John Berndt

CANADIAN HEATING, VENTILATING AND AIR-CONDITIONING CODE 1975

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CANADIAN HEATING, VENTILATING AND AIR-CONDITIONING CODE 1975

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PREFACE

The Canadian Heating, Ventilating and Air-Conditioning Code 1975 contains the requirements for the design and installation of heating, ventilating and air-conditioning systems formerly in Section 6.2 of Part 6 (Building Services) of the National Building Code of Canada.

It also includes two important Appendices: Appendix A contains the corresponding requirements for heating, ventilating and air-conditioning from Part 9 (Housing and Small Buildings) of the National Building Code; Appendix B contains supplementary material in the form of notes and diagrams which provide additional information and explanation of Code requirements.

The first line of each item in Appendix B contains in bold-face type a reference to the requirement in the main body of the Code to which the supplementary material is applicable. These references have been placed in numerical order to ensure that they are easily found when they are referred to in the text.

Where metric equivalents have been included in this Code, they are not intended to have legal significance as they are approximations only.

The Canadian Heating, Ventilating and Air-Conditioning Code 1975 is published by the National Research Council of Canada and is prepared under the auspices of the Associate Committee on the National Building Code.

It is one of a special code series published separately from but referenced in the National Building Code. It can thus be adopted for legal use by a municipality or provincial body jointly with or separately from the National Building Code.

Enquiries regarding this document should be directed to: The Secretary, Associate Committee on the National Building Code, National Research Council of Canada, Ottawa, Ontario K1A 0R6.

Le Code national du bâtiment, ses suppléments et les documents qui s'y rattachent sont disponibles en français. On peut se les procurer en s'adressant au Secrétaire, Comité associé du Code national du bâtiment, Conseil national de recherches du Canada, Ottawa, Ontario K1A 0R6.

SECTION 1 DEFINITIONS AND ABBREVIATIONS

SUBSECTION 1.1 DEFINITIONS OF WORDS AND PHRASES

1.1.1. Definitions of words and phrases used in this Code that are not included in the list of definitions in this Section shall have the meanings which are commonly assigned to them in the context in which they are used in this Code, taking into account the specialized use of terms by the various trades and professions to which the terminology applies.

1.1.2. The words and terms in italics in this Code shall have the following meanings:

Appliance means a device to convert fuel into energy, and includes all components, controls, wiring and piping required to be part of the device by the applicable standard referred to in this Code.

Appropriate authority having jurisdiction means the department of the provincial governments and agents thereof that have authority over the subject that is regulated.

Approved means approved by the *authority having jurisdiction* or the *appropriate authority having jurisdiction.*

Assembly occupancy means the *occupancy* or use of a *building,* or part thereof, by a gathering of persons for civic, political, travel, religious, social, educational, recreational or like purposes, or for the consumption of food or drink.

Attic or roof space means the space between the roof and the ceiling of the top *storey* or between a dwarf wall and a sloping roof.

Authority having jurisdiction means

(a) with respect to the proclamation and amendment of this Code, and the creation of a Board of Appeal, the adopting governmental body, or

(b) with respect to the administration of this Code, the person (designated official) appointed by the adopting governmental body and any person authorized by him to administer this Code.

Boiler means an *appliance* intended to supply hot water or steam for space heating, processing or power purposes.

Breeching means a *flue pipe* or chamber for receiving *flue* gases from 1 or more *flue* connections, and for discharging these gases through a single *flue* connection.

Building means any structure used or intended for supporting or sheltering any use or *occupancy.*

Business and personal services occupancy means the *occupancy* or use of a *building* or part thereof for the transaction of business or the rendering or receiving of professional or personal services.

Chimney means a primarily vertical shaft enclosing at least 1 *flue* for conducting *flue* gases to the outdoors.

Chimney, factory-built means a *chimney* consisting entirely of factory-made parts, each designed to be assembled with the other without requiring fabrication on site.

Chimney liner means a conduit containing a chimney *flue* used as a lining of a *masonry or concrete chimney.*

Chimney, masonry or concrete means a *chimney* of brick, stone, concrete or *approved* masonry units constructed on site.

Chimney, metal means a single-wall *chimney* of metal constructed on site.

Closure means a device for shutting off an opening through a construction assembly, such as a door or a shutter, and includes all components such as hardware, closing devices, frames and anchors.

Combustible (as applying to an elementary building material) means that such material fails to conform to CSA B54.1-1972, "Determination of Noncombustibility in Building Materials."

Combustible construction means that type of construction that does not meet the requirements for *noncombustible construction.*

Dwelling unit means a room or suite of rooms operated as a housekeeping unit, used or intended to be used as a domicile by 1 or more persons, and usually containing cooking, eating, living, sleeping and sanitary facilities.

