

chimney stoppage will merely cause some of the products of combustion to be vented out into the boiler room, but will not interfere with combustion. In fact, gas-designed appliances must perform safely under such a condition to be approved by the *American Gas Association* Laboratory. Other functions of the back-draft diverter are to protect the burner and pilot from the effects of down-drafts, and to neutralize the effects of variable chimney drafts, thus maintaining the appliance efficiency at a

TABLE 2. SUGGESTED GENERAL DIMENSIONS FOR VERTICAL BACK-DRAFT DIVERTER

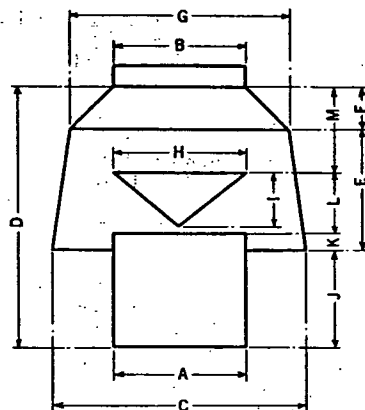


Table of Dimensions (In.)

Pipe Size	A	B	C	D	E	F	G	H	I	J	K	L	M
3	3	3	5.5	7.0	3.8	0.7	4.4	3.0	1.5	2.5	0.7	1.5	2.3
4	4	4	7.2	9.5	5.0	1.0	6.0	4.0	2.0	3.5	1.0	2.0	3.0
5	5	5	9.4	10.8	5.3	1.5	8.0	5.0	2.3	4.0	0.9	2.4	3.5
6	6	6	11.5	12.0	5.6	1.9	9.8	6.0	2.5	4.5	0.8	2.7	4.0
7	7	7	13.5	13.9	6.4	2.3	11.6	7.0	2.9	5.3	0.9	3.1	4.6
8	8	8	15.5	15.8	7.1	2.7	13.4	8.0	3.2	6.0	1.0	3.5	5.3
9	9	9	17.5	17.5	7.7	3.1	15.2	9.0	3.5	6.7	1.0	4.0	5.8
10	10	10	19.7	18.8	7.9	3.6	17.2	10.0	3.8	7.3	1.0	4.3	6.2
11	11	11	22.2	20.7	8.4	4.3	19.6	11.0	4.1	8.0	1.5	4.6	6.6
12	12	12	24.7	22.2	8.7	5.0	22.0	12.0	4.4	8.5	1.7	5.0	7.0

substantially constant value. Converted boilers or furnaces, as well as gas-designed appliances, should be provided with back-draft diverters.

Since back-draft diverters have a special function to perform in protecting gas burning appliances, it is necessary that they should be built to the proper size as shown in Table 2. Work is now in progress on the development of a horizontal diverter for use where there is not enough room to install a vertical type of diverter. Information on the approved proportion of such equipment may be secured from the *American Gas Association* Testing Laboratory.

TABLE 3. MINIMUM ROUND CHIMNEY DIAMETERS FOR GAS APPLIANCES (INCHES)

HEIGHT OF CHIMNEY FEET	GAS CONSUMPTION IN THOUSANDS OF BTU PER HOUR								
	100	200	300	400	500	750	1000	1500	2000
20	4.50	5.70	6.60	7.30	8.00	9.40	10.50	12.35	13.85
40	4.25	5.50	6.40	7.10	7.80	9.15	10.25	12.10	13.55
60	4.10	5.35	6.20	6.90	7.60	8.90	10.00	11.85	13.25
80	4.00	5.20	6.00	6.70	7.35	8.65	9.75	11.50	12.85
100	3.90	5.00	5.90	6.50	7.20	8.40	9.40	11.00	12.40

As is the case with the complete combustion of almost all fuels, the products of combustion for gas are carbon dioxide (CO_2) and water vapor with just a trace of sulphur trioxide (SO_3). Sulphur usually burns to the trioxide in the presence of an iron oxide catalyst. The volume of water vapor in the flue products is about twice the volume of the carbon dioxide when coke oven or natural gas is burned. Because of the large quantity of water vapor which is formed by the burning of gas, it is quite important that all gas-fired central heating plants be connected to a chimney having a good draft. Lack of chimney draft causes stagnation of the products of combustion in the chimney and results in the condensation of a large amount of the water vapor. A good chimney draft draws air into the chimney through the openings in the back-draft diverter, lowers the dew point of the mixture, and reduces the tendency of the water vapor to condense.

The flue connections from a gas-fired boiler or furnace to the chimney should be of a non-corrosive material. In localities where the price of gas requires the use of highly efficient appliances, the material used for the flue connection not only should be resistant to the corrosion of water, but should resist the corrosion of dilute solutions of sulphur trioxide in water. Sheet aluminum, as well as some other materials, seems to serve this purpose very well.

When condensation in a chimney proves troublesome, it may be necessary to provide a drain to a dry well or sewer. The cause of the excessive condensation should be investigated and remedied if possible. This may be done by raising the flue temperature slightly or increasing the size of the back-draft diverter. The protection of unlined chimneys has been investigated and the results indicate that after the loose material has been removed, the spraying with a water emulsion of asphalt-chromate provides an excellent protection.

A chimney for a gas-fired boiler or furnace should be constructed in accordance with the principles applicable to other boilers. Where the wall forming a smoke flue is made up of less than an 8-in. thickness of brick, concrete, or stone, a burnt fire clay flue tile lining should be used. Care should be used that the lengths of flue tile meet properly with no openings at the joints. Cement mortar should be used for the entire chimney.

Table 3 gives the minimum cross-sectional diameters of round chim-