Chimney 10. Cinder concrete building block having two cells, 9 x 9-in. fire clay flue liner with an air space, 7-in.-diam steel thimble.

Chimney 11. Same as Chimney 10, except that solid cinder blocks were used.

Chimney 12. Cinder concrete chimney unit blocks 17 x 22 x 8 in., designed to be used with 9 x 13-in. fire clay liner. Except for a spacing boss at the midlength of each side, the liner was spaced $\frac{3}{4}$ in. from the interior of the unit.

Chimney 13. Cinder concrete chimney unit blocks 16 x 16 x 8 in., 9 x 9-in. fire clay liner grouted in solid with mortar, 7-in.-diam thimble of tile.

Chimney 14. Same as Chimney 13, except that the liner was grouted only at the joints.

These chimneys were all approximately 15.5 ft high, and the drafts have been corrected to 29.92 in. Hg at 32 F.

There are several lightweight chimneys that have been recently approved by the *National Board of Fire Underwriters* for use with all types of fuel. These chimneys are constructed of precast masonry or vitreous enameled steel insulated with an insulating material. The characteristics of these chimneys can be assumed to be approximately those presented in Table 3.

DRAFT REQUIREMENTS OF DOMESTIC APPLIANCES

Typical flue-gas temperatures and drafts required at rated output for several kinds of domestic heating appliances[10] are contained in Table 4.

TABLE 4. DRAFTS REQUIRED BY TYPICAL DOMESTIC HEATING DEVICES OR APPLIANCES

DEVICE	DRAFT, INCHES WATER	STACK TEMPERATURE F DEG
Space Heater, Oil Burning, Pot Burner	0.06 to 0.08	1000
Warm Air Furnace, Oil Burning, Pot Burner	0.06	860
Warm Air Furnace, Hand Fired	0.06[b]	900
Floor Furnace, Oil Burning, Pot Burner	0.06	860
Mechanical Oil Burner, Less than 5 gph	0.03[a]	.....
Mechanical Oil Burner, More than 5 gph	0.05[a] or less	.....
Cooking Stove, Solid Fuel	0.04[b]	400
Space Heater, Coal Burning	0.06[b]	900

[a] Draft in firebox. [b] For chestnut sized anthracite.

CHIMNEYS FOR GAS HEATING

Heating appliances designed to burn gas, as well as appliances converted to gas burning, except those equipped with power type burners and excepting conversion burner installations in excess of 400,000 Btu per hour input in large steel boilers, are always equipped with a draft hood attached to the flue outlet of the appliance. This draft hood is required if the appliance is to meet the approval requirements of the *American Gas Association* and the *American Standards Association*, and is essential for safe operation. It is designed to prevent excessive chimney draft which would lower appliance efficiency, to prevent a blocked flue or a down-draft in the chimney from impairing combustion, to provide a relief opening for the products of combustion during down-draft or blocked flue conditions, and to prevent spillage of the products of combustion to the space surrounding the appliance, if there is a chimney draft equivalent to that provided by a 3-ft chimney. As the draft hood is designed without moving parts, the relief opening is always open, and consequently some air is drawn into the chimney. This air lowers the gas temperature in the chimney, but it also lowers the dew-point of the gases and tends to prevent condensation.

The installation of conversion burner equipment in large boilers is

usually made in accordance with regulations of the local gas company. In such installations a definite chimney draft may be required for proper combustion, and consequently the foregoing reference to the use of draft hoods would not apply.

The products of complete combustion of gas are water vapor (H_2O) and carbon dioxide (CO_2). In the case of manufactured gas, the presence of organic sulfur compounds, generally between 3 and 15 grains per hundred cubic feet, gives rise to minute percentages of sulfur dioxide and sulfur

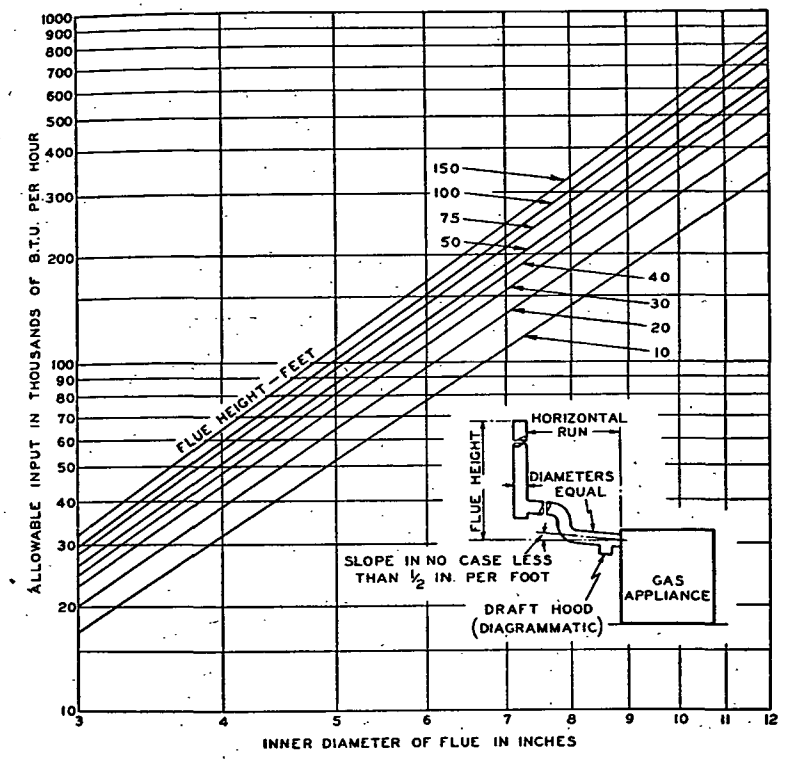


FIG. 7. ALLOWABLE BTU INPUT TO CIRCULAR FLUES FOR DOMESTIC GAS APPLIANCES WITH DRAFT HOODS

NOTES APPLYING TO FIG. 7:

1. Chart is based on: average flue temperature of 150 F, outside temperature of 60 F, barometric pressure of 30 in. Hg, 100 percent excess air and 100 percent dilution at draft hood.
2. Based on terra-cotta lined flues. With rough brick flues, capacities are 15 percent less.
3. Based on condition that horizontal run is not greater than 20 ft except for a flue height less than 20 ft, in which case the horizontal run is not to have greater length than the height of the flue.
4. Two long radius elbows are included in the horizontal run, the diameter of which is equal to that of the flue.
5. Each additional elbow reduces the allowable horizontal run by a length in feet equal to the diameter in inches.
6. When the horizontal run has an effective length in excess of that given (or additional elbows) the next larger size of flue should be chosen. It is desirable that long horizontal runs be insulated to reduce heat loss of flue products and to conserve draft.
7. Capacities should be reduced 3.5 percent for each 1000 ft above sea level.