Concrete chimney (see *chimney, masonry or concrete*).

Exhaust duct means a duct through which air is conveyed from a room or space to the outdoors.

Factory-built chimney (see *chimney, factory-built*).

Fire damper means a *closure* which consists of a normally held open damper installed in an air distribution system or in a wall or floor assembly, and designed to close automatically in the event of a fire in order to maintain the integrity of the *fire separation.*

Fire-protection rating means the time in hours or fraction thereof that a *closure,* window assembly or glass block assembly will withstand the passage of flame when exposed to fire under specified conditions of test and performance criteria, or as otherwise prescribed in the National Building Code of Canada 1975.

Fire resistance means the property of a material or assembly to withstand fire or give protection from it; as applied to elements of *buildings,* it is characterized by the ability to confine a fire or to continue to perform a given structural function, or both.

Fire-resistance rating means the time in hours or fraction thereof that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria, or as determined by extension or interpretation of information derived therefrom as prescribed in the National Building Code of Canada 1975.

Fire separation means a construction assembly that acts as a barrier against the spread of fire and may not be required to have a *fire-resistance rating* or a *fire-protection rating.*

Fire stop means a draft-tight barrier within or between construction assemblies that acts to retard the passage of smoke and flame.

Fire stop flap means a device intended for use in horizontal assemblies required to have a *fire-resistance rating* and incorporating protective ceiling membranes, which operates to close off a duct opening through the membrane in the event of a fire.

Firewall means a type of *fire separation* of *noncombustible construction* which subdivides a *building* or separates adjoining *buildings* to resist the spread of fire and which has a *fire-resistance rating* as prescribed in the National Building Code of Canada 1975 and has structural stability to remain intact under fire conditions for the required fire-rated time.

Flame-spread rating means an index or classification indicating the extent of spread-of-flame on the surface of a material or an assembly of materials, as determined in a standard fire test as prescribed in the National Building Code of Canada 1975.

Floor area means the space on any *storey* of a *building* between exterior walls and required *firewalls,* including the space occupied by interior walls and *partitions,* but not including *exits* and *vertical service spaces* that pierce the *storey.*

Flue means an enclosed passageway for conveying *flue* gases.

Flue collar means the portion of a fuel-fired *appliance* designed for the attachment of the *flue pipe* or *breeching.*

Flue pipe means the pipe connecting the *flue collar* of an *appliance* to a *chimney.*

Forced-air furnace (see *furnace, forced-air*).

Furnace means a *space-heating appliance* using warm air as the heating medium and usually having provision for the attachment of ducts.

Furnace, forced-air means a *furnace* equipped with a fan that provides the primary means for circulation of air.

Garage, repair means a *building* or part thereof where facilities are provided for the repair or servicing of motor vehicles.

Garage, storage means a *building* or part thereof intended for the storage or parking of motor vehicles and which contains no provision for the repair or servicing of such vehicles.

Gas vent means that portion of a venting system designed to convey vent gases vertically to the outside air from the *vent connector* of a gas-fired *appliance,* or directly from the *appliance* when a *vent connector* is not used, and includes any offsets.

High hazard industrial occupancy (see *industrial occupancy, high hazard*).

Horizontal service space means a space such as an attic, duct, ceiling, roof or crawl space oriented essentially in a horizontal plane, concealed and generally inaccessible, through which building service facilities such as pipes, ducts and wiring may pass.

Indirect service water heater (see *service water heater, indirect*).

Industrial occupancy means the *occupancy* or use of a *building* or part thereof for assembling, fabricating, manufacturing, processing, repairing or storing of goods and materials.

Industrial occupancy, high hazard (Group F, Division 1) means an *industrial occupancy* containing sufficient quantities of highly *combustible* and flammable or explosive materials which, because of their inherent characteristics, constitute a special fire hazard.

Industrial occupancy, medium hazard (Group F, Division 2) means an *industrial occupancy* in which the *combustible* content is more than 10 lb (4.5 kg) or 100,000 Btu/sq ft (1,135,600 kJ/m^2) of floor area and not classified as *high hazard industrial occupancy.*

Industrial occupancy, low hazard (Group F, Division 3) means an *industrial occupancy* in which the *combustible* content is not more than 10 lb (4.5 kg) or 100,000 Btu/sq ft (1,135,600 kJ/m^2) of floor area.

Institutional occupancy means the *occupancy* or use of a *building* or part thereof by persons harboured or detained to receive medical care or treatment or by persons involuntarily detained.

Low hazard industrial occupancy (see *industrial occupancy, low hazard*).

Masonry or concrete chimney (see *chimney, masonry or concrete*).

