U. S. FEDERAL PUBLIC HOUSING AUTHORITY

Technical Division

EQUIPMENT SPECIFICATIONS

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SPECIFICATIONS FOR SEWAGE PUMPS

These specifications cover electric motor-driven sewage pumps with operating capacities approximately as follows:

Operating Capacity	Motor HP	Motor RPM
150 GPM against 30 feet head to 500 GPM against 17 feet head	5	1150
800 GPM against 42 feet head to 550 GPM against 23 feet head	5	1750
250 GPM against 48 feet head to 700 GPM against 28 feet head	7½	1750

These are the normal expected ranges of pumping. There will be cases when total dynamic heads will be only about 10 feet.

Pumps shall be vertical, pedestal-mounted, heavy duty, non-clogging type sewage pumps, complete with motors, controls and anchor bolts. Pumps shall be for clockwise rotation. If practicable, all pumps shall have the same frame size so that they can be adapted to the required operating conditions in each case by changing the impeller diameter and selecting the proper motor size.

Motor Support:

Each pump shall be furnished with a separate cast iron or steel pedestal which will mount the motor on top of the pump. The motor support shall be attached to the pump casing. The motor shall be direct connected to the pump shaft by a flexible coupling.

Pump Casing:

The pump shall be of single suction type and the casing shall be machined for tongue and groove fit with the casing cover and the suction pedestal. The casing shall be made of close grained cast iron or semi-steel with wall thickness of ample size to withstand safely any pressure generated by the impeller.

Discharge and Suction Opening:

The pump discharge and suction shall not be less than 4 inches diameter and shall be furnished with 125-lb. standard flanges.

Casing Cover:

The casing cover shall be made of close grained cast iron and shall be cast integrally with the pump shaft stuffing box. Casing cover shall be machined for tongue and groove fit with the volute and bearing leg.

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These specifications cover electric motor-driven sewage pumps with operating capacities approximately as follows:

Operating Capacity	Motor HP	Motor RPM
100 GPM against 30 feet head to 500 GPM against 17 feet head.....	3	1150
200 GPM against 42 feet head to 550 GPM against 23 feet head.....	5	1750
250 GPM against 43 feet head to 700 GPM against [illegible] feet head.....	7½	1750

These are the normal expected ranges of pumping. There will be cases when total dynamic heads will be only about 10 feet.

Pumps shall be vertical, pedestal-mounted, heavy duty, non-clogging type sewage pumps, complete with motors, controls and anchor bolts. Pumps shall be for clockwise rotation. If practicable, all pumps shall have the same frame size so that they can be adapted to the required operating conditions in each case by changing the impeller diameter and selecting the proper motor size.

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Each pump shall be furnished with a separate cast iron or steel pedestal which will mount the motor on top of the pump. The motor support shall be attached to the pump casing. The motor shall be direct connected to the pump shaft by a flexible coupling.

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Discharge and Suction Openings:

The pump discharge and suction shall not be less than 4 inches diameter and shall be furnished with 125-lb. standard flanges.

Casing Cover:

The casing cover shall be made of close grained cast iron and shall be cast integrally with the pump shaft stuffing box. Casing cover shall be machined for tongue and groove fit with the volute and bearing leg.

Pump Pedestal:

Pump pedestal shall be of rigid construction and shall include the suction plate, suction elbow and pump support cast integrally and shall be constructed of close grained cast iron or semi-steel and shall be machined for a tongue and groove fit with the volute casting.

Handholes:

Handholes of ample size shall be provided in the pump casing and in the suction elbow. Covers shall be furnished so constructed that they will properly fit the curvature of the elbow and provide a streamline form to prevent rags and other materials being caught on the projections in the line of flow.

Bearing Housing:

The bearing housing shall be case in one piece of close grained cast iron or semi-steel to provide a rigid support for the shaft and bearings. The bearing guides shall be accurately machined and provided with felt seals in the bearing caps to prevent the entrance of moisture and dirt to the bearing housings.

Pump Impeller:

The impeller shall be of the enclosed two-blade non-clogging type constructed of cast iron or semi-steel and machined and hand finished to insure close clearances and high efficiencies. The impeller shall be capable of passing spheres of not less than 2½-inch diameter.

Gauge Connections:

The suction and discharge flanges shall be drilled and tapped for mounting gauges.

Lubrication:

The pump bearings shall be grease lubricated. Hydraulic grease lubrication fittings shall be furnished at accessible points on the bearing housing to provide easy maintenance of the equipment. A hydraulic grease gun shall be furnished as part of the pumping equipment.

Pump Bearings:

Each pump shall have one thrust and one radical bearing of the single row deep groove ball type. These bearings shall be of ample size to withstand safely any load imposed upon them. The bearings shall be spaced along the shaft at a distance so that the distance between bearings is greater than the overhang of the impeller to minimize whipping and vibration.

Pump Shaft:

The pump shaft shall be made of steel, turned and ground to the diameter that is ample to carry the full load imposed under all operating conditions. Pump shafts shall be protected from wear where they pass through the packing glands by bronze or stainless steel sleeves.

Pump Casing:

Pump casing shall be of rigid construction and shall include the suction plate, suction elbow and pump support cast integrally and shall be constructed of close grained cast iron or semi-steel and shall be machined for a tongue and groove fit with the volute casing.

Impeller:

Impellers of ample size shall be provided in the pump casing and in the suction elbow. Covers shall be furnished so constructed that they will properly fit the curvature of the elbow and provide a streamline flow to prevent rags and other materials being caught on the projections in the line of flow.

Bearings:

The bearing housing shall be cast in one piece of close grained cast iron or semi-steel to provide rigid support for the shaft and bearings. The bearing cavities shall be accurately machined and provided with felt seals in the bearing cover to prevent the entrance of moisture and dirt to the bearing housings.

Pump Impeller:

The impeller shall be of the enclosed two-blade non-clogging type constructed of cast iron or semi-steel and machined and hand finished to insure close clearances and high efficiencies. The impeller shall be capable of passing spheres of not less than 3-inch diameter.

Piping Connections:

Suction and discharge flanges shall be drilled and tapped for mounting as shown.

Lubrication:

The pump bearings shall be grease lubricated. Provision grease lubrication fittings shall be furnished and accessible points on the bearing housing to provide easy maintenance of the equipment. A hydraulic grease gun shall be furnished as part of the pumping equipment.

Pump Bearings:

Each pump shall have one thrust and one radial bearing of the single row deep groove ball type. These bearings shall be of ample size to withstand a distance between bearings is greater than the overhung of the impeller to minimize whipping and vibration.

Pump Shafts:

The pump shaft shall be made of steel, turned and ground to the diameter that is ample to carry the full load imposed under all operating conditions. Pump shafts shall be protected from wear where they pass through the packing glands by bronze or stainless steel sleeves.

Packing Glands:

The packing glands shall be split to facilitate renewal of packing. The packing boxes shall deep to accommodate extra large packing and they shall be fitted with spring loaded type grease cups.

Motors:

The motors shall be standard 40-degree, vertical, open type ball bearing motors with windings especially impregnated against moisture. The tors shall be designed with drip covers and to operate on 3-phase, 60 cycle, 220-volt, A. C. current.

Control:

With each pumping unit there shall be furnished a fused line switch and across-the-line starter, or a control similar to Westinghouse Class 11-206, in watertight enclosure, provided with hand resent thermal overload and low voltage protection. Each starter shall be wall mounted and automatically controlled by a float switch in waterfight enclosure. Each float switch assembly shall consist of a float switch with mounting for wall or floor stand, start and st p push buttons, float rod or chain, adjustable buttons, counterweights and cylindrical type float, the float guide to be furnished by others.

The control for an installation of two pumping units shall also include an alternator which will automatically operate each pump in turn and allow both pumps to operate in the event the load exceeds the capacity of one pump.

An independent high water alarm shall be provided for each pumping installation of one or more units.

Modifications in Motor Capacities or Characteristics:

Equitable adjustment in the contract price and delivery dates will be made in case motors of capacities or characteristics other than above specified are required.

Guarantee:

The manufacturer shall guarantee satisfactory test of all pumping equipment supplied under the specified conditions of service in each case, and shall replace any item or items of equipment found to be defective during a period of 12 months after test of each pumping station.

Packing Glands:

The packing glands shall be split to facilitate renewal of packing. The packing boxes shall be deep to accommodate extra large packing and they shall be fitted with spring loaded type grease cups.

Motors:

The motors shall be standard 40-degree, vertical, open type ball bearing motors with windings especially impregnated against moisture. The motors shall be designed with drip covers and to operate on 3-phase, 60 cycle, 220-volt, A. C. current.

Control:

With each pumping unit there shall be furnished a fused line switch and across-the-line starter, or a control similar to Westinghouse Class 11-206, in watertight enclosure, provided with hand reset thermal overload and low voltage protection. The starter shall be wall mounted and automatically controlled by a float switch in watertight enclosure. Each float switch assembly shall consist of a float switch with mounting for wall or floor stand, start and stop push buttons, float rod or chain, adjustable buttons, counterweights and cylindrical type float, the float guide to be furnished by others.

[illegible] for an installation of two pumping units shall also include an alternator which will automatically operate each pump in turn and allow both pumps to operate [illegible] should the load exceed the capacity of one pump.

[illegible] high water alarm shall be provided [illegible] pumping installation [illegible].

[illegible] Motor Capacities or Characteristics:

[illegible] will be made in case [illegible] other than those specified are [illegible].

[illegible]

[illegible] shall [illegible] all pumping equipment [illegible] specified [illegible] and [illegible] selective [illegible] of [illegible].

RTF:np TS-3297

TENTATIVE DRAFT OF COMMERCIAL STANDARD

FOR COAL-BURNING SPACE HEATERS

As Adopted by Preliminary Conference on June 23, 1942

FILE SPECIFICATIONS

PURPOSE

1. The purpose of this Commercial Standard is to serve as a basis for certification of quality and performance of the heaters covered herein for the guidance of manufacturers, distributors, installers, contractors and purchasers.

SCOPE

2. This standard covers surface-fired and magazine-feed flue-connected space heaters with output rating up to 60,000 Btu per hour using anthracite, bituminous coal, coke or lignite as a fuel.

DEFINITIONS

3. Space heater.--A space heater is a device suitable for mounting on the floor, capable of delivering heat by radiation and convection to the surrounding space without the use of external pipes or ducts.

3a. Radiant space heater.--A space heater designed for the primary purpose of heating one room with less than 75 percent of the outside area of the heating surface surrounded by an outer casing shall be called an unjacketed space heater or radiant heater.

3b. Circulating space heater.--A space heater designed for the purpose of heating one or more rooms with 75 percent or more of the outside area of the heating surface surrounded by an outer casing shall be called a jacketed space heater or circulator.

4. Output.--The output of a space heater is defined as the rate at which it delivers heat by radiation and convection to the surrounding space. It is expressed in Btu per hour and shall be obtained by subtracting the total stack and grate losses from the heat value of the coal used.

4a. Range of rating.--The range of rating of a heater is that range of output between the maximum rating and the minimum rating as specified in paragraphs 13 and 14. A given heater may be used to supply any house with a design heat loss falling within that range.

4b. Indirect efficiency.--Indirect efficiency is the output (par.4) divided by the heat value of the coal supplied ... multiplied by 100. (See Item 46a in Summary of Data, Par. 28a.)

GENERAL REQUIREMENTS

5. Draft regulator.--The space heater shall be equipped with an automatic draft regulator in the flue pipe so located and permanently set as to limit the burning rate to the maximum rated output of the heater. The draft regulator, if of the barometric type, shall have no manual adjustment other than stops to permit its use as a checking damper, provided that they do not interfere with its freedom to open.

6. Doors.--All doors and access openings into the firebox, ash pit, or gas passages of the heater shall be provided with well-fitting joints to control the fire effectively and to prevent the emission of smoke, ash, dust or other products of combustion into the heated space. All handles for doors and dampers shall be so designed as to minimize the danger of burns from personal contact. The fire door of surface-fired heaters shall be protected from the heat of combustion by means of a suitable liner.

7. Grates.--Grates shall be of such materials and construction as to provide a reasonable life under normal operating conditions and preferably of the shaking and dumping type, allowing complete removal of the contents of the firepot through the grates.

8. Ash pan.--The 60,000 Btu size of space heater shall be provided with an ash pan with a minimum capacity of 0.5 cu ft and of sufficient area to catch all the ashes falling from the grate. Other sizes of space heaters shall have ash pan capacities in proportion thereto.

9. Finish.--Outside metal surfaces of heaters, grilles and accessories shall be adequately protected against rust or corrosion and against damage during manufacture, test, shipment and reasonable conditions of use and storage.

10. Operating instructions.--Each heater shall be accompanied by a complete set of instructions covering essential points with respect to selection of fuel, operation, upkeep and ordering of repair parts.

SIZES

11. The maximum ratings of space heaters most generally desirable are:

Btu per hour at maximum rated output	
30,000	50,000
40,000	60,000

11a. Size required.--It is recommended that the size of the heater selected for a given house be such that the design heat loss of the house falls within the range of rating of the heater, as defined in paragraph 4a.

OPERATING REQUIREMENTS

12. A stock model of the heater as offered for general sale shall, when tested as described below, meet the specified operating requirements.

13. Maximum rating.--The maximum rating of the heater is the average output developed by the heater during the test cycle when complying with the following operating requirements:

(a) The indirect efficiency shall be at least 60 percent.

(b) The flue-gas temperature shall not exceed 900°F.

(c) The draft required shall not exceed 0.06 in. water gage.

(d) The period between attentions shall be at least six hours for surface-fired and twelve hours for magazine-feed heaters. Attention shall be considered firing, poking, or shaking grates.

(e) The metal serving as heat exchange surface shall not glow visibly in a darkened room, nor exceed 1000°F.

(f) The surface temperature of the jacket of a circulating space heater, when operating at maximum rating, shall not exceed 400°F, except at points within 6 in. of the firing door, door frame, top grille, or flue pipe.

14. Minimum rating.--The minimum rating shall be computed on the following assumptions:

(a) A fuel-burning rate of not less than three times that observed during the banking test.

(b) An efficiency at least equal to that observed during the test for maximum rating.

15. Banking.--With coaling door closed and with the secondary air openings in the firing door closed, and the heater otherwise in accordance with manufacturer's instructions for banking, the space heater shall maintain a fire at an average of not more than 25 percent of the maximum output rating, for a minimum of 12 hours for surface-fired heaters and 24 hours for magazine-feed heaters.

