.  
Strevell Paterson Hardware Co., Salt Lake City, Utah.  
Sutherland, Don, Seattle, Wash.  
Swarthmore Heating Service, Swarthmore, Pa.  
Twining Laboratories, The, Fresno, Calif.  
Underwriters' Laboratories, Inc., Chicago, Ill.  
United States Testing Co., Inc., Hoboken, N. J.  
Walker Manufacturing & Sales Corp., St. Joseph, Mo.  
Warren, Little & Lund, Spokane, Wash.  
Western Furnaces, Inc., Tacoma, Wash.  
Wiley Electric Shop, Milford, Ohio.  
Yungmeyer Hardware Co., Wichita, Kans.

### FEDERAL GOVERNMENT AGENCIES

Agriculture, U. S. Department of, Division of Purchase, Sales, and Traffic, Washington, D. C.  
Agriculture, U. S. Department of, Agricultural Research Center, Beltsville, Md.  
Army, Department of the, Standards Branch, Washington, D. C.  
Federal Housing Administration, Underwriting Division, Washington, D. C.  
General Services Administration, Public Buildings Service, Washington, D. C.  
Housing and Home Finance Agency, Office of the Administrator, Washington, D. C.

## COMMERCIAL STANDARDS

### CS No.

- 0-40. Commercial standards and their value to business.
- 1-42. Commercial thermometers.
- 2-30. Mopsticks.
- 3-40. Stoddard solvent.
- 4-29. Staple porcelain (all-clay) plumbing fixtures.
- 5-46. Pipe nipples; brass, copper, steel and wrought-iron.
- 6-31. Wrought-iron pipe nipples. Superseded by CS5-46.
- 7-29. Standard weight malleable iron or steel screwed unions.
- 8-41. Gage blanks.
- 9-33. Builders' template hardware.
- 10-29. Brass pipe nipples. Superseded by CS5-46.
- 11-41. Moisture regains of cotton yarns.
- 12-48. Fuel oils.
- 13-44. Dress patterns.
- 14-51. Boys' sport and dress shirt (woven fabrics) size measurements.
- 15-46. Men's pajama sizes (made from woven fabrics).
- 16-29. Wallpaper.
- 17-47. Diamond core drill fittings.
- 18-29. Hickory golf shafts.
- 19-32. Foundry patterns of wood.
- 20-49. Vitreous china plumbing fixtures.
- 21-39. Interchangeable ground-glass joints, stopcocks, and stoppers.
- 22-40. Builders' hardware (nontemplate).
- 23-30. Feldspar.
- 24-43. Screw threads and tap-drill sizes.
- 25-30. Special screw threads. Superseded by CS24-43.
- 26-30. Aromatic red cedar closet lining.
- 27-36. Mirrors.
- 28-46. Cotton fabric tents, tarpaulins and covers.
- 29-31. Staple seats for water-closet bowls.
- 30-31. (Withdrawn).
- 31-38. Wood shingles.
- 32-31. Cotton cloth for rubber and pyroxylin coating.
- 33-43. Knit underwear (exclusive of rayon).
- 34-31. Bag, case, and strap leather.
- 35-49. Hardwood plywood.
- 36-33. Fourdriner wire cloth.
- 37-31. Steel bone plates and screws.
- 38-32. Hospital rubber sheeting.
- 39-37. (Withdrawn).
- 40-32. Surgeons' rubber gloves.
- 41-32. Surgeons' latex gloves.
- 42-49. Structural fiber insulating board.
- 43-32. Grading of sulphonated oils.
- 44-32. Apple wraps.
- 45-48. Douglas fir plywood.
- 46-49. Hosiery lengths and sizes.
- 47-34. Marking of gold-filled and rolled-gold-plate articles other than watchcases.
- 48-40. Domestic burners for Pennsylvania anthracite (underfired type).
- 49-34. Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.
- 50-34. Binders board for bookbinding and other purposes.
- 51-35. Marking articles made of silver in combination with gold.
- 52-35. Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).
- 53-35. Colors and finishes for cast stone.
- 54-35. Mattresses for hospitals.
- 55-35. Mattresses for institutions.
- 56-49. Oak flooring.
- 57-40. Book cloths, buckrams, and impregnated fabrics for bookbinding purposes except library bindings.
- 58-36. Woven elastic fabrics for use in overalls (overall elastic webbing).
- 59-44. Textiles—testing and reporting.