Medium hazard industrial occupancy (see *industrial occupancy, medium hazard*).

Mercantile occupancy means the *occupancy* or use of a *building* or part thereof for the displaying or selling of retail goods, wares or merchandise.

Metal chimney (see *chimney, metal*).

Noncombustible (as applying to an elementary building material) means that such material conforms to CSA B54.1-1972, "Determination of Noncombustibility in Building Materials."

Noncombustible construction means that type of construction in which a degree of fire safety is attained by the use of *noncombustible* materials for structural members and other building assemblies.

Occupancy means the use or intended use of a *building* or part thereof for the shelter or support of persons, animals or property.

Partition means an interior wall, 1 *storey* or part-*storey* in height that is not loadbearing.

Plenum means a chamber forming part of an air duct system.

Public corridor means a corridor that provides access to exit from individually rented rooms, suites of rooms or *dwelling units.*

Range means a cooking *appliance* equipped with a cooking surface and 1 or more ovens.

Repair garage (see *garage, repair*).

Residential occupancy means the *occupancy* or use of a *building* or part thereof by persons for whom sleeping accommodation is provided, but who are not harboured or detained to receive medical care or treatment, or are not involuntarily detained.

Restaurant means any *building,* or portion thereof, where food is offered for sale for immediate consumption therein, but does not include any *building,* or portion thereof, where drink or prepackaged food requiring no further preparation before consumption is offered for sale.

Return duct means a duct for conveying air from a space being heated, ventilated or air-conditioned back to the heating, ventilating or air-conditioning *appliance.*

Service room means a room or space provided in a *building* to accommodate building service equipment such as air-conditioning or heating *appliances,* electrical services, pumps, compressors and incinerators.

Service space means space provided in a *building* to facilitate or conceal the installation of building service facilities such as chutes, ducts, pipes, shafts or wires.

Service space, horizontal (see *horizontal service space*).

Service space, vertical (see *vertical service space*).

Service water heater means a device for heating water for plumbing services.

Service water heater, indirect means a *service water heater* that derives its heat from a heating medium such as warm air, steam or hot water.

Space heater means a *space-heating appliance* for heating the room or space within which it is located without the use of ducts.

Space-heating appliance means an *appliance* intended for the supplying of heat to a room or space directly, such as a *space heater,* fireplace or *unit heater,* or to rooms or spaces of a *building* through a heating system such as a central *furnace* or *boiler.*

Storage garage (see *garage, storage*).

Storey means that portion of a *building* which is situated between the top of any floor and the top of the floor next above it, and if there is no floor above it, that portion between the top of such floor and the ceiling above it.

Stove means an *appliance* intended for cooking and space heating.

Supply duct means a duct for conveying air from a heating, ventilating or air-conditioning *appliance* to a space to be heated, ventilated or air-conditioned.

Unit heater means a suspended *space heater* with an integral air circulating fan.

Vent connector means the part of a venting system that conducts the *flue* gases or vent gases from the *flue collar* of a gas *appliance* to the *chimney* or *gas vent,* and may include a draft control device.

Vertical service space means a shaft oriented essentially vertically that is provided in a *building* to facilitate the installation of building services including mechanical, electrical and plumbing installations and facilities such as elevators, refuse chutes and linen chutes.

SUBSECTION 1.2 ABBREVIATIONS

1.2.1. The abbreviations in this Code for the names of associations shall have the meanings assigned to them in this Subsection.

ACNBC ..... Associate Committee on the National Building Code
(National Research Council of Canada, Ottawa,
Ontario K1A 0R6)

ANSI ..... American National Standards Institute
(1430 Broadway, New York, New York 10018 U.S.A.)

ASHRAE ..... American Society of Heating, Refrigerating and Air-Conditioning Engineers
(345 East 47th Street, New York, New York 10017 U.S.A.)

ASTM ..... American Society for Testing and Materials
(1916 Race Street, Philadelphia, Pa. 19103 U.S.A.)

CGSB ..... Canadian Government Specifications Board
(c/o Department of Supply and Services
88 Metcalfe Street, Ottawa, Ontario K1A 0S5)

CSA ..... Canadian Standards Association
(178 Rexdale Blvd., Rexdale, Ontario M9W 1R3)

HRA ..... Heating, Refrigerating and Air-Conditioning Institute of Canada
(Suite 267, 385 The West Mall, Etobicoke, Ontario M9C 1E7)

HI ..... Hydronics Institute (Heating)
(35 Rusco Place, Berkeley Heights, New Jersey 07922 U.S.A.)

NBC ..... National Building Code of Canada
(National Research Council of Canada
Ottawa, Ontario K1A 0R6)

NFPA ..... National Fire Protection Association
(470 Atlantic Avenue, Boston, Massachusetts 02210 U.S.A.)