16. Gassing.--With the coaling door closed and the heater otherwise in accordance with the manufacturer's instructions, there shall be no noticeable gassing in the space adjacent to the heater at any time during the firing cycle. The design of magazine heaters shall be such as to minimize the emission of smoke into the room during the firing of the heater.

17. Application to other fuels.--It should be noted that the operating requirements, rating and tests herein are based on anthracite fuel as specified in Par. 21.

METHODS OF TEST

18. Mounting of heater.--The heater shall be mounted on a platform scale with an accuracy of 0.5 lb. All connections to the heater, including that to the source of draft, shall be so flexible as not to affect the accuracy of weighing. The smoke pipe shall be provided with locations for draft tip, thermocouple, and flue-gas sampler as shown in figs. 1 and 2.

19. Source of draft.--The rating test shall be conducted with the draft produced by a chimney, fan or other available means capable of producing a draft of 0.06 in. of water with the heater operating at its rated capacity.

20. Instruments.--The following instruments shall be provided:

(a) Draft gage.--A draft gage with an accuracy of plus or minus 0.005 in. of water.

(b) Thermocouple.--A thermocouple for measurement of the flue-gas temperature of not larger than No. 20 A.W.G. wires with a maximum diameter of twisted junction of 0.07 in. The details of the thermocouple are shown in fig. 3.

(c) A potentiometer, preferably recording.

(d) Thermometer, with a range of not less than 50-120°F, indexed in intervals not greater than 1°F.

(e) An orsat, or equivalent gas analyzer, equipped for determination of CO_2, O_2 and CO.

(f) Surface temperature-sensitive indicators.--For the measurement of surface temperature of the casing, either thermocouples or temperature-sensitive paints or crayons may be used.

21. Fuel for test.--The fuel used for these tests shall be Anthracite with the following characteristics: Volatile matter 3 1/2 to 8 percent; ash content not to exceed 12 percent; sulfur content under 1 percent; heating value (dry basis) 13,000 Btu per pound or above; size, Chestnut or as recommended by the heater manufacturer for regular operation.

21a. Fuel sampling.--A sample of the fuel fired shall be taken in accordance with the method of sampling coal as outlined by the American Society for Testing Materials, Designation D21-40, and stored in a covered, watertight container in a cool place. The gross sample shall be quickly reduced to a laboratory sample of 3 lb by the methods described in the current Standard Method of Sampling Coal of the American Society for Testing Materials, Designation D21-40, and placed in a sealed container for transportation to the laboratory.

21b. Lot sampling.--When a number of tests are to be conducted with the same lot of fuel, it shall be permissible to sample the entire lot for ultimate and proximate analysis and calorific value as specified in the current Standard Method of Sampling Coal of the American Society for Testing Materials, Designation D21-40. When this method is used, samples shall be collected during each test, as in Par. 21a, for determination of moisture and ash, and the ultimate and proximate analysis and calorific value for the gross lot corrected for same, as applied to the individual tests.

22. Starting and duration of tests.--Each heater shall be fired through a preliminary cycle, to attain thermal equilibrium and establish a fuel bed, and through one or more test cycles.

23. Preliminary cycle.--The fire shall be kindled with wood or charcoal on which shall be fired not less than 15 lb of coal per sq ft of grate area. The draft shall be so adjusted as to raise the flue-gas temperature to 900°F as quickly as possible, and shall then be so adjusted as to maintain the flue-gas temperature at 900°F without exceeding limitations 13(c), (e) and (f) under Maximum rating.

24. Flue-gas test temperature.--

24a. If, with 0.06 in. draft, the flue-gas temperature fails to reach 900°F, and the temperature limitations for the heat exchange surface or for the jacket are not exceeded, the test shall be run at the highest flue-gas temperature attained with 0.06 in. draft; or with that flue-gas temperature occurring with the heat exchange surface at 1000°F or with the jacket temperature at 400°F, whichever flue-gas temperature

is the lowest. This shall be called the flue-gas test temperature. The cycle shall be considered to have ended when the flue-gas temperature drops to 75 percent of the flue-gas test temperature.

24b. The grates shall then be shaken until a glow appears in the ash pit and the ashes removed and discarded. The heater shall then be filled with coal to the level of the bottom of the firing door or to the level which the manufacturer prescribes.

25. Test cycle.--

25a. The first test cycle shall be run under the conditions established in the preliminary cycle.

25b. The end of this cycle shall be determined the same as for the preliminary cycle. The grates shall then be shaken, the ashes removed, weighed, and retained for sampling and analysis.

25c. If conditions 13(b), (c), (d), (e) and (f) under Maximum rating have been met, and the calculations indicate that the required indirect efficiency has been safely met, no further test, except banking, Par. 27, will be required.

25d. If condition 13(a) or (d) has not been met, a second cycle at a flue-gas temperature of 600°F shall be run immediately after shaking the grate and refueling. If impractical to continue with the second cycle at once, the fire may be dumped and the test at 600°F flue-gas temperature run after a preliminary period as required before the first cycle. As a second alternative, the heater may be refueled and banked. A preliminary period of operation at a flue-gas temperature of 600°F shall precede refueling for the second cycle.

26. Frequency of observations.--

26a. Observations of drafts and temperatures shall be made at regular intervals of not more than 20 minutes.

26b. If the flue gas is sampled continuously and collected in bottles, which is recommended, analysis shall be made at not more than 30-minute intervals. If instantaneous samples are taken, the interval between samples shall not exceed 20 minutes.

26c. The weight of the assembly shall be read and recorded at 20-minute intervals.

27. Banking test.--

27a. At the close of the last rating cycle, the heater shall be refueled and banked as specified in paragraph 15. Under these conditions, the heater shall maintain a fire at an average of not more than 25 percent of the maximum output rating for a minimum of 12 hours for surface-fired heaters and 24 hours for magazine-feed heaters.

27b. At the end of the banking period, the assembly shall be weighed, the grate shaken, a fresh charge of fuel added, the ash pit damper opened, and the draft increased to 0.06 in. The stack temperature shall rise to 900°F, or to the maximum flue-gas test temperature, in not more than one hour.

28. Maximum rating.--The maximum rating of the heater, to meet the requirements of Par. 13(a), (b) and (c), shall be determined as follows:

> The average flue-gas temperatures, drafts, and efficiencies shall be plotted as ordinates against output as abscissa. The maximum rating shall be the lowest value corresponding to the limitations 13(a), (b) and (c). In the Appendix there is a chart, fig. 4, showing how the rating of the heater would be calculated from data obtained as specified in this paragraph. Three hypothetical cases are illustrated.

28a. Report of data on heater performance.--

1. Number of test
2. Date of test
3. Make and Catalog number of heater
4. Heating surface of heater, sq ft
5. Grate area of heater, sq ft
6. Ratio, heating surface to grate area
7. Weight of heater, lb
8. Overall dimensions of heater, ft and in.
9. Length of test cycle, hours and minutes

Fuel

10. Kind
11. Seam
12. Size

Proximate analysis, as fired, percent

13. Moisture
14. Volatile matter
15. Fixed carbon
16. Ash
17. Calorific value, Btu per lb

Ultimate analysis, percent

18. Carbon
19. Hydrogen
20. Oxygen
21. Nitrogen
22. Sulphur
23. Ash

Weights

24. Total weight loss during test cycle, lb
25. Equivalent coal burned during test cycle, lb

Ash and refuse

26. Weight of ash and refuse, lb
27. Combustible in ash and refuse, percent
28. Carbon burned per lb of fuel fired, lb

Draft

29. Draft in ash pit, inches water
30. Draft at smokehood, inches water

Flue-gas composition, percent

31. Carbon dioxide (CO_2)
32. Oxygen (O_2)
33. Carbon monoxide (CO)
34. Nitrogen (N_2)
35. Dry flue gas per lb of fuel, lb

Temperatures, °F

36. Air for combustion
37. Flue gases leaving heater

Hourly rates

38. Coal burned, lb per hr.
39. Heat release rate, Btu per hour

Heat balance	a Btu per lb coal	b Percent
40. Heat lost in steam in flue gases		
41. Heat lost in dry flue gases		
42. Heat lost in carbon monoxide		
43. Heat lost in combustible in ash		
44. Total measurable losses		
45. Calorific value of coal		
46. Heat utilized, efficiency		

Output

47. Output, Btu per hour

Notes and Methods of Calculation

$$\text{Item 25} = \frac{\text{Item 24} \times 100}{(100 - \text{Item 16})}$$

$$\text{Item 28} = \frac{\text{Item 18} - \frac{\text{Item 27} \times \text{Item 16}}{100 - \text{Item 27}}}{100}$$

$$\text{Item 35} = \frac{700 + 4CO_2 + O_2}{3(CO_2 + CO)} \times \text{Item 28}$$

$$\text{Item 38} = \frac{\text{Item 25}}{\text{Item 9}}$$

$$\text{Item 39} = \text{Item 38} \times \text{Item 17}$$

$$\text{Item 40a} = \frac{9 \times \text{Item 19}}{100} \times (1090.7 + 0.455 \times \text{Item 37} - \text{Item 36})$$

$$\text{Item 41a} = \text{Item 35} \times 0.24 \times (\text{Item 37} - \text{Item 36})$$

$$\text{Item 42a} = \frac{\text{Item 33}}{\text{Item 31} + \text{Item 33}} \times \text{Item 28} \times 10{,}150$$

$$\text{Item 43a} = \left(\frac{\text{Item 18}}{100} - \text{Item 28}\right) \times 14{,}600$$

$$\text{Item 44a} = \text{Item 40} + \text{Item 41} + \text{Item 42} + \text{Item 43}$$

$$\text{Item 46a} = \text{Item 45} - \text{Item 44}$$

$$\text{Item 47} = \text{Item 46a} \times \text{Item 38}$$

LABELING

29. Manufacturer's certificate.--A manufacturer's certificate, worded as follows, shall accompany each space heater:

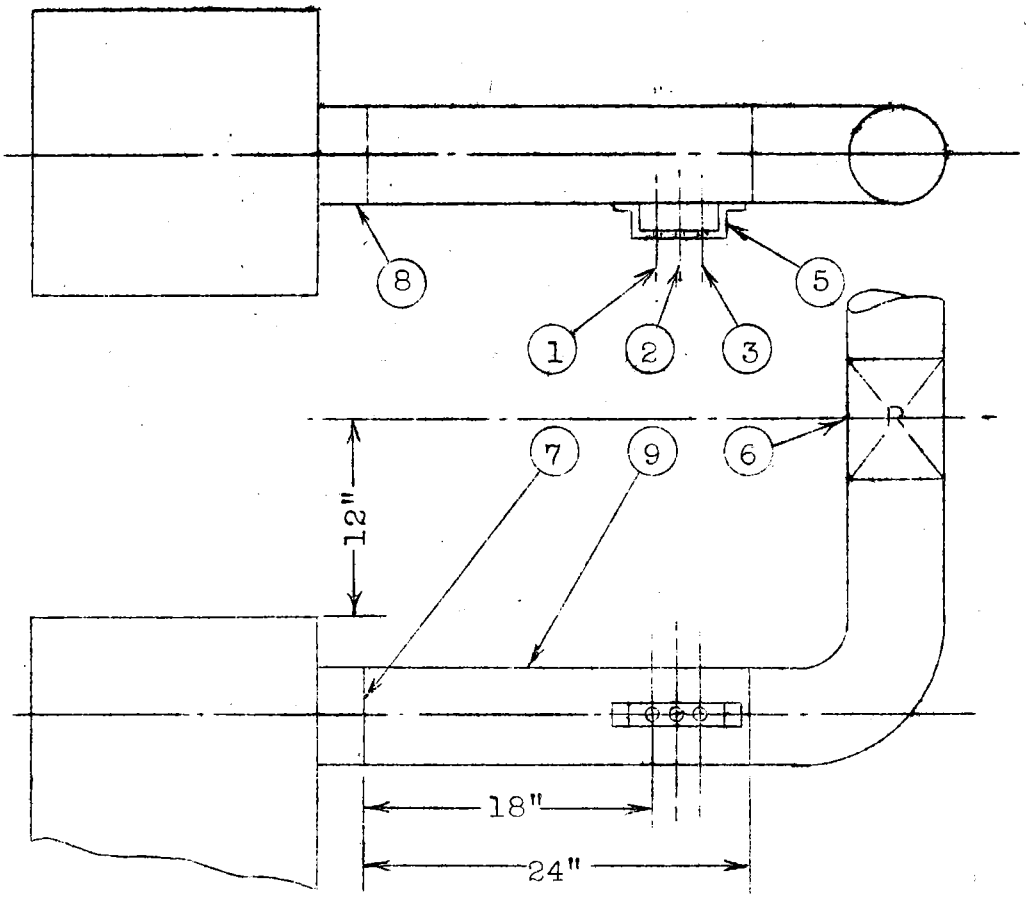
MANUFACTURER'S CERTIFICATE

Coal-Burning _____* Space Heater

.....
(Name of manufacturer) (Address)

This heater is guaranteed to have an output of ____ to ____ Btu per hour when tested according to CS_____ for Coal-Burning Space Heaters, as issued by the U. S. Department of Commerce.

*In this space the manufacturer should insert the word "Radiant" or "Circulating" according to the type of space heater.



1. Center line of thermocouple - See figures 2 and 3.
2. Gas sampling tube - see figure 2.
3. Draft tube - see figure 2.
5. Support bracket - see figure 2.
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.