### CS No.

- 60-48. 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.
- 65-43. Methods of analysis and of reporting fiber composition of textile products.
- 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) (published with CS71-41).
- 71-41. Phenolic disinfectant (soluble type) (published with CS70-41).
- 72-38. Household insecticide (liquid spray type).
- 73-48. Old growth Douglas fir, Sitka spruce, and Western hemlock standard stock doors.
- 74-39. Solid hardwood wall paneling.
- 75-42. Automatic mechanical draft oil burners designed for domestic installations.
- 76-39. Hardwood interior trim and molding.
- 77-48. Enameled cast-iron plumbing fixtures.
- 78-40. Ground-and-polished lenses for sun glasses (published with CS70-40).
- 79-40. Blown, drawn, and dropped lenses for sun glasses (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 stoplamps for vehicles (after market).
- 87-41. Red electric warning lanterns.
- 88-41. Liquid burning flares.
- 89-40. Hardwood stair treads and risers.
- 90-49. Power cranes and shovels.
- 91-41. Factory-fitted Douglas fir entrance doors.
- 92-41. Cedar, cypress and redwood tank stock lumber.
- 93-50. Portable electric drills (exclusive of high frequency).
- 94-41. Calking lead.
- 95-41. Lead pipe.
- 96-41. Lead traps and bends.
- 97-42. Electric supplementary driving and passing lamps for vehicles (after market).
- 98-42. Artists' oil paints.
- 99-42. Gas floor furnaces—gravity circulating type.
- 100-47. Porcelain-enameled steel utensils.
- 101-43. Flue-connected oil-burning space heaters equipped with vaporizing pot-type burners. (Reserved for "Diesel and fuel-oil engines.")
- 103-48. Rayon jacquard velour (with or without other decorative yarn).
- 104-49. Warm-air furnaces equipped with vaporizing type oil burners.
- 105-48. Mineral wool insulation for low temperatures.
- 106-44. Boys' pajama sizes (woven fabrics).
- 107-45. (Withdrawn).
- 108-43. Treading automobile and truck tires.
- 109-44. Solid-fuel-burning forced-air furnaces.
- 110-43. Tire repairs—vulcanized (passenger, truck and bus tires).
- 111-43. Earthenware (vitreous-glazed) plumbing fixtures.
- 112-43. Homogeneous fiber wallboard.

## CS No.

- 113-51. Oil-burning floor furnaces equipped with vaporizing pot-type burners.
- 114-43. Hospital sheeting for mattress protection.
- 115-44. Porcelain-enameled tanks for domestic use.
- 116-44. Bituminized-fibre drain and sewer pipe.
- 117-49. Mineral wool insulation for heated industrial equipment.
- 118-44. Marking of jewelry and novelties of silver.
- (E)119-45.<sup>1</sup> Dial indicators (for linear measurements).
- 120-48. Standard stock ponderosa pine doors.
- 121-45. Women's slip sizes (woven fabrics).
- 122-49. Western softwood plywood.
- 123-49. Grading of diamond powder.
- (E) 124-45.<sup>1</sup> Master disks.
- 125-47. Prefabricated homes.
- 126-45. Tank-mounted air compressors.
- 127-45. Self-contained mechanically refrigerated drinking water coolers.
- 128-49. Men's sport shirt sizes—woven fabrics (other than those marked with regular neckband sizes).
- 129-47. Materials for safety wearing apparel.
- 130-46. Color materials for art education in schools.
- 131-46. Industrial mineral wool products, all types—testing and reporting.
- 132-46. Hardware cloth.
- 133-46. Woven wire netting.
- 134-46. Cast aluminum cooking utensils (metal composition).
- 135-46. Men's shirt sizes (exclusive of work shirts).
- 136-46. Blankets for hospitals (wool, and wool and cotton).
- 137-51. Size measurements for men's and boys' shorts (woven fabrics).
- 138-49. Insect wire screening.
- 139-47. Work gloves.
- 140-47. Testing and rating convectors.
- 141-47. Sine bars, blocks, plates, and fixtures.
- 142-47. Automotive lifts.
- 143-47. Standard strength and extra strength perforated clay pipe.
- 144-47. Formed metal porcelain enameled sanitary ware.
- 145-47. Testing and rating hand-fired hot-water supply boilers.

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- 146-47. Gowns for hospital patients.
- 147-47. Colors for molded urea plastics.
- 148-50. Men's circular flat- and rib-knit rayon underwear.
- 149-48. Utility type house dress sizes.
- 150-48. Hot rolled rail steel bars (produced from Tee-section rails).
- 151-48. Body measurements for the sizing of apparel for infants, babies, toddlers, and children (for the knit underwear industry).
- 152-48. Copper naphthenate wood-preserved (spray, brush, dip application).
- 153-48. Body measurements for the sizing of apparel for girls (for the knit underwear industry).
- 154- . (Reserved for "Wire rope").
- 155-50. Body measurements for the sizing of boys' apparel (knit underwear, shirts, trousers).
- 156-49. Colors for polystyrene plastics.
- 157-49. Ponderosa pine and sugar pine plywood.
- 158-49. Model forms for girls' apparel.
- 159-49. Sun-glass lenses made of ground and polished plate glass, thereafter thermally curved.
- 160-49. Wood-fiber blanket insulation (for building construction).
- 161-49. "Standard grade" hot-dipped galvanized ware (coated after fabrication).
- 162-49. Tufted bedspreads.
- 163-49. Standard stock ponderosa pine windows, sash, and screens.
- 164- . (Reserved for "Concrete mixers").
- 165-50. Zinc naphthenate wood-preserved (spray, brush, dip application).
- 166-50. Size measurements for men's work trousers.
- 167-50. Automotive and general service copper tube.
- 168-50. Polystyrene plastic wall tiles, and adhesives for their application.
- 169-50. Galvanized ware fabricated from *pregalvanized* steel sheets.
- 170-50. Cotton flour bag (sack) towels.
- 171-50. Hardwood veneered doors.
- 172-50. Brass trim for water-closet bowls, tanks, and urinals (dimensional standards).
- 173-50. Heavy-duty alpha-cellulose-filled melamine tableware.
- 174-51. 140-F dry-cleaning solvent.
- 175-51. Circular-knitted gloves and mittens.

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

**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, Office of Industry and Commerce, U. S. Department of Commerce, Washington 25, D. C.

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