ULC ..... Underwriters' Laboratories of Canada
(7 Crouse Road, Scarborough, Ontario M1R 3A9)

UL ..... Underwriters' Laboratories, Inc.
(207 East Ohio Street, Chicago, Illinois 60611 U.S.A.)

1.2.2. The abbreviations of words and phrases in this Code shall have the meanings assigned to them in this Subsection.

B&SG ..... Brown and Sharpe Gauge
Btu ..... British thermal unit(s)
Btuh ..... British thermal unit(s) per hour
°C ..... degree(s) Celsius
cfm ..... cubic foot (feet) per minute
deg. ..... degree(s)
diam. ..... diameter
°F ..... degree(s) Fahrenheit
ft ..... foot (feet)
ga ..... gauge
gal. ..... gallon(s)
gpm ..... gallon(s) per minute
GSG ..... Galvanized Sheet Gauge
hr ..... hour(s)
in. ..... inch(es)
Inc. ..... Incorporated
kg ..... kilogram(s)
J ..... Joule(s)
k ..... kilo
l ..... litre(s)
lb ..... pound(s)
max. ..... maximum
m ..... metre(s)
m^2 ..... square metre(s)
mm ..... millimetre(s)
min. ..... minimum
min. ..... minute(s)
MSG ..... Manufacturers' Standard Gauge
N ..... Newton(s)
N/m^2 ..... Newton(s) per square metre
No. ..... number(s)
nom. ..... nominal
oz. ..... ounce(s)
psf ..... pound(s) per square foot
psi ..... pound(s) per square inch
psig ..... pound(s) per square inch gauge
R ..... thermal resistance
sec. ..... second(s)
sq ft ..... square foot(feet)
sq in ..... square inch(es)
temp. ..... temperature
US gpm ..... United States gallon(s) per minute
USSG ..... United States Standard Gauge
W ..... Watt(s)
w.g. ..... water gauge
wt ..... weight

SECTION 2 HEATING, VENTILATING AND AIR-CONDITIONING SYSTEMS AND EQUIPMENT

SUBSECTION 2.1 GENERAL

2.1.1.(1) Except as provided in Sentence (3), all heating, ventilating and air-conditioning systems and equipment shall be designed and installed in conformance with this Code.

Application

(2) This Code applies to
(a) all *buildings* used for
  (i) Group A, *assembly occupancies,*
  (ii) Group B, *institutional occupancies,* and
  (iii) Group F, Division 1, *high hazard industrial occupancies,* and
(b) all buildings exceeding 6000 sq ft (558 m²) in *building area* or exceeding 3 *storeys* in *building height* used for
  (i) Group C, *residential occupancies,*
  (ii) Group D, *business and personal services occupancies,*
  (iii) Group E, *mercantile occupancies,* and
  (iv) Group F, Divisions 2 and 3, *medium* and *low hazard industrial occupancies.*

(3) For *buildings* not listed in Sentence (2), requirements for heating, mechanical ventilating and air-conditioning systems will be found in Part 9 of the National Building Code of Canada 1975. (See Appendix A).

Administration

2.1.2. In addition to the administrative requirements of this Code the requirements of Part 2 of the National Building Code of Canada 1975 shall apply.

Repairs or adjustments

2.1.3. Repairs, adjustments or component replacements that change the capacity or extent of safety of an existing heating, ventilating or air-conditioning system and that alter the method of operation shall conform to this Code.

Minimum metal thickness

2.1.4. Minimum metal thickness in this Code is specified in inches. Where reference documents in this Code specify minimum metal thickness by gauge number, inches shall be substituted for gauge number according to Table 6.1.4.A. of Part 6 of the National Building Code of Canada 1975.

SUBSECTION 2.2 PLANS AND SPECIFICATIONS

2.2.1.(1) Plans, specifications and other information for heating, ventilating and air-conditioning systems shall be submitted for approval to the *authority having jurisdiction.*

(2) The information shown on architectural plans and plans for heating, ventilating, and air-conditioning systems shall be clear and legible and such plans shall contain all details necessary for checking the installation, including the following:
(a) name, type and location of *building,*
(b) name of *owner,*
(c) name of architect,
(d) name of engineer or designer,
(e) north point on plans,
(f) dimensions and height of all rooms,
(g) intended use of all rooms,
(h) detail or description of wall, roof, ceiling and floor construction including insulation,
(i) detail or description of windows and outside doors, including size, weather-stripping, storm sash, sills and storm doors,

(j) size and continuity of all pipes, ducts, shafts, *flues* and *fire dampers,*
(k) location, size, capacity and type of all principal units of equipment,
(l) size, shape and height of *chimney* or *gas vent,*
(m) size and location of combustion air and ventilation openings, and
(n) location and grade of required *fire separations.*

SUBSECTION 2.3 DESIGN AND INSTALLATION

Good engineering practice

2.3.1.(1) Heating, ventilating and air-conditioning equipment shall not be used unless *approved* for its intended use.