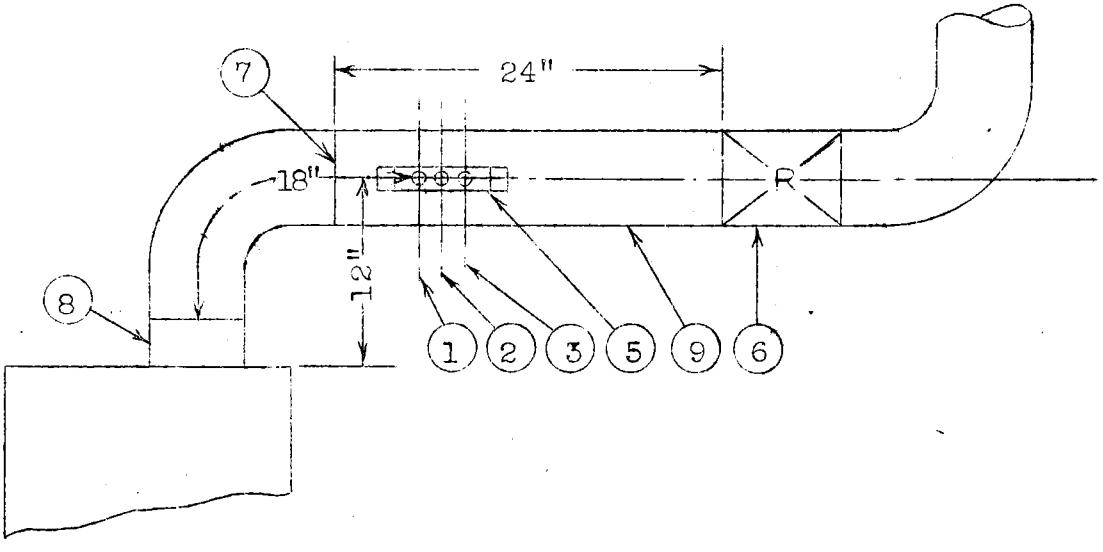
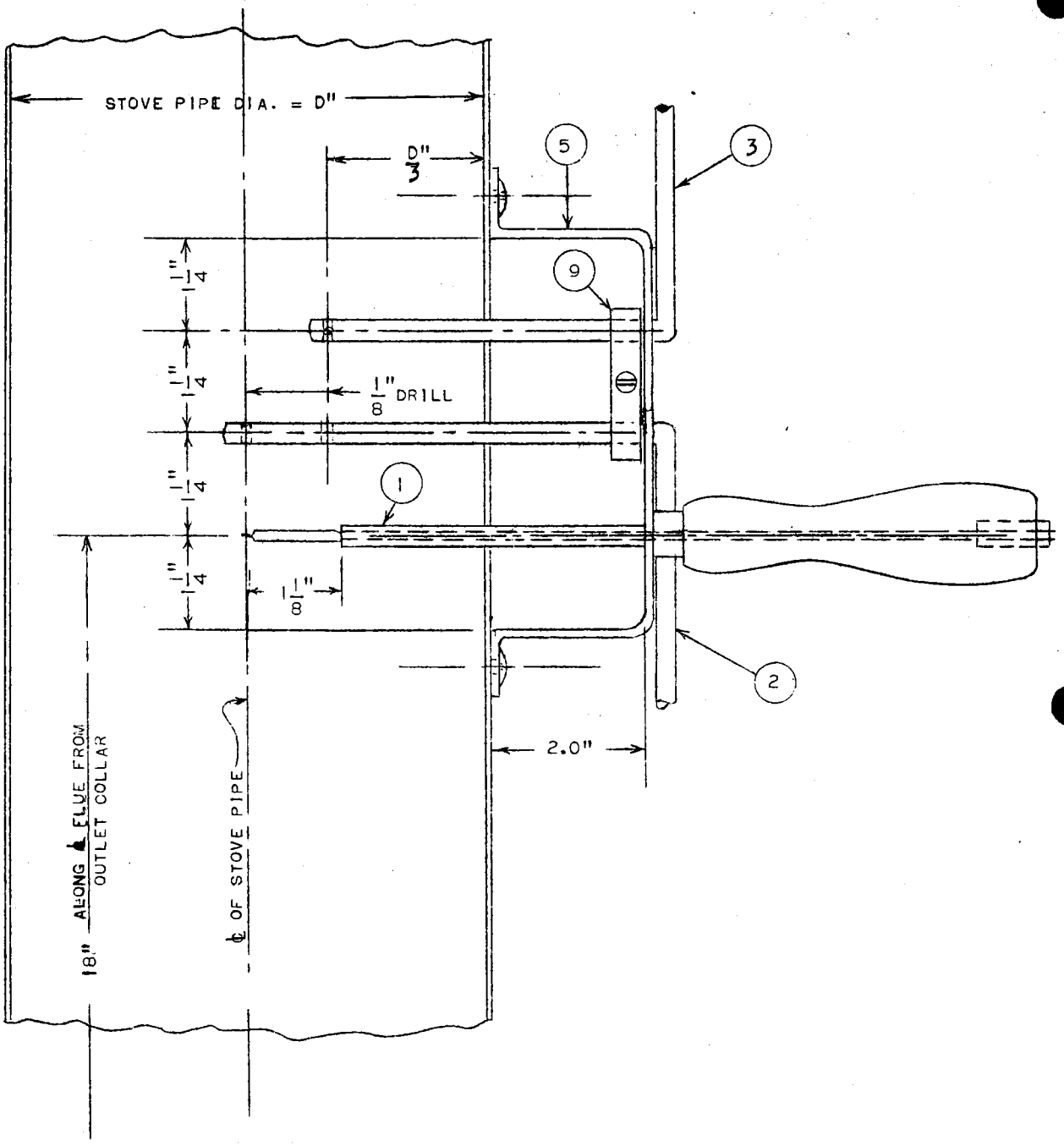


FIGURE 1 HEATER FLUE CONNECTIONS

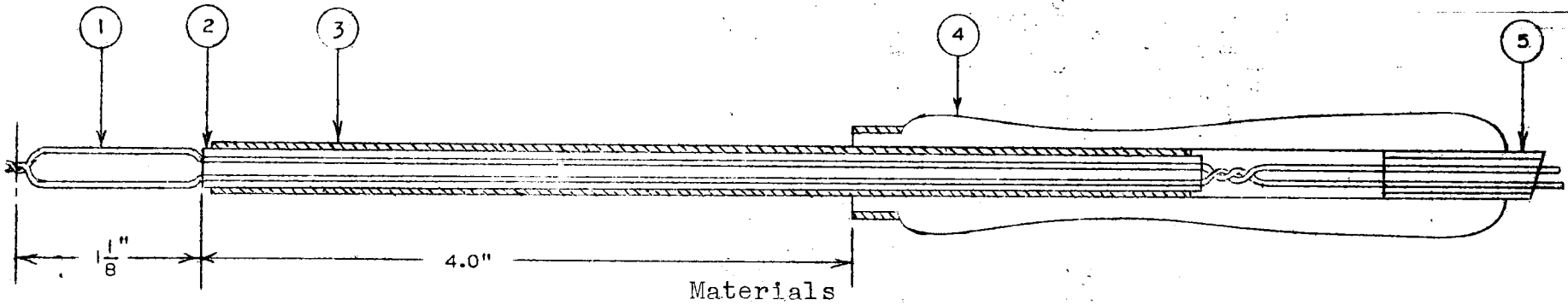


① - Thermocouple.

② - ③ Gas sampling & draft tubes, (1/4" x approx. ".032 wall).

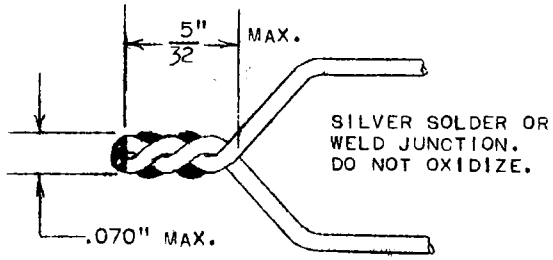
⑤ - ⑨ Support bracket & tube clamp, (1/2" x ".093 half hard flat steel wire).

FIGURE 2 GAS SAMPLING AND DRAFT TUBES, THERMOCOUPLE AND SUPPORT BRACKET ASSEMBLY



Materials

① - 10' - No. 20 B & S gauge 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, 1/4" O.D. - 2 hole porcelain insulator cut 6.0" long and ends beveled on two sides.
③ - 1 - 5/16" O.D. x ".032 wall. 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.



DETAIL OF HOT JUNCTION

FIGURE 3 STANDARD THERMOCOUPLE FOR FLUE-GAS TEMPERATURE MEASUREMENT

APPENDIX

Examples of Calculation of Maximum Rating

1. The chart in figure 4 shows how the rating of the heater would be calculated from the data obtained as specified in paragraph 28. Three hypothetical cases are given below:

2. In Case A, the temperature of the flue gases did not reach 900° with the maximum draft of 0.06 in. of water but maintained an average of 725°. The efficiency was calculated to be 67 percent. Thus only one test cycle was required and the design rating was set by the maximum draft; it was 44,000 Btu per hour.

3. In Case B, the maximum flue-gas temperature of 900° was reached with less than the maximum draft but the efficiency was less than the required 60 percent. A second test was run at a flue-gas temperature of 600° which gave an efficiency of more than 60 percent. The design rating was set by the minimum of 60 percent efficiency; it was 40,000 Btu per hour.

4. In Case C, the maximum allowable flue-gas temperature was not reached because the temperature of a part of the heating surface reached 1000° when the flue-gas temperature was only 850°. The efficiency was also less than 60 percent. A second test was run at 600° flue-gas temperature and the design rating was set at the point where the line drawn between the two points of efficiency crossed 60 percent; it was 25,000 Btu per hour.

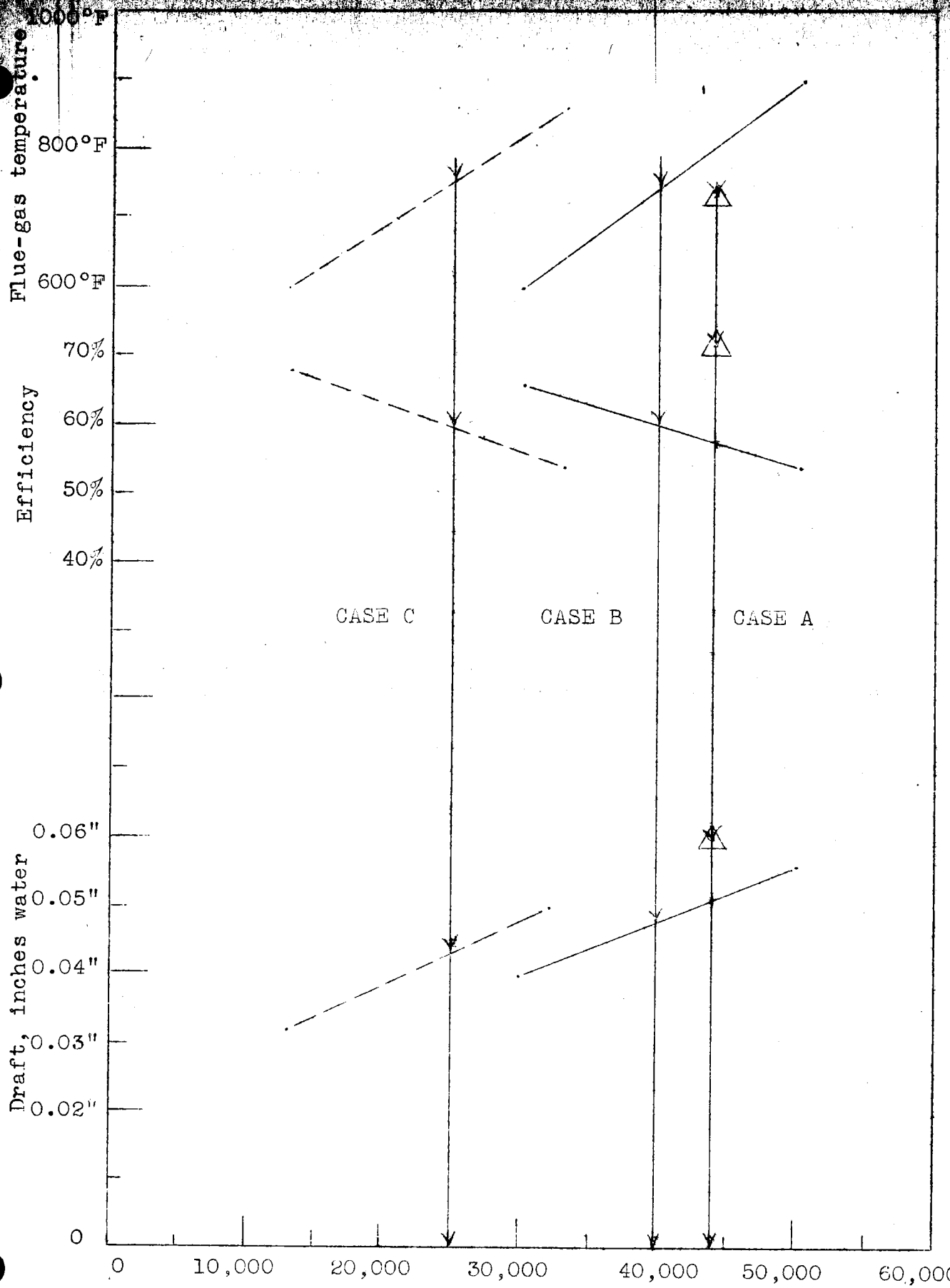


FIGURE 4 EXAMPLE OF CALCULATION OF MAXIMUM RATING

IJF:LEM TS-3443

PROPOSED COMMERCIAL STANDARD (EMERGENCY) FOR COAL-BURNING SPACE HEATERS

As Adopted by Preliminary Conference on June 23, 1942
And Adjusted by a Special Conference on February 23, 1943.

PURPOSE

1. The purpose of this Commercial Standard is to serve as a basis for certification of construction and performance of the heaters covered herein for the guidance of manufacturers, testing laboratories, distributors, installers, contractors and purchasers.

SCOPE

2. This standard covers surface-fired and magazine-feed flue-connected coal-burning space heaters with output ratings up to 60,000 Btu per hour when using chestnut size anthracite as a test fuel.

DEFINITIONS

3. Space heater.--A space heater is a device suitable for mounting on the floor, capable of delivering heat by radiation and convection to the surrounding space without the use of external pipes or ducts.

3a. Radiant space heater.--A space heater designed for the primary purpose of heating one room with less than 75 percent of the outside area of the heating surface surrounded by an outer casing shall be called an unjacketed space heater or radiant heater.

3b. Circulating space heater.--A space heater designed for the purpose of heating one or more rooms with 75 percent or more of the outside area of the heating surface surrounded by an outer casing shall be called a jacketed space heater or circulator.

4. Output.--The output of a space heater is defined as the rate at which it delivers heat to the surrounding space. It is expressed in Btu per hour and shall be obtained by subtracting the total stack and grate losses from the heat value of the coal used.

4a. Range of rating.--The range of rating of a heater is that range of output between the maximum rating and the minimum rating as specified in paragraphs 12 and 13. A given heater may be used to heat any space with a design heat loss falling within that range.

4b. Indirect efficiency.--Indirect efficiency is the output (par. 4) divided by the heat value of the coal used multiplied by 100. (See Item 41 in Summary of Data, par. 27a.)

GENERAL REQUIREMENTS

5. Draft regulator.--The space heater shall be equipped with an automatic draft regulator in the flue pipe so located and permanently set as to limit the burning rate to the maximum rated output of the heater. The draft regulator, if of the barometric type, shall be set by the installer according to the heater manufacturer's instructions for the fuel used, so as to limit the burning rate to the maximum rated output of the heater.

