

CHIMNEYS, SMOKESTACKS, FLUES AND VENTS

1. GENERAL

1.01 This section outlines suggested standards of construction for protection from the hazards involved in the removal of the products of combustion from heating appliances used in telephone buildings.

1.02 This issue includes a general revision of the practice to conform to present recommendations, and suggests protective measures for additional types of heating appliances. Marginal arrows, indicating changes in the text, are omitted in this issue because of the general revision of the text.

1.03 The suggested standards are based in general on the following:

- (a) National Fire Codes, Volume I - Flammable Liquids, Gases, Chemicals and Explosives.
- (b) National Fire Codes, Volume III - Building Construction and Equipment.
- (c) National Building Code, recommended by The National Board of Fire Underwriters.
- (d) Standard of the National Board of Fire Underwriters for the Installation of Gas Piping and Gas Appliances in Buildings as recommended by the National Fire Protection Association - N.B.F.U. Pamphlet No. 54 (1950).

The National Fire Codes are obtainable from the National Fire Protection Association, 60 Battery March Street, Boston, Massachusetts. Copies of the National Building Code and N.B.F.U. Pamphlet No. 54 may be had on application to the offices of the National Board of Fire Underwriters, 85 John Street, New York City.

1.04 In addition to the provision of adequate flues or vents, it is important that the installation of each type of heater is in accordance with approved practices. Heating devices should be suitable for the particular installation and the installation should be made in accordance with the manufacturer's instructions and conditions of safe operation of which there is acceptable evidence, such as labeling or listing by Underwriters' Laboratories, Incorporated, or the American Gas Association Testing Laboratories.

1.05 The recommended construction outlined in this section, unless otherwise stated, is for the removal, by natural draft, of the products of combustion from heating apparatus and

heat producing appliances normally used in telephone buildings, and which do not develop temperatures in excess of 600 degrees Fahrenheit.

1.06 Recommendations pertaining to clearances to combustible materials and construction in connection with the installation of heating equipment are outlined in B.S.P. Section H42.110, Heating Equipment - Fire Protection. Clearances in connection with the installation of gas appliances and accessories are recommended to conform to the standard of the National Board of Fire Underwriters for the Installation of Gas Piping and Gas Appliances in Buildings.

1.07 Where local or state regulations exceed the standards suggested in this practice, the legislated measures are applicable.

2. DEFINITIONS

2.01 The various devices and their functions in the removal of products of combustion are as follows:

- (a) Flue or Vent: A conduit or passageway, vertical or nearly so, for removing products of combustion from solid, liquid or gas fuel.
- (b) Chimney: A vertical masonry or reinforced concrete shaft containing one or more flues or vent.
- (c) Smoke Pipe: A pipe of breeching connecting a heating appliance with the flue or vent.
- (d) Gas Vent: A flue for removing products of combustion from gas appliances, but not suitable for other fuels.

2.02 With consideration of the requirements for venting the heating devices, flues or vents are identified by the protection afforded in their construction, as follows:

- (a) Type A Flue: A chimney or metal smokestack.
- (b) Type B Gas Vent: Approved vent piping for use with approved gas appliances not required to be vented to Type A flues.
- (c) Type C Gas Vent: Vent piping of approved material and used for venting certain types of gas appliances directly to the outer air.

3. TYPE A FLUES

Chimneys

3.01 Chimneys are constructed of approved solid masonry units or reinforced concrete and are wholly supported on masonry or self-supporting fireproof construction. The chimney walls are not less than 8 inches thick except that walls of rubble stone masonry are not less than 12 inches thick. In community dial offices and buildings of similar heating requirements the chimney walls have a thickness of not less than 4 inches. Where 4-inch chimney walls are used, however, it is important that the installation is made in a manner to reduce the movement of air through the flue walls. The brick should be carefully bedded on full mortar joints, and the area between the flue lining and the walls of the chimney filled with mortar.

3.02 Chimneys are extended at least 3 feet above the highest point where they pass through the roof of the building, at least 2 feet higher than any ridge within 10 feet, and are properly capped with brick, terra cotta, stone, concrete or other approved non-combustible weatherproof material.

3.03 Changes in the size or shape of a chimney where it passes through the roof are not recommended to be made within a distance of 6 inches above or below the roof joists or rafters.

3.04 Corbeling, where necessary, is limited to walls not less than 12 inches thick unless it projects equally on each side of the wall. The projection from the face of the wall is limited to 6 inches and one course of brick for each inch of projection.