(2) Heating, ventilating and air-conditioning systems shall be designed, constructed and installed to conform to good engineering practice.

(The procedures described in the ASHRAE Guide and Data Books, the ASHRAE Handbooks, the HRA Digest and the Hydronics Institute Manuals are to be considered as good engineering practice.)

(3) Heating and air-conditioning equipment other than solid-fuel-fired equipment shall be installed to conform to the following appropriate standards:
(a) CSA B139-1971, "Installation Code for Oil Burning Equipment,"
(b) CSA B149.1-1971, "Installation Code for Natural Gas Burning Appliances and Equipment," and Supplement No. 1-1973,
(c) CSA B149.2-1969, "Installation Code for Propane Burning Appliances and Equipment," and Supplement No. 2-1973,
(d) CSA C22.1-1972, "Canadian Electrical Code, Part I,"
(e) CSA B51-1972, "Code for the Construction and Inspection of Boilers and Pressure Vessels," and
(f) CSA B52-1965, "Mechanical Refrigeration Code."

Design conditions

2.3.2. The outside conditions to be used in designing heating, ventilating and air-conditioning systems shall be the appropriate values in the Table of Climatic Data in Part 2 of the National Building Code of Canada 1975.

Access

2.3.3.(1) Equipment forming part of a heating, ventilating or air-conditioning system, with the exception of embedded pipes or ducts, shall be installed with provision for access for inspection, maintenance, repair and cleaning.

Guards

(2) Mechanical equipment shall be guarded to prevent injury to the public or maintenance staff.

Protection from freezing

(3) Equipment forming part of a heating or air-conditioning system that may be adversely affected by freezing temperatures and which is located in unheated areas shall be adequately protected from freezing.

Expansion and contraction

2.3.4. Heating and cooling systems shall be designed to allow for expansion and contraction of the heat transfer fluid and to maintain the system pressure within the rated working pressure limits of all components of the system.

Systems for contaminated spaces

2.3.5.(1) Systems serving spaces that contain sources of contamination shall be operated in such a manner as to prevent spreading of such contamination to other occupied parts of the *building* and surrounding areas.

(2) Systems serving spaces that contain hazardous gases, dusts or liquids such as grain elevators, metal powder plants and ammonium nitrate storage shall be designed, constructed and installed to conform to good engineering practice.

(Information on the design and installation of such systems is contained in publications of the National Fire Protection Association and in the National Fire Code of Canada.) (See Appendix B.)

(3) Systems for the ventilation of *restaurant* and other commercial cooking equipment shall be designed, constructed and installed to conform to NFPA 96-1973, "Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment," except as required by Sentence 3.5.3.1.(1) and Article 3.5.4.2. of Part 3 of the National Building Code of Canada 1975.

(4) Ventilation of *buildings* shall conform to Subsection 3.6.3. of Part 3 of the National Building Code of Canada 1975. (See Appendix B.) Ventilation

2.3.6. Electrical wiring and electrical equipment used in heating, ventilating and air-conditioning systems shall be installed to conform to CSA C22.1-1972, "Canadian Electrical Code, Part I." Electrical equipment

SUBSECTION 2.4 AIR DUCT SYSTEMS

2.4.1.(1) This Subsection applies to the design, construction and installation of air duct systems for mechanical ventilation or air-conditioning in which the rated fan capacity exceeds 4000 cfm (113.3 m^3/min.). Scope

(2) Where the rated fan capacity of ventilation or air-conditioning systems does not exceed 4000 cfm (113.3 m^3/min.), the requirements of Part 9 of the National Building Code of Canada 1975 shall apply. (See Appendix A.)

2.4.2.(1) Except as provided in Sentences (2) and (3), all ducts including flexible duct connectors, associated fittings and *plenums* used in air duct systems shall be constructed of steel, aluminum alloy, copper or other *approved* metal, or of clay, asbestos-cement or similar *noncombustible* material. Duct construction materials

(2) Ducts, flexible duct connectors, associated fittings and *plenums* may contain limited amounts of *combustible* material provided they

(a) conform to the appropriate requirements for Class 1 air duct materials and connectors in ULC-S110-1970, "Air Ducts,"
(b) are not used in vertical runs serving more than 2 *storeys*, and
(c) are not exposed to heated air or radiation from heat sources that would result in the exposed surface exceeding a temperature of 250°F (121°C).