6. Doors.--All doors and access openings into the firebox, ash pit, or gas passages of the heater shall be provided with paper-tight joints (testing with equivalent of U. S. paper currency thickness and width) to control the fire effectively and to prevent the emission of smoke, ash, dust or other products of combustion into the heated space. All handles for doors and dampers shall be so designed as to minimize the danger of burns from personal contact. The fire door of surface-fired heaters shall be protected from the heat of combustion by means of a suitable liner.

7. Grates.--Grates shall be of such materials and construction as to provide a reasonable life under normal operating conditions and of either the shaking or shaking and dumping type, allowing complete removal of the contents of the firepot through the grates. The arrangement shall be such that the grates shall not be dislodged during the shaking or dumping operation.

8. Ash pan.--The 60,000 Btu size of space heater shall be provided with a removable ash pan not lighter than 24-gage steel with a minimum capacity of 0.5 cu ft and of sufficient area to catch all the ashes falling from the grate. Other sizes of space heaters shall have ash pan capacities in proportion thereto.

9. Finish.--Outside metal surfaces of heaters, grilles and accessories shall be adequately protected against rust or corrosion and against damage during manufacture, test, shipment and reasonable conditions of use and storage.

10. Operating instructions.--Each heater shall be accompanied by a complete set of instructions covering essential points with respect to operation with various fuels, upkeep and ordering of repair parts.

PERFORMANCE REQUIREMENTS UNDER TEST

11. A stock model of the heater as offered for general sale shall, when tested as described below, meet the following performance requirements.

12. Maximum rating.--The maximum rating of the heater is the average output developed by the heater during the test cycle when complying with the following performance requirements:

(a) The indirect efficiency shall be at least 50 percent for magazine-feed heaters and 55 percent for surface-fired heaters.

(b) The flue-gas temperature shall not exceed 900°F.

(c) The draft shall not exceed 0.06 in. water gage measured as hereinafter described.

(d) The period between attentions shall be at least six hours for surface-fired and twelve hours for magazine-feed heaters. Attention shall be considered firing, poking, or shaking grates.

(e) The metal serving as heat exchange surface shall not glow visibly in a darkened room, nor exceed 1000°F.

(f) The surface temperature of the jacket of a circulating space heater, when operating at maximum rating, shall not exceed 400°F, except at points within 6 in. of the firing door, door frame, top grille, or flue pipe.

13. Minimum rating.--The minimum rating shall be computed on the following assumptions:

(a) A fuel-burning rate of not less than three times that observed during the banking test.

(b) An efficiency equal to that observed during the test for maximum rating.

14. Banking. With the heater regulated in accordance with manufacturer's instructions for banking, the space heater shall maintain a fire at an average fuel consumption rate of not more than 25 percent of that required for the maximum rating, for a minimum of 12 hours for surface-fired heaters and 24 hours for magazine-feed heaters.

15. Gassing.--With the coaling door closed and the heater otherwise in accordance with the manufacturer's instructions, there shall be no noticeable gassing from the heater at any time during the maximum rating and banking cycles. The design of magazine heaters shall be such as to minimize the emission of smoke into the room during the firing of the heater.

16. Application to other fuels.--It should be noted that the operating requirements, rating and tests herein are based on anthracite fuel as specified in paragraph 20.

METHODS OF TEST

17. Mounting of heater.--The heater shall be mounted on a platform scale with an accuracy of 0.5 lb. All connections to the heater, including that to the source of draft, shall be so flexible as not to affect the accuracy of weighing. The smoke pipe shall be provided with locations for draft tip, thermocouple, and flue-gas sampler as shown in figs. 1 and 2.

18. Source of draft.--The rating test shall be conducted with the draft produced by a chimney, fan or other available means capable of producing a draft of 0.06 in. of water with the heater operating at its rated capacity.

19. Instruments.--The following instruments shall be provided.

(a) Draft gage.--A draft gage with an accuracy of plus or minus 0.005 in. of water.

(b) Thermocouple.--A thermocouple for measurement of the flue-gas temperature of not larger than No. 20 A.W.G. wires with a maximum diameter of twisted junction of 0.07 in. The details of the thermocouple are shown in fig. 3.

(c) A potentiometer, preferably recording.

(d) Thermometer, with a range of not less than 50-120°F, indexed in intervals not greater than 1°F.

(e) An orsat, or equivalent gas analyzer, equipped for determination of CO_2, O_2 and CO.

(f) Surface temperature-sensitive indicators.--For the measurement of surface temperature of the casing, either thermocouples or temperature sensitive paints or crayons may be used.

20. Fuel for test.--The fuel used for these tests shall be Anthracite with the following characteristics: Volatile matter 4 to 6 percent; ash content not to exceed 12 percent; heating value (dry basis) 13,000 Btu per pound or above; size, chestnut, according to Standard Anthracite Sizing Specifications adopted by the Anthracite Committee of the Production Control Plan for the Anthracite Industry, Harrisburg, Pennsylvania, effective December 15, 1941. (See page 12, 7th edition, Mac's Directory and Handbook of Anthracite, published by National Coal Publications. Mimeographed copies of the sizing specifications may be obtained on request from the Anthracite Committee, State Street Building, Harrisburg, Pennsylvania.)

20a. Fuel sampling.--A sample of fuel shall be taken, reduced to a laboratory sample, and placed in a sealed container for transportation to the laboratory, all in accordance with American Society for Testing Materials Designation D21-40.

20b. Lot sampling.--When a number of tests are to be conducted with the same lot of fuel, it shall be permissible to sample the entire lot for proximate analysis and calorific value as specified in the current Standard Method of Sampling Coal of the American Society for Testing Materials, Designation D21-40. When this method is used, samples shall be collected on arrival and the coal stored in a dry place until used.

21. Starting and duration of tests.--Each heater shall be fired through a preliminary cycle, to attain thermal equilibrium and establish a fuel bed, and through one or more test cycles.

22. Preliminary cycle.--The fire shall be kindled with wood or charcoal on which shall be fired not less than 15 lb of coal per sq ft of grate area. The draft shall be so adjusted as to raise the flue-gas temperature to 900°F as quickly as possible, and shall then be so adjusted as to maintain the flue-gas temperature at 900°F without exceeding limitations 12 (c), (e) and (f) under Maximum rating.

23. Flue-gas test temperature.--

23a. If, with 0.06 in. draft, the flue-gas temperature fails to reach 900°F, and the temperature limitations for the heat exchange surface or for the jacket are not exceeded, the test shall be run at the highest flue-gas temperature attained with 0.06 in. draft; or with that flue-gas temperature occurring with the heat exchange surface at 1000°F or with the jacket temperature at 400°F, whichever flue-gas temperature is the lowest. This shall be called the flue-gas test temperature. The cycle shall be considered to have ended when the flue-gas temperature drops to 75 percent of the flue-gas test temperature.

23b. The grates shall then be shaken until a glow appears in the ash pit and the ashes removed and discarded. The heater shall then be filled with coal to the level of the bottom of the firing door or to the level which the manufacturer prescribes.

24. Test cycle.--

24a. The first test cycle shall be run under the conditions established in the preliminary cycle.

24b. The end of this cycle shall be determined the same as for the preliminary cycle. The grates shall then be shaken, the ashes removed, weighed, and retained for sampling and analysis.

24c. If conditions 12 (b), (c) (d), (e) and (f) under Maximum rating have been met, and the calculations indicate that the required indirect efficiency has been safely met, no further test, except banking, paragraph 26, will be required.

24d. If condition 12 (a) or (d) has not been met, a second cycle at a flue-gas temperature of 600°F shall be run immediately after shaking the grate and refueling. If impractical to continue with the second cycle at once, the fire may be dumped and the test at 600°F flue-gas temperature run after a preliminary period as required before the first cycle. As a second alternative, the heater may be refueled and banked. A preliminary period of operation at a flue-gas temperature of 600°F shall precede refueling for the second cycle.

25. Frequency of observations.--

25a. Observations of drafts and temperatures shall be made at regular intervals of not more than 20 minutes.

25b. If the flue gas is sampled continuously and collected in bottles, which is recommended, analysis shall be made at not more than 30-minute intervals. If instantaneous samples are taken, the interval between samples shall not exceed 20 minutes.

25c. The weight of the assembly shall be read and recorded at 20-minute intervals.

26. Banking test.--

26a. At the close of the last rating cycle, the heater shall be refueled and banked as specified in paragraph 14. Under these conditions, the heater shall maintain a fire at an average fuel consumption rate of not more than 25 percent of that required for the maximum rating for a minimum of 12 hours for surface-fired heaters and 24 hours for magazine-feed heaters.

26b. At the end of the banking period, the assembly shall be weighed, the grate shaken, a fresh charge of fuel added, the ash pit damper opened, and the draft increased to 0.06 in. The stack temperature shall rise to 900°F, or to the maximum flue-gas test temperature, in not more than one hour.

27. Maximum rating.--The maximum rating of the heater, to meet the requirements of paragraphs 12 (a), (b) and (c), shall be determined as follows:

The average flue-gas temperatures, drafts and efficiencies shall be plotted as ordinates against output as abscissa. The maximum rating shall be the lowest value corresponding to the limitations 12 (a), (b) and (c). In the Appendix there is a chart, fig. 4, showing how the rating of the heater would be calculated from data obtained as specified in this paragraph. Three hypothetical cases are illustrated.

27a. Report of data on heater performance.--

1. Number of test
2. Date of test
3. Make and model number of heater
4. Heating surface of heater, sq ft
5. Grate area of heater, sq ft
6. Ratio heating surface to grate area
7. Weight of heater, lb
8. Overall dimensions of heater, ft and in.
9. Length of test cycle, hours and minutes

Fuel

10. Kind
11. Size

Proximate analysis, as fired

12. Moisture, percent
13. Volatile matter, percent
14. Fixed carbon, percent
15. Ash, percent
16. Calorific value, Btu per lb

Ultimate analysis, as fired

17. Carbon, percent
18. Hydrogen, percent

Weights

19. Total weight loss during test cycle, lb
20. Equivalent coal burned during test cycle, lb

Ash and refuse

21. Weight of ash and refuse, lb.
22. Combustible in ash and refuse, percent
23. Carbon burned per lb of fuel fired, lb

Draft

24. Draft in ash pit, inches water
25. Draft at smokehood, inches water

Flue-gas composition

26. Carbon dioxide (CO_2), percent
27. Oxygen (O_2), percent
28. Carbon monoxide (CO), percent
29. Nitrogen (by difference) (N_2), percent
30. Dry flue gas per lb of fuel, lb

Temperatures, °F

31. Air for combustion
32. Flue gases leaving heater

Hourly rates

33. Coal burned, lb per hr
34. Heat release rate, Btu per hour

Heat balance

35a. Heat lost in steam in flue gases, Btu per lb of coal
35b. Heat lost in steam in flue gases, percent
36a. Heat lost in dry flue gases, Btu per lb of coal
36b. Heat lost in dry flue gases, percent
37a. Heat lost in unburned carbon monoxide, Btu per lb of coal
37b. Heat lost in unburned carbon monoxide, percent
38a. Heat lost in unburned combustible in ash, Btu per lb of coal
38b. Heat lost in unburned combustible in ash, percent
39a. Total measurable losses, Btu per lb of coal
39b. Total measurable losses, percent
40. Calorific value of coal, Btu per lb
41a. Heat utilized, Btu per lb of coal
41b. Heat utilized, efficiency, percent

Output

42. Output, Btu per hour

Notes and Methods of Calculation

$$\text{Item 20} = \frac{\text{Item 19} \times 100}{100 - \text{Item 15}}$$

$$\text{Item 23} = \frac{\text{Item 17}}{100} - \frac{\text{Item 22} \times \text{Item 15}}{100\,(100 - \text{Item 22})}$$

$$\text{Item 30} = \frac{700 + 400_2 + O_2 \times \text{Item 23}}{3(CO_2 + CO)}$$

$$\text{Item 33} = \frac{\text{Item 20}}{\text{Item 9}}$$

$$\text{Item 34} = \text{Item 33} \times \text{Item 16}$$

$$\text{Item 35a} = \frac{9 \times \text{Item 18}}{100} \times [(1090.7 + 0.455 \times (\text{Item 32} - \text{Item 31})]$$

$$\text{Item 36a} = \text{Item 30} \times 0.24 \times (\text{Item 32} - \text{Item 31})$$

$$\text{Item 37a} = \frac{\text{Item 28}}{\text{Item 26} + \text{Item 28}} \times \text{Item 23} \times 10{,}150$$

$$\text{Item 38a} = \left(\frac{\text{Item 17}}{100} - \text{Item 23}\right) \times 14{,}600$$

$$\text{Item 39a} = \text{Item 35a} + \text{Item 36a} + \text{Item 37a} + \text{Item 38a}$$

$$\text{Item 41a} = \text{Item 40} - \text{Item 39a}$$

$$\text{Item 41b} = \frac{\text{Item 40} - \text{Item 39a}}{\text{Item 40}}$$

$$\text{Item 42} = \text{Item 41a} \times \text{Item 33}$$

LABELING

Manufacturer's certificate.--A manufacturer's certificate, worded as follows, shall accompany each space heater.