3.05 Chimneys are constructed with flue linings of fire clay or other refractory clay which will withstand the action of flue gases and resist without softening or cracking, the temperatures to which they will be subjected, but not less than 2000° Fahrenheit. In taller buildings where considered desirable, cast iron piping of approved quality, form and construction is used for flue lining.

3.06 Flue linings are installed ahead of the construction of the chimney as it is carried up, carefully bedded one on the other in approved or fire clay mortar with close fitting joints left smooth on the inside. Filling the area between the flue lining and the chimney walls with mortar tends to reduce the movement of air through the walls of the flue.

3.07 Flue linings are installed from a point not less than 8 inches below the intake and extend, as nearly vertically as possible, for the entire height of and 4 inches above the top or cap of the chimney.

3.08 Required clay flue linings are not less than 5/8 of an inch thick for the smaller flues, increasing in thickness for the larger ones. The cross-sectional area is not less than the aggregate areas of the vents of the appliances connected to them.

3.09 Smoke pipe or breeching connections to flues are limited to one story of a building, unless provision is made for effectively closing the connection when their use is discontinued temporarily, and completely closing them with masonry when discontinued permanently. Smoke pipe runs are short, well fitted and supported, and where practicable, are sloped upward toward the flue connection.

3.10 Two or more smoke pipes are not joined for a single flue connection, unless the smoke pipes and flue are of sufficient size to serve all of the appliances so connected.

3.11 Cleanouts for flues are equipped with cast iron doors and frames arranged to remain tightly closed when not in use.

3.12 Whenever the construction of a new building or building addition involves the vertical extension of a wall along or within 3 feet of a lot line and above the top of a chimney or smoke flue or an adjacent building, all chimneys and smoke flues within 10 feet of the new construction are extended to conform to the requirements of their use.

Metal Smokestacks

3.13 The requirements for venting the heating apparatus and appliances in telephone buildings do not generally warrant the use of smokestacks. For reasons of maintenance and appearance exterior stacks are not considered desirable, and the cost and space requirements for wall enclosure limit the economical use of interior stacks to one-story buildings. The suggested standards for their construction and use are included in this section for consideration of existing installations, and for new construction where the flue requirements can not be met by standard chimneys.

3.14 Metal smokestacks are of adequate thickness, properly riveted or welded and, unless structurally self-supporting, are guyed securely, or firmly anchored to or otherwise supported by the building served.

3.15 All metal work is painted or galvanized and the stacks are extended to a height of not less than 10 feet above the highest point of any roof within 25 feet. Cleanout openings are provided at the base of each stack.

3.16 Metal smokestacks need no protection against lightning other than that afforded by their construction, except that they are properly grounded. If the foundation does not provide ample electrical connection with the earth, ground connections are made in the manner generally prescribed for buildings. Metal guy wires and cables are grounded at their lower ends.

3.17 Exterior Stacks should have a clearance of not less than: 4 inches from non-combustible walls; 24 inches from walls of a frame building; or 24 inches in any direction from any wall opening, fire escape or other exit facility, unless the stack is insulated in an approved manner, in which case the clearance herein prescribed may be reduced one third.

3.18 Interior Stacks, except in a one-story building, are enclosed above the story in which the heating apparatus or appliance is located, in walls of non-combustible construction having a fire resistance rating of not less than one hour. Space is provided between the stack and enclosing walls for accessibility for examination and repair, and wall openings are limited to the requirements for inspection purposes.

3.19 A stack is protected in passing through a roof constructed of combustible materials by a galvanized iron ventilating thimble extending not less than 9 inches below and 9 inches above the roof construction. The thimbles are of sufficient size to provide a clearance on all sides of the stack of not less than 6 inches.

4. TYPE B GAS VENTS

4.01 Type B gas vents are made up of approved vent piping of non-combustible, corrosion-resistant piping material of adequate strength and heat insulating value, with tight joints of approved type.

4.02 They are installed with a clearance of not less than one inch to combustible material or construction, provided that for vents of floor furnaces the clearance is not less than 3 inches for a distance of not less than 3 feet from the outlet of the draft hood. Provision is made to prevent mechanical injury to Type B gas vents where they are extended through walls, floors or roofs.

5. TYPE C GAS VENTS

5.01 Type C gas vents are made up of sheet copper piping of not less than 24 U. S. gauge or of galvanized iron of not less than 20 U. S. gauge or of other approved corrosion-resistant material.