(3) The concealed space between the ceiling and floor or ceiling and roof of a *building* may be used as a *plenum* and need not conform to Sentences (1) and (2) provided Ceiling spaces used as plenums

(a) all materials within the ceiling space have a *flame-spread rating* of not more than 25 and a smoke developed classification of not more than 50,
(b) the supports for the ceiling membrane are of *noncombustible* material having a melting point of at least 1400°F (760°C), and
(c) when the concealed space is used as a return-air *plenum* and incorporates a ceiling membrane that forms part of the required *fire-resistance rating* of the assembly, every opening through the membrane shall be protected by a *fire stop flap* which shall in the event of a fire
  (i) stop the flow of air into the concealed space, and
  (ii) be supported in a manner that will maintain the integrity of the *fire resistance* of the ceiling membrane for the duration of time required to provide the required *fire-resistance rating*.

(See also Article 3.1.5.6. of Part 3 of the National Building Code of Canada 1975.)

(4) Materials in Sentences (1), (2) and (3) which when used in a location where they may be subjected to excessive moisture shall have no appreciable loss of strength when wet and shall be corrosion-resistant. Materials subjected to moisture

Duct construction and support

2.4.3.(1) The construction and support of air ducts, fittings and *plenums,* including joints, seams, stiffening, reinforcing and access openings shall conform to the applicable requirements of the duct construction standards contained in the ASHRAE Guide and Data Book 1972 (Equipment) and ASHRAE Handbook 1973 (Systems).

Access openings

(2) Air duct systems shall be made substantially air tight throughout, and shall have no openings other than those required for proper operation and maintenance of the system. Access openings shall be provided where debris, paper or other *combustible* material may accumulate in *plenums* and ducts. Removable grilles requiring only the loosening of catches or screws for removal may be considered as access openings. Fastenings on walk-in access doors shall be such that the door may be readily opened from the inside without the use of keys.

Vibration isolation connectors

2.4.4.(1) Vibration isolation connectors in air duct systems shall be *noncombustible,* except that *combustible* fabric connectors are permitted provided they

(a) do not exceed 10 in. (254 mm) in length,

(b) comply with the flame-resistance requirements of ULC-S109-1969, "Flame Tests of Flame-Resistant Fabrics and Films," and

(c) are not used in a location where they are exposed to heated air or radiation from heat sources that may cause the exposed surface to exceed a temperature of 250°F (121°C).

Joint tape

2.4.5. Tape used for sealing joints in air ducts, *plenums* and other parts of air duct systems shall meet the flame-resistance requirements for fabric in ULC-S109-1969, "Flame Tests of Flame-Resistant Fabrics and Films."

Coverings and linings

2.4.6.(1) Coverings, linings and associated adhesives and insulation of air ducts, *plenums* and other parts of air duct systems shall be of *noncombustible* material when exposed to heated air or radiation from heat sources that would result in the exposed surface exceeding a temperature of 250°F (121°C).

(2) When *combustible* coverings and linings, including associated adhesives and insulation, are used they shall have a *flame-spread rating* of not more than 25 on any exposed surface or any surface that would be exposed by cutting through the material in any direction, and a smoke developed classification of not more than 50, except that the outer covering of ducts, *plenums* and other parts of air duct systems used within an assembly of *combustible construction* may have an exposed surface *flame-spread rating* of not more than 75 and may have a smoke developed classification greater than 50.

(3) *Combustible* coverings and linings in Sentence (2) shall not flame, glow, smoulder or smoke when tested in accordance with the method of test ASTM C411-61 (1967), "Hot-Surface Performance of High-Temperature Thermal Insulation," at a temperature of 250°F (121°C).

(4) *Combustible* coverings and linings of ducts, including associated adhesives and insulation, shall be interrupted at the immediate area of operation of heat sources in a duct system, such as electric resistance heaters or fuel-burning heaters or *furnaces,* and where the duct penetrates a *fire separation.*

(5) Linings of ducts shall be installed so that they will not interfere with the operation of *fire dampers, fire stop flaps* and other *closures.*

Underground ducts

2.4.7. Underground ducts shall be constructed to provide interior drainage and shall not be connected directly to a sewer.

Clearances

2.4.8. The clearances from *combustible* material of supply *plenums, supply ducts,* boots and register boxes of heating systems shall conform to the requirements of Subsection 9.34.3. of Part 9 of the National Building Code of Canada 1975. (See Appendix A.)

2.4.9.(1) *Fire dampers* shall conform to the requirements of Articles 3.1.7.1. and 3.5.1.5. of Part 3 of the National Building Code of Canada 1975 and to this Article. (See Appendix B.) Fire dampers

(2) *Fire dampers* shall be arranged to close automatically upon the operation of a fusible link conforming to ULC-S505-1974, "Fusible Links for Fire-Protection Service," or other *approved* heat or smoke-actuated device. When actuated by heat, the device shall be located where it is readily affected by an abnormal rise of temperature in the duct, and have a temperature rating approximately 50°F (28°C) above the maximum temperature that would exist in the system either with the system in operation or shut down.