MANUFACTURER'S CERTIFICATE

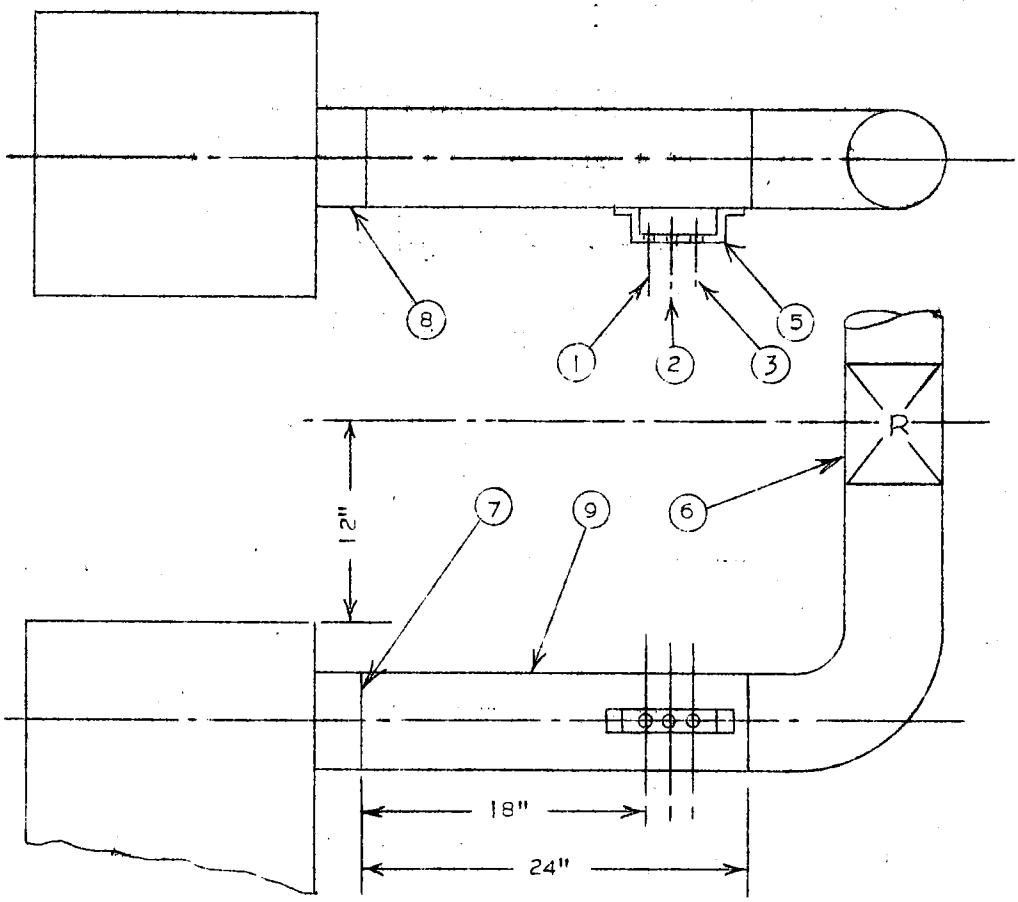
Coal-Burning _____* Space Heater Model No. _____.

.....

(Name of manufacturer) (Address)

This heater is guaranteed to have an output range from _____ maximum rating to _____ minimum rating Btu per hour when tested according to CS(E) - for Coal-Burning Space Heaters, as issued by the U. S. Department of Commerce.

*In this space the manufacturer should insert the word "Radiant" or "Circulating" according to the type of space heater.



1. Center line of thermocouple - See figures 2 and 3
2. Gas sampling tube - see figure 2.
3. Draft tube - see figure 2.
5. Support bracket - see figure 2.
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.

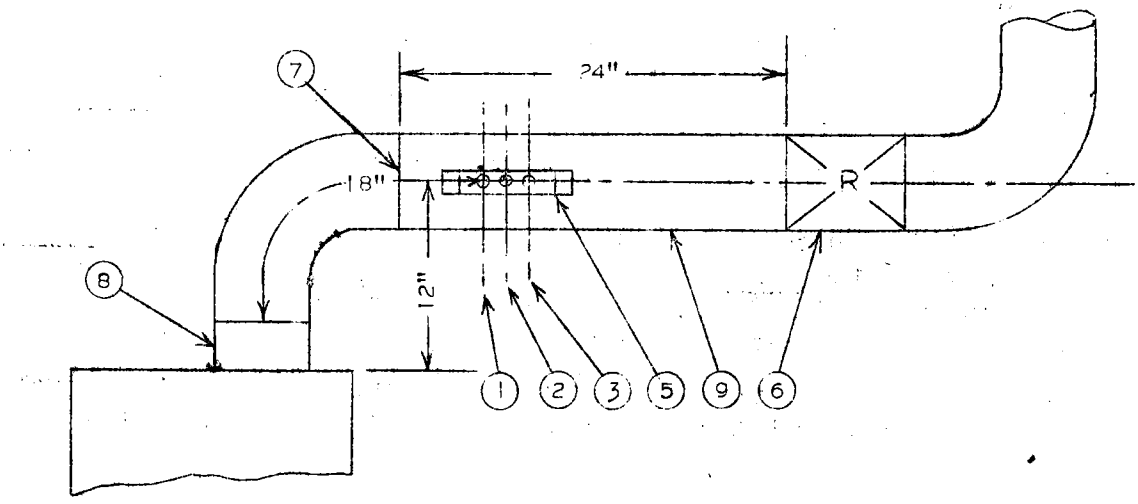
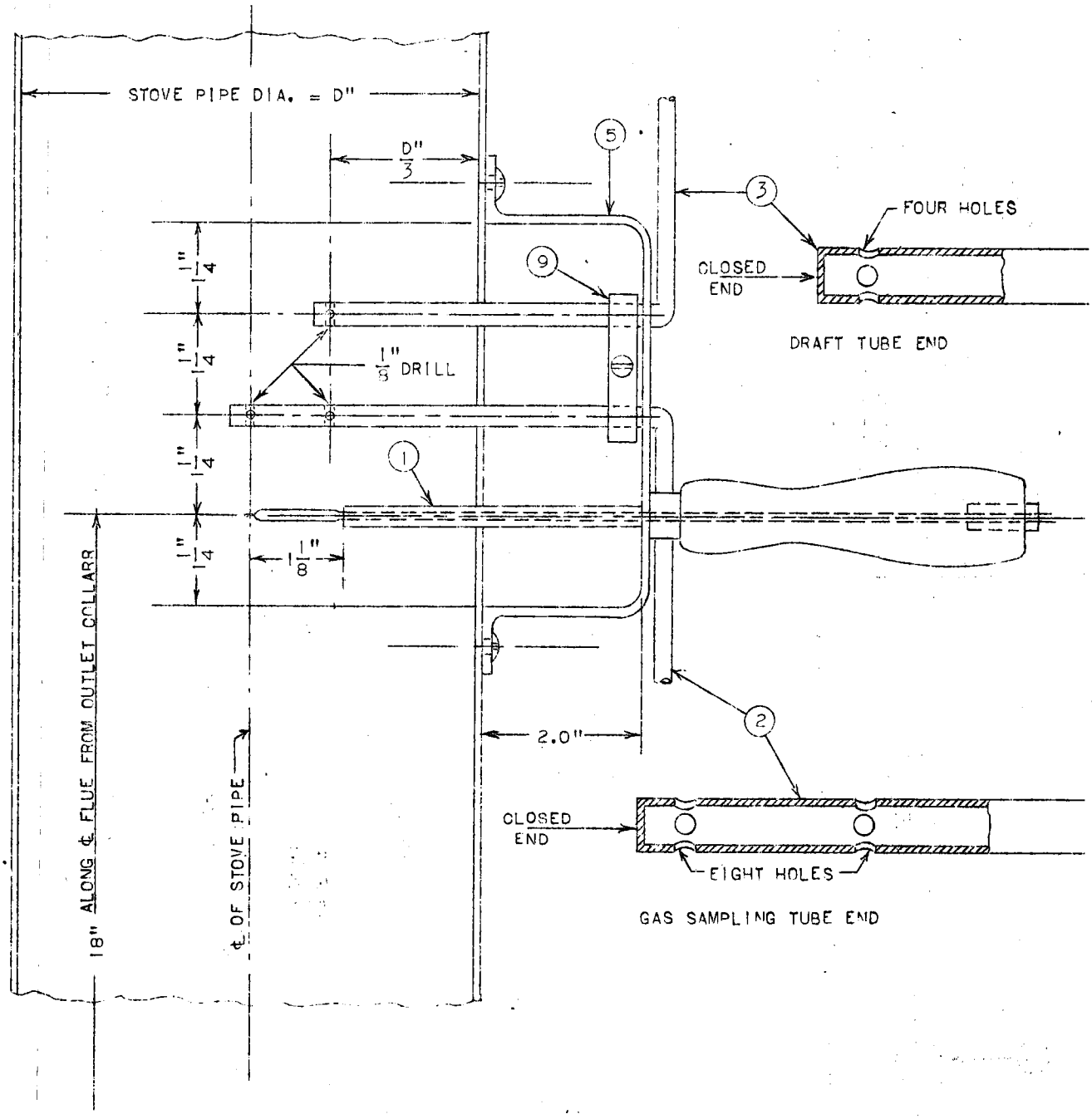


FIGURE 1 HEATER FLUL CONNECTIONS

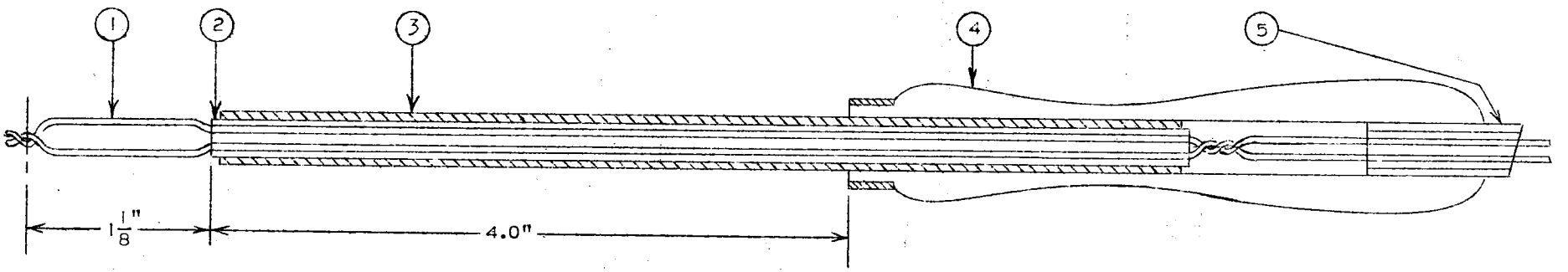


(1) - Thermocouple

(2) - (3) Gas sampling & draft tubes, (1/4" x approx. ".032 wall).

(5) - (9) Support bracket & tube clamp, (1/2" x ".093 half hard flat steel wire).

Figure 2, Gas Sampling and Draft Tubes, Thermocouple and Support Bracket Assembly



Materials

(1) - 10' - No. 20 B & S gauge 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, 1/4" O.D. - 2 hole porcelain insulator cut 6.0" long and ends beveled on two sides.

(3) - 1 - 5/16" O.D. x .032 wall. 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.

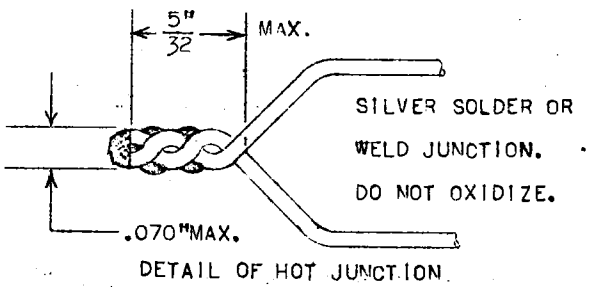


FIGURE 3 STANDARD THERMOCOUPLE FOR FLUE-GAS TEMPERATURE MEASUREMENT

APPENDIX

Examples of Calculation of Maximum Rating

1. The chart in figure 4 shows how the rating of the heater would be calculated from the data obtained as specified in paragraph 27. Three hypothetical cases are given below.

2. In Case A, the temperature of the flue gases did not reach 900° with the maximum draft of 0.06 in. of water but maintained an average of 725°. The efficiency was calculated to be 72 percent. Thus only one test cycle was required and the design rating was set by the maximum draft; it was 44,000 Btu per hour.

3. In Case B, the maximum flue-gas temperature of 900° was reached with less than the maximum draft but the efficiency was less than the required 55 percent for surface-fired heaters. A second test was run at a flue-gas temperature of 600° which gave an efficiency of more than 55 percent. The design rating was set by the minimum of 55 percent efficiency; it was 49,000 + Btu per hour.

4. In Case C, the maximum allowable flue-gas temperature was not reached because the temperature of a part of the heating surface reached 1000° when the flue-gas temperature was only 850°. The efficiency was also less than 55 percent. A second test was run at 600° flue-gas temperature and the design rating was set at the point where the line drawn between the two points of efficiency crossed 55 percent; it was 32,000 Btu per hour.

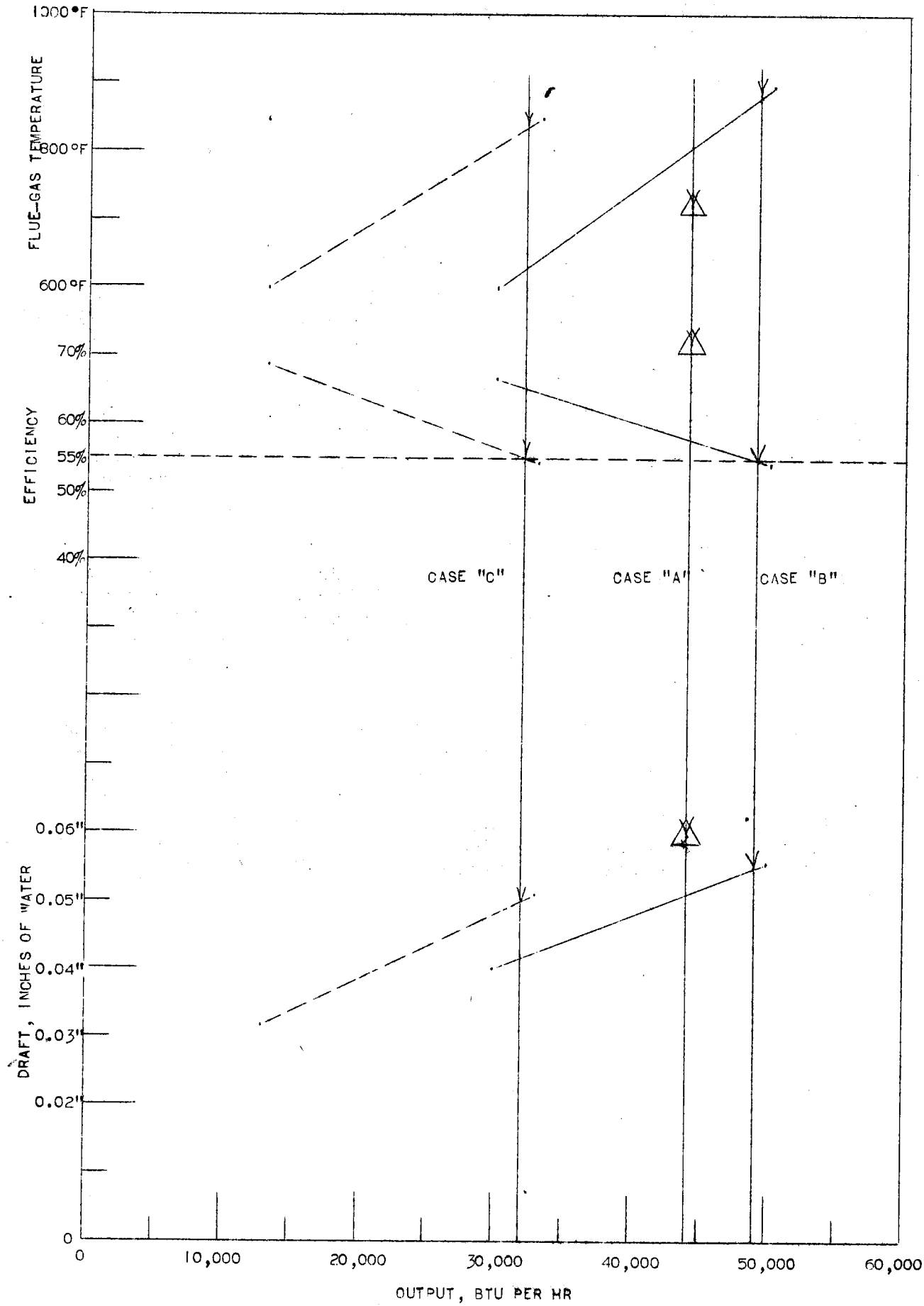


Figure 4, Example of Calculation of Maximum Rating

ACCEPTANCE OF PROPOSED COMMERCIAL STANDARD (EMERGENCY)

(Please retain this copy for your files)

Date .....