5.02 The vent piping is used in runs directly from the space in which the appliance is located to the outer air and is not extended through any combustible walls or partitions unless it is guarded at the point of passage by ventilated metal thimbles of sizes approved for use with the appliance.

5.03 The requirements for Type C gas vents apply to all gas appliance vent piping other than approved Type B vents.

6. SOLID AND LIQUID FUEL BURNING APPLIANCES

6.01 Boilers and Furnaces associated with warm air, hot water and low pressure steam heating systems are generally vented into chimneys as outlined in Part 3.

6.02 Stoves and Cooking Ranges burning solid or liquid fuel also require Type A flues.

6.03 Incinerators of approved domestic or portable type, or having a horizontal grate area not exceeding 9 square feet, are vented to Type A flues when installed in accordance with accepted conditions of safe operation. Incinerators of the non-fuel fired stationary type used in some telephone buildings, require a flue lining of fire brick not less than 4-1/2 inches thick laid on the 4-1/2-inch bed in fire-clay mortar and extended the full height of the flue. All flues for non-fuel fired incinerators are terminated in substantially constructed spark arresters. Spark arresters of heavy wire netting of not more than 3/4-inch mesh are generally satisfactory, particularly where wire of chrome nickel alloy or high chrome content nickel steel is used. Expansion chambers or hood type spark arresters may be considered where combustible surroundings warrant their use.

6.04 Internal Combustion Engine Exhausts are not recommended to be vented into the low heat appliance flues as covered in this section. Suggested methods of exhaust piping are outlined in B.S.P. H42.210, Internal Combustion Engines.

7. GAS BURNING APPLIANCES

7.01 It is considered advisable to provide flue connections for all gas appliances except industrial appliances of such size and

character that the absence of a connection does not constitute a hazard to the occupants of the building.

7.02 Vent piping from a gas appliance is not recommended to be interconnected with another vent pipe, smoke pipe, or flue, unless the gas appliance is equipped with an automatic device to prevent the escape of unburned gas at the main burner or burners, and the individual vents joined by a Y fitting located as close as practicable to the chimney or flue.

7.03 Chimneys or flues installed for the use of gas appliances but which are not suitable for solid or liquid fuels, are recommended to be plainly labeled where the vent pipe enters the chimney or flue to prevent their use for appliances burning solid or liquid fuels.

7.04 Every flue connected appliance except an incinerator, unless its construction serves the same purpose, is equipped with a draft hood designed to (1) insure the ready escape of the products of combustion in the event of no draft, back draft, or stoppage beyond the draft hood; (2) prevent a back draft from entering the appliance; and (3) neutralize the effect of stack action of the chimney flue upon the operation of the appliance.

7.05 Small Gas Appliances and heaters which may be installed without vents include:

- (a) Domestic appliances with input rating of less than 50,000 British thermal units per hour.
- (b) Domestic gas ranges.
- (c) Automatic instantaneous water heaters of the single faucet type.
- (d) Automatically controlled appliances equipped with automatic device to prevent escape of unburned gas at the main burner and having an input rating less than 5,000 British thermal units per hour. Automatically controlled appliances are equipped to turn

the gas supply on or off automatically in accordance with the demand for heat, but do not include appliances equipped with controls governing the supply of gas to the main burner or burners which can not automatically reduce the gas supply below 30 per cent of the input rating.

7.06 Type A Flues are used for venting gas burning appliances which (1) may readily be converted to the use of solid or liquid fuel; (2) gas fired incinerators; and (3) other appliances which produce flue gas temperatures in excess of 550 degrees Fahrenheit at the outlet of the draft hood when burning gas at the manufacturer's input rating. Gas fired boilers and furnaces and water heater units are generally vented to standard chimneys as outlined in Part 3.

7.07 Type B Gas Vents may be accepted in lieu of a connection to a standard chimney when:

- (a) Local conditions with respect to gas supply are such that a change to solid or liquid fuel in the particular appliance is unlikely.
- (b) Arrangements can be made so that the enforcing authority is notified of the change to gas or other fuel so that the requirements of a chimney can be enforced.

7.08 In general, Type B vents are used with gas appliances which burn gas at the manufacturer's input rating without producing flue gas temperatures in excess of 550 degrees Fahrenheit at the outlet of the draft hood of the appliance.

7.09 Domestic and other gas burning appliances are labeled by the American Gas Association Laboratory, indicating that they have been tested and found to be reliable and safe for operation with Type B gas vents.

7.10 Type C Gas Vents are used for the venting of gas appliances which do not require Type A flues or Type B gas vents.