(3) *Fire dampers* shall be installed in the plane of the *fire separation* so as to stay in place should the duct be dislodged during a fire.

(4) *Fire dampers* tested in the vertical or horizontal position shall be installed in the manner in which they were tested.

(5) A tightly fitted access door shall be installed for each *fire damper* to provide access for the inspection of the damper and resetting of the release device. (See Appendix B.)

2.4.10.(1) Where *fire stop flaps* are used in air duct systems in membrane ceilings required in Article 3.1.5.6. of Part 3 of the National Building Code of Canada 1975, such *fire stop flaps* shall be of an *approved* type or constructed of steel having a minimum thickness of 0.058 in. (1.47 mm) covered on both sides with asbestos paper at least 1/16 in. (1.6 mm) thick. Such *fire stop flaps* shall be equipped with corrosion-resistant pins and hinges. (See Appendix B.) Fire stop flaps

(2) *Fire stop flaps* shall be held open with a fusible link conforming to ULC-S505-1974, "Fusible Links for Fire-Protection Service," or other *approved* heat-actuated device having a temperature rating approximately 50°F (28°C) above the maximum temperature that would exist in the system either with the system in operation or shut down.

2.4.11.(1) Except as provided in Sentence (2), *exhaust ducts* of non-mechanical ventilating systems serving separate rooms or spaces shall not be combined. Exhaust ducts

(2) *Exhaust ducts* of non-mechanical ventilating systems serving similar *occupancies* may be combined immediately below the point of final delivery to the outside, such as at the base of a roof ventilator.

(3) *Exhaust ducts* of ventilating systems shall have provision for the removal of condensation where this may be a problem. The exhaust outlet shall be designed to prevent back draft under wind conditions.

(4) Except as provided in Sentence (6), *exhaust ducts* serving rooms containing water closets, urinals, basins, showers or slop sinks shall be independent from *exhaust ducts* serving other areas of the *building.*

(5) Except as provided in Sentence (6), *exhaust ducts* serving rooms containing residential cooking equipment shall be independent from *exhaust ducts* serving other areas of the *building.*

(6) Two or more exhaust systems in Sentences (4) and (5) may be interconnected or connected with *exhaust ducts* serving other areas of the *building* provided the connections are made at the inlet of an exhaust fan and all interconnected systems are equipped with suitable back pressure devices to prevent passage of odours from one system to another when the fan is not in operation.

(7) Where *exhaust ducts* containing air from heated spaces pass through or are adjacent to unheated spaces, the ducts shall be insulated to prevent moisture condensation in the duct.

Air recirculation

2.4.12. In *residential occupancies* sleeping rooms occupied separately and not as suites, suites or *dwelling units* shall not have air duct systems that allow air to be circulated from such rooms, suites or *dwelling units* to other rooms, suites or *dwelling units* or to *public corridors.*

Make-up air

2.4.13.(1) In ventilating systems that exhaust air to the outdoors, provision shall be made for the admission of a supply of make-up air in sufficient quantity so that the efficiency of the exhaust system is not adversely affected. (See Appendix B.)

Air openings

(2) Supply, return and exhaust air openings in rooms or spaces in *buildings* when located less than 7 ft (2.1 m) above the floor shall be protected by a substantial grille having openings of a size that will not allow the passage of a ½-in. (13 mm)-diameter sphere.

(3) Outdoor air intakes and exhaust outlets at the *building* exterior shall be designed or located so that the air entering the *building* system will not contain more contaminants than the normal exterior air of the locality in which the *building* is situated.

(4) Exterior openings for outdoor air intakes and exhaust outlets shall be shielded from the entry of snow and rain and shall be fitted with corrosion-resistant screens of mesh not larger than ½-in. (13 mm), except where climatic conditions may require larger openings. Such screens shall be accessible for maintenance.

Air filters

2.4.14.(1) Air filters for air duct systems shall conform to the requirements for Class 1 and Class 2 air filter units when subjected to the flame-exposure and spot-flame tests of ULC-S111-1970, "Air Filter Units."

Air washers

(2) The filter and water evaporation medium of every air washer and evaporative cooling section enclosed within a *building* shall be made of *noncombustible* material. Sumps for such sections shall be constructed and installed so that they can be flushed and drained.