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

Gentlemen:

We accept the Proposed Commercial Standard (Emergency), TS-3443, as our standard of practice in the

production* distribution* use* testing*

of coal-burning space heaters, beginning 90 days after date of NBS announcement of official acceptance by the trade.

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.

Please send me a printed copy of the standard when available.

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 in pamphlet)

Street address .....

City and State .....

*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, etc., desiring to record their general approval, the words "In Principle" should be added after the signature.

TO THE ACCEPTOR

The follow ing 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 tra de 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.

EQUIPMENT SPECIFICATIONS - No. 101-1
COVERING
CIRCULATING SPACE HEATERS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

101-1 COAL

Type: Magazine feed, flue connected, circulating type.

Capacity: Minimum rated output 35,000 Btu per hour.

Overall Dimensions: Shall not exceed 26 inches deep, 26 inches wide, 48 inches high.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations, but in no case shall exceed 150 pounds.

Applicable Specifications:

(a) Tentative Draft of Commercial Standards for Coal Burning Space Heaters, issued through the Department of Commerce, National Bureau of Standards, dated June 23, 1942, and adjusted February 23, 1943, except the indirect efficiency requirement is waived.

(b) Stove board of smooth surfaced noncombustible material of sufficient size to extend on all sides of heater, not less than 3/8 inch thickness.

(c) Flue outlet shall be on top of heater.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 101-2 and 3
COVERING
CIRCULATING SPACE HEATERS

National Housing Agency
Federal Public Housing Authority
June 30, 1943.

101-2 OIL (18,000 Btu)

Type: Flue-connected, circulating type equipped with vaporizing pot type burner.

Capacity: Minimum rated output 18,000 Btu per hour at 0.06 inches draft.

Overall Dimensions: Shall not exceed 22 inches wide, 26 inches deep, and 36 inches high.

Federal Restrictions: Amount of critical materials used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Commercial Standard CS-101-43 covering Flue Connected Oil Burning Space Heaters Equipped with Vaporizing Pot-Type Burners, issued through the Department of Commerce, National Bureau of Standards. Heater shall be so labeled.

(b) Stove board of smooth surfaced noncombustible material of sufficient size to extend on all sides of heater, not less than 3/8 inch thickness.

(c) Fuel tank of at least 3 gallons capacity shall be an integral part of heater.

(d) Casing shall be without perforations between bottom and top level of combustion chamber.

101-3 OIL (30,000 Btu)

Same requirements as specified for Oil (18,000 Btu), No. 101-2, except as follows:

Capacity: Minimum rated output 30,000 Btu per hour.

Overall Dimensions: Shall not exceed 24 inches wide, 28 inches deep, and 38 inches high.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

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EQUIPMENT SPECIFICATIONS - No. 101-4 and 5
COVERING
CIRCULATING SPACE HEATERS

National Housing Agency
Federal Public Housing Authority
June 30, 1943.

101-4 GAS (30,000 Btu)

Type: Vented, circulating type, cabinet style, for operation with manufactured, natural or mixed gases.

Capacity: Minimum rated input 30,000 Btu per hour.

Overall Dimensions: Shall not exceed 32 inches wide, 20 inches deep, and 38 inches high.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) American Standard Approval Requirements for Gas Space Heaters, American Standards Association Z21-11-1940, and be so labeled.

(b) Automatic pilot and hand regulator shall be an integral part of heater.

101-5 GAS (40,000 Btu)

Same requirements as specified for Gas (30,000 Btu), No. 101-4, except as follows:

Capacity: Minimum rated input 40,000 Btu per hour.

Overall Dimensions: Shall not exceed 34 inches wide, 22 inches deep, and 40 inches high.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 101-6
COVERING
COAL BURNING CIRCULATING SPACE HEATERS

National Housing Agency
Federal Public Housing Authority
August 13, 1943

101-6 Coal:

Type: Flue connected with circulating casing. Top of heater to have cooking top with two lids. Casing to have hinged cover over cooking top.

Capacity: Minimum output 25,000 BTU per hour for a four hour firing period. Output shall be measured according to test method of Tentative Draft of Commercial Standards for Coal Burning Space Heaters issued by National Bureau of Standards dated June 23, 1942 and as revised February 23, 1943. Heater shall bank 10 hours. Combustion chamber shall hold 20 pounds of bituminous coal (stove) on a bare grate.

Overall Dimensions: Shall not exceed 30" high, 15" deep, 21" wide. Flue outlet shall be 6" D. or equivalent, located at top of heater making vertical connection to smoke pipe.

Applicable Specifications: Combustion chamber shall be cast iron. Ash pit door shall be tight fitting with ground joint and shall have adjustable air control. Provide stove board of smooth surfaced incombustible material, extending beyond all sides of heater, not less than 3/8" thick. Provide poker.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS, NO. 201

COVERING PLUMBING FIXTURES

December 1942

B

201-4-A- Sink and Tray Undercabinets

1. Undercabinet nominal dimensions 42-1/4 inches long, 24 inches deep and 36 inches high, constructed of kiln dried hard wood and 1/4 inches, 3-ply, poplar, gum, fir on ponderose pine plywood made with water resisting glue.

2. Mortised and tenoned joints securely glued, with plywood panels fitting into rabbets shall be the general method of construction.

3. Drain board of approximately 21-3/4 x 13-1/4 inches shall fit over the sink or tray opening and drain in the open fixture.

4. Returns and front apron finished with enamel or lacquer enamel on two undercoats, sanded between each coat. Other parts shall be sanded and coated with raw linseed oil.

5. Cabinets shall be knocked down, consisting of the following assemblies: (a) top frame, (b) side panels, (c) front apron, (d) back rail, and (e) center rail. Required screws shall be provided for assembly.

EQUIPMENT SPECIFICATIONS - No. 201-1
COVERING
PLUMBING FIXTURES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

201-1 WATER CLOSETS

1. Vitreous china, wash down, low down or close coupled tank complete with all fittings.

General Requirements:

1. Plumbing fixtures specified are covered by Federal Specification E-WW-P-541a, Plumbing Fixtures, Land Use, dated July, 1942.

2. Full compliance with effective limitation orders established by Federal Agencies having control over such limitations is mandatory.

3. Minor imperfections which will not affect the use and service of equipment will be acceptable.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 201-1-A
COVERING
PLUMBING FIXTURES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

201-1-A WATER CLOSET SEATS:

1. Seat of varnished wood, less cover, Figure 71, (See Federal Specification).

General Requirements:

1. Plumbing fixtures specified are covered by Federal Specification E-WW-P-541a, Plumbing Fixtures, Land Use, dated July, 1942.

2. Full compliance with effective limitation orders established by Federal Agencies having control over such limitation is mandatory.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 201-2
COVERING
PLUMBING FIXTURES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

201-2 LAVATORIES:

1. Vitreous china or vitreous glazed earthenware.

2. Not over 20 x 18 inches. Basin size not less than 14 x 9 inches and 4 inches from bottom to overflow. Minimum height of back 1-1/2 inches, including concealed hangers. Supporting screws with washers to be furnished with lavatories.

3. Lavatory drilled with 4 inch centers.

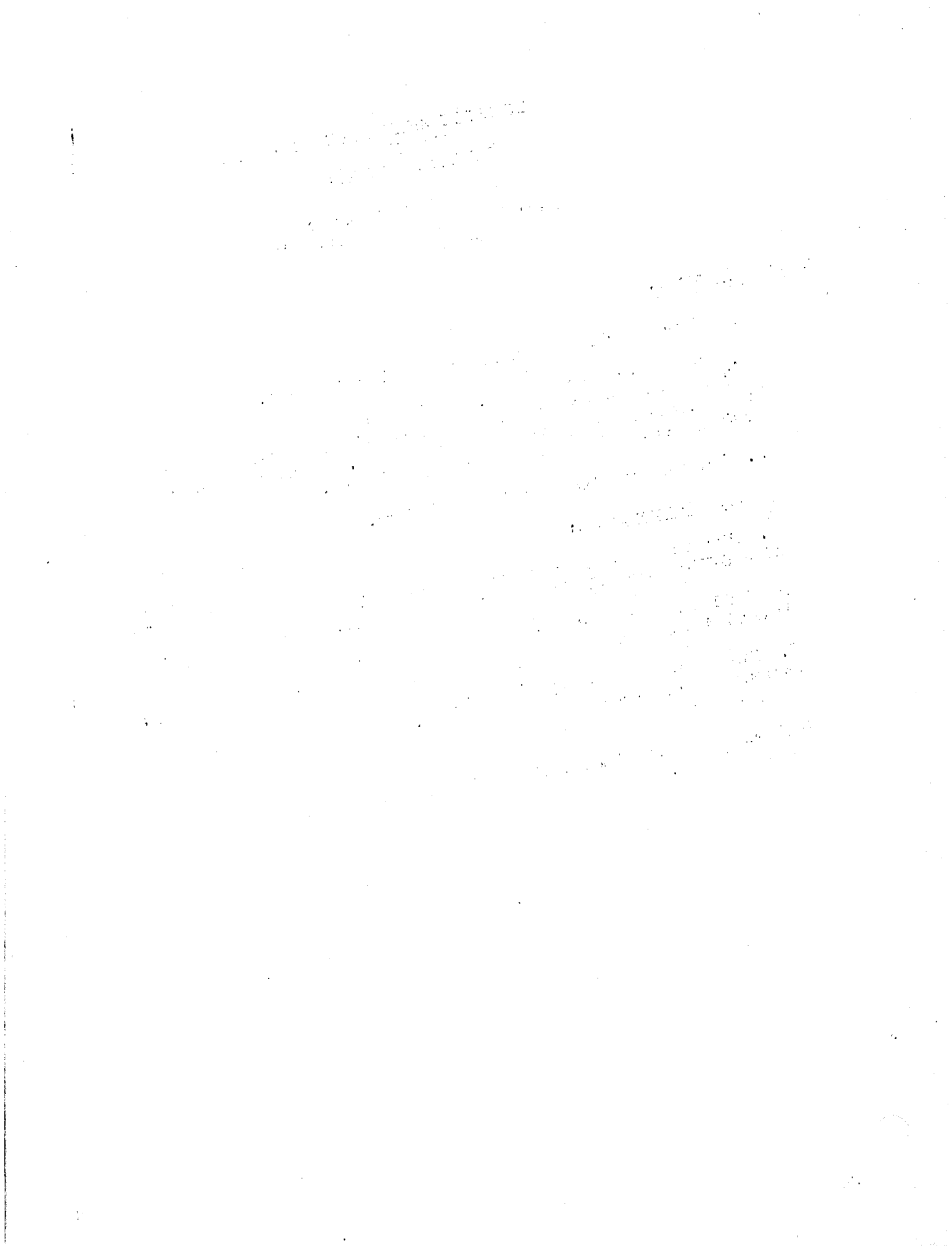
General Requirements:

1. Plumbing Fixtures specified are covered by Federal Specification E-WW-P-541a, Plumbing Fixtures, Land Use, dated July, 1942.

2. Full compliance with effective limitation orders established by Federal Agencies having control over such limitations is mandatory.

3. Minor imperfections which will not affect the use and service of equipment will be acceptable.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.



June 30, 1943

EQUIPMENT SPECIFICATIONS - No. 201-2-A
COVERING
PLUMBING FIXTURES

National Housing Agency
Federal Public Housing Authority

201-2-A LAVATORY TRIM AND FITTINGS:

For use in conjunction with vitreous china or vitreous glazed earthenware lavatories. Each set to consist of:

1. Double faucet similar to Figure 75 (see Federal Specifications) less lift handle pop up waste or stopper.

OR

2. Single lavatory faucet similar to Figure 73 (see Federal Specification)

3. One drain plug, including leather or fibre gasket.

4. One 1-1/4" x 5" tail piece.

5. One non-metallic stopper (less chain)

6. One 1-1/4" rigid "P" trap with a 1-1/4" tapped outlet and a clean out at the bottom (or as an alternate, one 1-1/4" swivel "P" trap without cleanout).

General Requirements:

1. Plumbing fixtures specified are covered by Federal Specification E-WW-P-541a, Plumbing Fixtures, Land Use, dated July, 1942.

2. Full compliance with effective limitation orders established by Federal Agencies having control over such limitation is mandatory.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS- No. 201-3
COVERING
PLUMBING FIXTURES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

201-3 SHOWERS COMPLETE, STALL AND FIXTURES:

1. Fixture consisting of combination compression fitting, riser and nonmetallic shower head, located so the water will be directed to the interior corner.

2. Receptor shall be leak proof, non-absorbent and non-slip, having a nominal outside dimension of 32 x 32 inches; if of concrete, if shall be reinforced to prevent cracking. Front stiles and threshold shall prevent water from splashing to the outside when curtain is drawn. Drain shall be assembled to receptor.

3. Enclosure of hard pressed vegetable fiber board having a dry modulus of rupture not less than 8,000 pounds per square inch, or of cement asbestos board having a dry modulus of rupture not less than 3,650 pounds per square inch. Each type shall not lose more than 50 per cent of its dry strength (modulus of rupture) after soaking in rain water (with surrounding air and water temperatures of 70 degrees F.) for 48 hours. After such soaking, absorption shall not exceed by weight 12 per cent for the vegetable fiber board, and 20 per cent for the cement asbestos board. Finish - white or gray synthetic baked enamel. Height above floor, 6 feet.

4. White duck curtain (8 ounce double filled, bleached and finished), snap hooks and curtain rod shall be provided.

General Requirements:

1. Plumbing fixtures specified are covered by Federal Specifications E-WW-P-541a, Plumbing Fixtures, Land Use, dated, July, 1942.

2. Full compliance with effective limitation orders established by Federal Agencies having control over such limitations is mandatory.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 201-4 - Revised
COVERING
PLUMBING FIXTURES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

Revised May 19, 1945

201-4 SINK

Vitreous china or vitreous glazed earthenware sink 20 x 18 inches at least 6 inches deep. 2-1/2 inch center outlets.

General Requirements:

1. Plumbing fixtures specified are covered by Federal Specification E-WW-P-541a, Plumbing Fixtures, Land Use, dated July, 1942.

2. Full compliance with effective limitation orders established by Federal Agencies having control over such limitations is mandatory.

3. Minor imperfections which will not affect the use and service of equipment will be acceptable.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 201-4-A
COVERING
PLUMBING FIXTURES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

201-4-A SINK & TRAY TRIM & FITTINGS:

For use in conjunction with two piece vitreous china or vitreous glazed earthenware sink and tray, with 2-1/2 inch center outlet. (Sink 20" x 18", 6" deep; Tray 12" x 18", 12" deep.) Each set of trim to consist of the following:

1. Supply fixture, deck type, exposed or concealed, iron body with not less than 6" swing spout. Brass seats, brass stems, adjusting nut escutcheons, lever handles, lock nuts and metal or fiber washers. Inlets may be 1/2" female 4" or 8" centers, 1/4" IP tail piece with one coupling nut for gasket joint (ground seat joint not acceptable).

2. Sink waste plug, wrought iron or cast metal, one piece body with perforated strainer.

3. Tray waste plug, wrought iron or cast metal, one piece body with nonmetallic stopper and with shanks not less than 1-3/4" long with lock nuts and approved lock nut washers and 1-1/2" OD tail pieces.

4. 1-1/2" OD continuous waste with fittings and 1-1/2" OD tail pieces and rigid "P" trap, slip nut, inlet for 1-1/2 OD and Outlet for 1-1/2 IP.

The faucets shall be similar to figure 84, Pattern KM of the Federal Specifications E-WW-P-541a, Plumbing Fixtures, for Land Use dated July 9, 1942.

General Requirements:

Full compliance with effective limitation orders established by Federal Agencies having control over such limitations is mandatory.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 202-1
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-1 STORAGE TANKS, GALVANIZED, 30 GALLONS:

Capacity: Nominal capacity of 30 gallons.

Operating Requirements: Water working pressure of not less than 85 pounds per square inch. Minimum hydrostatic pressure test at factory of 200 pounds per square inch.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Steel tank galvanized inside and outside.

(b) Five standard one inch I.P.S. tappings.

(c) Pressure relief valve 1/2 inch size AGA approved set to open at 100 pounds.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 202-2
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-2 STORAGE TANK, LINED, 30 GALLONS

Capacity: Nominal capacity of 30 gallons.

Operating Requirements: Water working pressure of not less than 85 pounds per square inch. Minimum hydrostatic pressure test at factory of 200 pounds per square inch.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Recommended Commercial Standard For Porcelain Enameled Tanks For Domestic Use, TS-3488, as adopted by the General Conference of April 22, 1943, issued through U. S. Department of Commerce, National Bureau of Standards; or tank may have an approved cement lining.

(b) Five standard one inch I. P. S. tappings.

(c) Pressure relief valve 1/2 inch size AGA approved set to open at 100 pounds.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 202-4
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-4 GAS FIRED STORAGE WATER HEATER, GALVANIZED TANK, 20 GALLONS:

Type: Automatic storage type.

Capacity: 15,000 Btu AGA rated input. Nominal tank capacity 20 gallons.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) American War Standard, Approval Requirements for Gas Water Heaters, issued by the American Standards Association.

(b) Steel tank galvanized inside and outside.

(c) Adjustable thermostat to automatically maintain water temperature between 120 degrees and 150 degrees.

(d) Burner gas cock included as part of heater. Automatic pilot to cut off supply of gas to main burner upon flame failure.

(e) Pressure relief value, 1/2 inch size, AGA approved, set to open at 100 pounds.

(f) Insulate complete unit with at least 1-1/2 inch of mineral wool or its equivalent, encased in enameled finished metal jacket. For internal flue type heaters, one inch mineral wool or equivalent insulation may be furnished.

(g) Provide 3/4 inch Boiler Drain Cock.

(h) The heater shall be suitable for operation with manufactured, natural, mixed gas, or liquefied (bottle gas). The number of heaters for each type of gas will be given on the delivery order.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 201-5
COVERING
PLUMBING FIXTURES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

201-5 BATHTUBS

1. May be vitreous glazed earthenware, reinforced precast concrete with glazed and polished surface, concrete precast vitrified surface or wood as approved by Federal Public Housing Authority.

2. Nominal length 5 feet, 12 inches minimum inside depth and 26 inches minimum inside width. Bottom of tub to overflow level not less than 9 inches.

3. Overflow may be cast integral with tub or 1-1/4 inch connected waste and overflow shall be provided complete. When overflow is cast with tub, provide plug and strainer nonmetallic stopper.

4. Each tub shall be fitted with over-rim supply fixture similar to Figure 80 (see Federal Specification) or of the surface type.

General Requirements:

1. Plumbing Fixtures specified are covered by Federal Specification E-WW-P-541a, Plumbing Fixtures, Land Use, dated July, 1942.

2. Full compliance with effective limitation orders established by Federal Agencies having control over such limitations is mandatory.

3. Minor imperfections which will not effect the use and service of equipment will be acceptable.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

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EQUIPMENT SPECIFICATION - No. 202-6
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-6 GAS FIRED STORAGE WATER HEATER, LINED TANK, 20 GALLONS:

Type: Automatic Storage Type.

Capacity: 15,000 Btu AGA rated input. Nominal tank capacity 20 gallons.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) American War Standard, Approval Requirements for Gas Water Heaters, issued by the American Standards Association.

(b) Recommended Commercial Standard For Porcelain Enameled Tanks For Domestic Use, TS-3488, as adopted by the General Conference of April 22, 1943, issued through U. S. Department of Commerce, National Bureau of Standards.

(c) Adjustable thermostat to automatically maintain water temperature between 120 degrees and 160 degrees.

(d) Burner gas cock included as part of heater. Automatic pilot to cut off supply of gas to main burner upon flame failure.

(e) Pressure relief valve, 1/2 inch size, AGA approved, set to open at 100 pounds.

(f) Insulate complete unit with at least 1-1/2 inch of mineral wool or its equivalent, encased in hard finished nonmetallic jacket. For internal flue type heaters, one inch mineral wool or equivalent insulation may be furnished.

(g) Provide capped nipple extending 1-1/2 inches beyond jacket for drain.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 202-8
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-8 OIL FIRED WATER HEATERS, GALVANIZED TANK, 30 GALLONS:

Type: Automatic Flue type, vertical storage tank and oil burner combined in complete unit.

Capacity: Nominal capacity of tank 30 gallons. Burner capable of heating not less than 30 gallons per hour based on a 60 degree temperature rise.

Operating Requirements: Burner adaptable for burning No. 1 fuel oil as defined in the latest "Commercial Standards for Fuel Oils" issued through U. S. Department of Commerce, National Bureau of Standards. Water working pressure of not less than 106 pounds per square inch. Minimum hydrostatic pressure test at factory of 250 pounds per square inch.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Burner and controls shall comply with applicable Underwriters' Laboratories Standards.

(b) Steel tank galvanized inside and outside.

(c) Burner of the vaporizing pot or sleeve type, provided with adjustable thermostat to automatically maintain water temperature between 120 and 160 degrees.

(d) Fuel tank mounted on heater with manual shut off valve. Minimum capacity of 3 gallons.

(e) Barometric damper for installation in smoke pipe.

(f) Sides of unit to be encased in an insulating jacket. Insulate top of water tank with approved insulation, average thickness 1-1/2 inches encased in cover. Capped nipple extending approximately 1-1/2 inches beyond jacket to be provided for drain.

(g) Pressure relief valve 1/2 inch size, AGA approved, set to open at 100 pounds.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 202-10
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-10 OIL FIRED WATER HEATERS, LINED TANK, 30 GALLONS:

Type: Automatic Flue type, vertical storage tank and oil burner combined in complete unit.

Capacity: Nominal Capacity of tank 30 gallons. Burner capable of heating not less than 30 gallons per hour based on a 60 degree temperature rise.

Operating Requirements: Burner adaptable for burning No. 1 fuel oil as defined in the latest "Commercial Standards for Fuel Oils" issued through U. S. Department of Commerce, National Bureau of Standards. Water working pressure of not less than 106 pounds per square inch. Minimum hydrostatic pressure test at factory of 250 pounds per square inch.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Burner and controls shall comply with applicable Underwriters' Laboratories Standards.

(b) Recommended Commercial Standard For Porcelain Enameled Tanks For Domestic Use, TS-3488, as adopted by the General Conference of April 22, 1943, issued through U. S. Department of Commerce, National Bureau of Standards.

(c) Burner of the vaporizing pot or sleeve type, provided with adjustable thermostat to automatically maintain water temperature between 120 and 160 degrees.

(d) Fuel tank mounted on heater with manual shut off valve. Minimum capacity of 3 gallons.

(e) Barometric damper for installation in smoke pipe.

(f) Sides of unit to be encased in an insulating jacket. Insulate top of water tank with approved insulation, average thickness 1-1/2 inches encased in cover. Capped nipple extending approximately 1-1/2 inches beyond jacket to be provided for drain.

(g) Pressure relief valve 1/2 inch size, AGA approved, set to open at 100 pounds.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 202-12
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-12 ELECTRIC STORAGE WATER HEATERS, LINED TANK, 20 GALLONS:

Type: Automatic Storage type electric water heater with tank.

Capacity: Nominal capacity of tank 20 gallons. Top and bottom heater elements of 1000 watts and 600 watts respectively.

Applicable Specifications:

(a) Recommended Commercial Standard For Porcelain Enameled Tanks For Domestic Use, TS-3488, as adopted by the General Conference of April 22, 1943, issued through U. S. Department of Commerce, National Bureau of Standards.

(b) Heating element or elements to have automatic control, shall be of the external or immersion type fixed so as to be readily removable for servicing without disturbing pipe connections.

(c) Each element shall be controlled by a separate adjustable thermostat for automatically maintaining a water temperature between 120 and 160 degrees, so wired that only one element functions at one time.

(d) Pressure relief valve 1/2 inch size, AGA approved, set to open at 100 pounds.

(e) Unit to be encased in insulated jacket, minimum thickness 2-1/2 inches, conductivity of which shall not exceed 0.30 Btu per hour per square foot per degree F. per inch thickness at mean temperature difference of 90 degrees F.

(f) Provide capped nipple extending 1-1/2 inches beyond jacket for drain.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 202-13
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-13 ELECTRIC STORAGE WATER HEATERS, GALVANIZED TANK, 30 GALLONS:

Type: Automatic storage type electric water heater with tank.

Capacity: Nominal capacity of tank 30 gallons. Top and bottom heater elements of 1000 watts and 600 watts respectively.

Operating Requirements: Operate on AC circuits, 2 wire, 199 to 240 volts. Water working pressure of not less than 85 pounds per square inch. Minimum hydrostatic pressure test at factory of 200 pounds per square inch. Heater to have automatic operation.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Steel tank galvanized inside and outside.

(b) Heating element or elements to have automatic control, shall be of the external or immersion type fixed so as to be readily removable for servicing without disturbing pipe connections.

(c) Each element shall be controlled by a separate adjustable thermostat for automatically maintaining a water temperature between 120 and 160 degrees, so wired that only one element functions at one time.

(d) Pressure relief valve 1/2 inch size, AGA approved, set to open at 100 pounds.

(e) Unit to be encased in insulated jacket, minimum thickness 2-1/2 inches, conductivity of which shall not exceed 0.30 Btu per hour per square foot per degree F. per inch thickness at mean temperature difference of 90 degrees F.

(f) Provide capped nipple extending 1-1/2 inches beyond jacket for drain.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION - No. 202-14
COVERING
WATER HEATERS AND TANKS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

202-14 ELECTRIC STORAGE WATER HEATERS, LINED TANK, 30 GALLONS:

Type: Automatic storage type electric water heater with tank.

Capacity: Nominal capacity of tank 30 gallons. Top and bottom heater elements of 1000 watts and 600 watts respectively.

Operating Requirements: Operate on AC circuits, 2 wire, 199 to 240 volts. Water working pressure of not less than 85 pounds per square inch. Minimum hydrostatic pressure test at factory of 200 pounds per square inch. Heater to have automatic operation.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Recommended Commercial Standard For Porcelain Enameled Tanks For Domestic Use, TS-3488, as adopted by the General Conference of April 22, 1943, issued through U. S. Department of Commerce, National Bureau of Standards.

(b) Heating element or elements to have automatic control, shall be of the external or immersion type fixed so as to be readily removable for servicing without disturbing pipe connections.

(c) Each element shall be controlled by a separate adjustable thermostat for automatically maintaining a water temperature between 120 and 160 degrees, so wired that only one element functions at one time.

(d) Pressure relief valve 1/2 inch size, AGA approved, set to open at 100 pounds.

(e) Unit to be encased in insulated jacket, minimum thickness 2-1/2 inches, conductivity of which shall not exceed 0.30 Btu per hour per square feet per degree F. per inch thickness at mean temperature difference of 90 degrees F.

(f) Provide capped nipple extending 1-1/2 inches beyond jacket for drain.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS No. 202-15
COVERING
COAL FIRED WATER HEATERS

National Housing Agency
Federal Public Housing Authority
August 26, 1943

202-15 COAL FIRED WATER HEATERS

Type: Dome type, with automatic control suitable for anthracite coal.

Capacity: Capable of heating not less than 15 gallons per hour based on a 100 degree temperature rise. Rating to be in accordance with Recommended Commercial Standard, TS-3438, Hot Water Supply Boilers.

Operating Requirements: Water working pressure of not less than 106 pounds per square inch. Minimum hydrostatic pressure test at factory of 250 pounds per square inch.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications: Heater shall have -

(a) 12 inch diameter grate.
(b) Fire brick lining 4 inches high.
(c) Rocking type grates of heavy cast iron.
(d) Shaker Handle.
(e) Ground door joints.
(f) Automatic control may be clamped to outlet pipe and control air supply by chain or linkage.
(g) Shall be shipped assembled.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 302-1 and 2
COVERING
LIGHTING FIXTURES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

GENERAL REQUIREMENTS:

1. Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

2. Emergency Alternate Standards of Underwriters' Laboratories, Inc.

3. Means shall be provided for supporting fixtures on standard 3-1/4", 4" outlet boxes and standard switch boxes. Leads 6" long shall be connected to terminals.

302-1 BEAM TYPE

Type: Ceiling beam type with flared ring opening, pull chain socket standard medium with short pull chain and 30" cord, provided with snubber to relieve strain of excessive pull.

302-2 BRACKET TYPE

Type: Bracket fixture with toggle or pull chain switch and single receptacle.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 401-1
COVERING
COOKING RANGES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

401-1 ELECTRIC

Type: Three surface units with oven below.

Capacity: Not more than 9 KW.

Operating Service: Ranges shall be for operation on 60 cycles, three wire circuits, rated for either 120/240 volts or 120/208 volts. The number of ranges required of each voltage rating will be given on delivery order.

Overall Dimensions: Not more than 23 inches wide, 26 inches deep. Approximately 36 inches from floor to cooking surface.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Federal Specification W-R-101 dated March 26, 1942, Style C.

(b) Range shall be suitable for operation when placed within one inch of adjacent walls and cabinets.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATION NO. 401-2
COVERING GAS COOKING RANGES

National Housing Agency
Federal Public Housing Authority
Revised June 8, 1945

401-2 GAS (adapted and adjusted for gas available at individual project as required):

TYPE: Four surface units with oven and broiler below. American Gas Association Type B with all steel body, concealed manifold, and two drop doors or one swing door (right or left hand as required).

OVERALL DIMENSIONS: Not more than 21 inches wide; 23 inches deep (exclusive of handles and flue collar); approximately 36 inches from the floor to cooking surface. Inside dimensions of oven - 16 inches wide, 18 inches deep and 12 inches high; tolerance plus or minus 5 percent.

APPLICABLE SPECIFICATIONS:

(a) American Standard Approval Requirements for Domestic Gas Ranges (American Standards Association Z21.1-1942). Range shall bear AGA label.

(b) Lighter arranged for automatic ignition of top burners as defined in the Appendix of American Standard Approval Requirements.

(c) Oven burner adjustment from front or side.

(d) Broiler pan and removable drip tray.

(e) Back splasher approximately 4 inches high, full width of range, connected to oven flue, and arranged to permit venting of oven gases therethrough away from rear wall, or oven flue collar adapted for connection to chimney flue (either arrangement as required).

(f) Metal finishes: exposed faces of splasher back, manifold shield, front panel frame, door panel or panels and sides in white or ivory vitreous enamel; cooking top in black vitreous enamel; drip tray, oven interior (except top), broiler, broiler pan in vitreous enamel; oven top in rust resisting finish or may be vitreous enamel; exposed faces of legs or front and side strips where bases are used instead of legs in vitreous enamel or synthetic baked-on enamel; range back in black synthetic baked-on enamel.

INSTRUCTIONS: Furnish installation and operating instructions and list of repair parts with each range.

EQUIPMENT SPECIFICATIONS - No. 401-4
COVERING
COOKING RANGES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

401-4 KEROSENE:

Type: Three surface burners with oven.

Overall Dimensions: Not more than 46 inches wide, 25 inches deep, (excluding handles). Approximately 36 inches from floor to cooking surface.

Federal Restriction: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Ranges shall be suitable for operation when placed within one inch of adjacent walls and cabinets of combustible construction.

(b) Range shall take weight of standard wash boiler 3/4 full of water without showing sign of sagging.

(c) Removable drip tray.

(d) Handles of low heat conduction materials.

(e) Oven-size approximately 14 inches wide, 12 inches high, 19 inches deep. Linings shall be easily removable. Temperature of 475 degrees F. shall be obtained. Provide one rack permitting minimum of two positions.

(f) Burners shall be of wick, lighting ring or wickless type equipped with chimneys.

(g) Reservoirs not less than one gallon. Burners requiring fixed oil level shall have reservoir sufficiently below top of burner bowls or wick tubes so flooding is prevented when stove is out of level; otherwise, provide leveling means.

(h) Metal Finishes - Front and Sides: White, gray or ivory vitreous enamel, Top: Black vitreous enamel. Oven interior: Vitreous enamel. Oven top: Rust resisting finish.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - No. 401-5 and 6
COVERING
COOKING RANGES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

401-5 (BITUMINOUS) COAL:

Type: To incorporate features of conventional coal range with polished cooking surface and oven below.

Operating Service: Wood, lignite and bituminous coal.

Overall Dimensions: Not more than 39 inches wide, 32 inches deep; approximately 36 inches from floor to cooking surface.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Firebox to accommodate wood 18 inches long. When used for coal to accommodate 25 pounds of coal, be capable of holding fire for at least 10 hours when banked, and capable of burning 4 pounds of coal per hour.

(b) Cooking surface - approximately 32 inches wide, 22 inches deep. Area over fire box, including two lids, shall heat to at least 700° F.

(c) Oven - Size approximately 16 inches wide, 17 inches deep, 11 inches high. Provide one rack, permitting minimum of two positions. Insulate oven door, equipped with liner rigidly secured. Oven shall be capable of maintaining a temperature of 450 degrees F.

(d) Back Splasher (approximately 4 inches high) full width of range.

(e) Line firebox with high grade refractory or cast iron except where water back is located.

(f) Smoke pipe connection - not less than 7 inch diameter or equivalent oval opening.

(g) Water back - minimum working and hydrostatic pressure of 125 and 300 pounds per square inch respectively. Capacity to heat minimum of 8 gallons per hour, temperature rise of 60 degrees F. Tap 3/4 inch IPS inlet and outlet connections.

(h) Ash pan - not less than 24 U.S. Gauge, of capacity to hold ashes from a minimum of 24 hours continuous operation, equipped with handles and bale.

(i) Metal finishes - Front and Sides: white or gray baked porcelain enamel.

(j) Furnish separate lid holder, shaker and soot scraper with each range.

401-6 (ANTHRACITE) COAL:

Same requirements as specified for Bituminous Coal Ranges No. 401-5, except:

Operating Service: Wood, coke and anthracite coal.

Applicable Specifications:

(e) Fire box, liners and grates shall be designed for anthracite operation. Line fire box with high grade refractory except where water back is located. Liners shall permit minimum of air leakage. Grates shall have sufficient free air opening for anthracite coal and when rocked they shall sift the ashes.

(a) (
(b) (
(c) (
(d) (
(f) (Same as specified for No. 401-5
(g) (
(h) (
(i) (
(j) (

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS - NO. 402-1 and 2
COVERING
REFRIGERATORS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

402-1 ELECTRIC:

Capacity: 6 cubic feet, NEMA rating.

Operating Service: 115 volts, single phase, 60 cycle.

Overall Dimensions: Not more than 32 inches wide, 28 inches deep, 63-1/2 inches high.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Federal Specification AA-R-211a, dated July 2, 1941.

(b) Right or left hand door swings as required. Number of each type will be given on delivery order.

402-2 GAS: (Manufactured, Natural or Mixed)

Capacity: 5 cubic feet, NEMA rating.

Operating Service: Manufactured, natural or mixed gases.

Overall Dimensions: Not more than 26 inches wide, 30 inches deep, 57 inches high.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits, established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) American Standard Approval Requirements for Gas Refrigerators (ASA Z21.19-1941, Parts I and II).

(b) Right or left hand door swings as required. Number of each type will be given on delivery order.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

EQUIPMENT SPECIFICATIONS NOS. 402-3 and 402-4
COVERING
ICE REFRIGERATORS

Revised January 31, 1944

(Supersedes June 30, 1943 issue)

National Housing Agency
Federal Public Housing Authority
January 31, 1944

402-3 ICE: (3-1/2 cubic feet)

Type: Table top; top icer (ice chamber above food storage) or may be side icer (ice chamber on one side of food storage).

Food Storage Capacity: 3-1/2 cubic feet (tolerance plus or minus 0.2 cubic feet).

Ice Chamber Capacity: 50 pounds of scored ice in not more than 3 pieces (tolerance plus or minus 10 per cent).

Drip Pan: Not less than 12 quart capacity of size to fit under refrigerator, equipped with means for easy lifting.

Overall Dimensions: Not more than 26-1/2 inches wide, 22-3/4 inches deep and 36 inches high including table top.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Top shall be of hardwood table top construction, recessed to provide rim 1/8 inch high.

(b) Interior and exterior panels, door panels, ice chamber liner and drain pan shall be constructed of hard pressed vegetable fibre board of tempered homogeneous or laminated structure, not less than 1/8 inch thick for the homogeneous material and not less than 1/10 inch thick for the laminated material. Drain pan and drain pipe may be of galvanized metal. Each type board shall have a dry modulus of rupture of not less than 8000 pounds per square inch, not lose more than 50 per cent of its dry modulus of rupture strength after soaking in 70 degrees F. rain water (with surrounding air at 70 degrees F.) for 48 hours. After such soaking, absorption shall not exceed by weight 12 per cent for the homogeneous board and 4 per cent for the laminated board. Surfaces of boards of interior and exterior panels

exposed to view shall have smooth natural finish. All panel joints, shall be sealed with waterproof mastic, or be fitted with watertight reinforcing strips. Provide vapor barrier and set between insulation and each exterior panel to prevent penetration of moisture to interior of refrigerator. Front, sides and interior of refrigerator including ice chamber liner shall be painted in durable white; finish of interior including ice chamber liner and non-metallic drain pan shall be non-odor absorbing.

(c) Refrigerator shall comply with "Performance Specifications for Domestic Ice Refrigerators" stipulated in Appendix A of the latest issue of War Production Board Limitation Order L-7C.

Affidavit: Furnish affidavit certifying that equipment complies with specified requirements.

402-4 ICE: (5 cubic feet)

Type: Top icer (ice chamber above food storage) or may be side icer (ice chamber on side of food storage).

Food Storage Capacity: 5 cubic feet (tolerance plus or minus 0.2 cubic feet).

Ice Chamber Capacity: 75 pounds of scored ice in not more than 3 pieces (tolerance plus or minus 10 per cent).

Drip Pan: Not less than 12 quart capacity of size to fit under refrigerator, equipped with means for easy lifting.

Overall Dimensions: Not more than 31 inches wide, 26 inches deep, 61 inches high.

Federal Restrictions: Amount of critical materials used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Interior and exterior panels, door panels, ice chamber liner and drain pan shall be constructed of hard pressed vegetable fibre board of tempered homogeneous or laminated structure, not less than 1/8 inch thick for the homogeneous material and not less than 1/10 inch thick for the laminated material. Drain pan and drain pipe may be of galvanized metal. Each type board shall have a dry modulus of rupture of not less than 8000 pounds per square inch, not lose more than 50 per cent of its dry modulus of rupture strength after soaking in 70 degrees F. rain water (with surrounding air at 70 degrees F.) for 48 hours. After such soaking, absorption shall not exceed by weight 12 per cent for the homogeneous board and 4 per cent for the laminated board. Surfaces of boards of interior and exterior panels exposed to view shall have

smooth natural finish. All panel joints, shall be sealed with waterproof mastic, or be fitted with watertight reinforcing strips. Provide vapor barrier and set between insulation and each exterior panel to prevent penetration of moisture to interior of refrigerator. Front, sides, top and interior of refrigerator including ice chamber liner shall be painted in durable white; finish of interior including ice chamber liner and non-metallic drain pan shall be non-odor absorbing.

(b) Refrigerator shall comply with "Performance Specifications for Domestic Ice Refrigerators" stipulated in Appendix A of the latest issue of War Production Board Limitation Order L-70.

Affidavit: Furnish affidavit certifying that equipment complies with specified requirements.

EQUIPMENT SPECIFICATIONS - No. 404-1
COVERING
OIL STORAGE DRUMS

National Housing Agency
Federal Public Housing Authority
June 30, 1943

404-1 OIL STORAGE DRUMS:

Capacity: 55 gallons.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) In accordance with requirements for I.C.C.-18 drums.

(b) Equipped with fill cap and lock type spigot, arranged for horizontal mounting.

(c) Painted with heavy coat of rusting resisting paint.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.

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EQUIPMENT SPECIFICATIONS - NO. 403-1 and 2
COVERING
HOT PLATES

National Housing Agency
Federal Public Housing Authority
June 30, 1943

403-1 ELECTRIC: (Light Duty)

Type: Light duty, portable.

Capacity: Not more than 1650 watts.

Operating Service: 115 volt, 60 cycles.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Federal Specification W-H-636 Type I and Emergency Alternate Federal Specification E-W-H-636.

(b) Comply with Standards of National Board of Fire Underwriters.

403-2 ELECTRIC: (Hot Plate and Oven Combination)

Type: Double heating plate with portable oven.

Capacity: Total nominal rating 1650 watts.

Operating Service: 115 volts, 60 cycle.

Federal Restrictions: Amount of critical material used in construction shall not exceed limits established by Federal Agencies having control over such limitations.

Applicable Specifications:

(a) Overall dimensions shall not exceed 12 inches x 24 inches.

(b) Applicable Underwriters' Laboratories Standards.

(c) One heating element, nominal rating 600 watts, controlled by switch having on and off positions; the other heating element 1050 watts nominal rating, controlled by switch having at least two heating positions and one off position. Switches shall be protected against spillage by means of a baffle.

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(d) Heating elements set in frame; frame adapted for placement on table top and provided with means for fastening. (As pig iron is less critical at this writing than steel and as a sturdy-built, rugged device is desired, cast iron frame is recommended.

(e) Three foot long electrical connection with standard receptacle plug. The internal wiring between supply, hot plates and switches shall be so fastened as not to be subjected to normal spillage.

(f) Each surface heating element to have resistance wire imbedded in closely packed insulating material, or if of the open coil type protected by a cast iron or sheet metal protective cover so as to avoid any spillage coming in contact with the open coils.

(g) Insulated oven to fit over the larger of the two heating plates. Oven to have two racks and be equipped with door. Inside oven dimensions not less than 10-1/2 inches wide, 11 inches deep and 8 inches high. Interior finished in ground coat of porcelain enamel.

(h) Provide removable drip tray or trays to receive normal spillage.

There is to be no provision for broiling. The assembly shall consist of but two main assemblies - (1) the base frame with two heating elements and control device, and (2) the oven.

GENERAL STIPULATIONS ATTACHED HERETO ARE MADE A PART OF THESE SPECIFICATIONS.