Evaporative cooling equipment

(3) Evaporative cooling sections or towers of *combustible* material located on or outside *buildings* shall have a clearance of at least 40 ft (12 m) from sources of ignition such as *chimneys* or incinerators when the tower exterior construction is *noncombustible,* and a clearance of at least 100 ft (30 m) when the tower exterior construction is *combustible.*

(4) Evaporative cooling sections or towers the main structure of which exceeds a volume of 2000 cu ft (56.6 m^3) shall comply with the requirements of NFPA 214-1971, "Water Cooling Towers."

Electrostatic filters

(5) Electrostatic-type filters when used shall be installed to ensure that the electric circuit is automatically de-energized when access doors are opened. Facilities for flushing and drainage shall be provided where the filters are designed to be washed in place.

Odour removal equipment

(6) When odour removal equipment of the adsorption type is used it shall be
(a) installed to provide access so that the adsorption material can be reactivated or renewed, and
(b) protected from dust accumulation by air filters installed on the inlet side.

Fans

2.4.15.(1) Fans for heating, ventilating and air-conditioning systems shall be located and installed so that their operation
(a) does not adversely affect the draft required for proper operation of fuel-fired *appliances,* and

(b) does not allow the air in the air duct system to be contaminated by air or gases from the boiler-room or furnace-room.

Equipment installations outdoors

(2) Fans and associated air handling equipment such as air washers, filters and heating and cooling units, when installed on the roof or otherwise outside the *building,* shall be of a type *approved* for outdoor use.

Protection screens or gratings

(3) Exposed drive assemblies and openings into fan housings shall be protected with substantial metal screens or gratings to prevent accidents.

SUBSECTION 2.5 HEATING APPLIANCES

Scope

2.5.1.(1) This Subsection applies to the design, construction and installation of
(a) solid-fuel-fired heating systems, and
(b) heating systems in which the rated heat input exceeds 400,000 Btu per hr (117.24 kW).

(2) Where the rated heat input of heating systems or equipment does not exceed 400,000 Btu per hr (117.24 kW), the requirements of Part 9 of the National Building Code of Canada 1975 shall apply. (See Appendix A.)

Enclosures and separations

2.5.2.(1) Fuel-fired heating *appliances* shall be located, enclosed or separated from the remainder of the *building* in conformance with Section 3.5 of Part 3 of the National Building Code of Canada 1975.

Outdoor installation of appliances

(2) Fuel-fired *appliances* installed on the roof of a *building* or otherwise outside the *building* shall be
(a) *approved* for such location,
(b) installed not closer than 4 ft (1.2 m) measured horizontally from the property line, and
(c) installed at least 10 ft (3.0 m) from an adjacent wall of the same *building* when such wall contains an opening or openings within 3 *storeys* above and 15 ft (4.6 m) horizontally from the *appliance,* unless such openings are protected by a *closure* assembly having a ¾-hr *fire-protection rating* determined in conformance with Article 3.1.7.1., or by wired glass conforming to Article 3.1.7.3. of Part 3 of the National Building Code of Canada 1975.

Appliances using oil, gas or electricity

(3) Heating *appliances* using oil, gas or electrical energy shall be installed
(a) in accordance with the appropriate standard listed in Sentence 2.3.1.(3), and
(b) to ensure that there is no damage to piping or equipment from possible movements of the *building* structure.

Chimney connection

(4) Heating *appliances* using solid fuel shall be connected to a *chimney* directly or by a *flue pipe* or *breeching* conforming to Subsection 2.8.

Boilers and Furnaces Using Solid Fuel

General

2.5.3.(1) Steam and hot water *boilers* using solid fuel shall be designed, constructed and installed to conform to CSA B51-1972, "Code for the Construction and Inspection of Boilers and Pressure Vessels."

(2) *Boilers* and *furnaces* using solid fuel shall be installed in a room or space having
(a) a volume sufficiently large to permit accessibility for inspection and servicing of the *appliance* and to provide clearances as required in Article 2.5.5., and
(b) a permanent opening or openings providing an area of at least 1½ sq in (960 mm^2) per 1000 Btu/hr (293.1 W) input, connecting with the outdoors or with some space that freely connects with the outdoors. (See Appendix B.)

Mounting

2.5.4.(1) Except as provided in Sentences (2) to (5), every *boiler* and *furnace* using solid fuel shall be mounted

(a) on the ground,
(b) on a concrete floor, or
(c) on any type of floor that is protected by 2 courses of 4-in.-(102 mm) thick hollow masonry units arranged so that the hollow cores in the 2 courses are at right angles to each other and will permit air circulation through them.

(2) A solid-fuel-fired *boiler* or *furnace* of a type in which flame or hot gases do not come in contact with its base may be mounted on any type of floor when
(a) the floor is protected with at least 4 in. (102 mm) of hollow masonry units covered with sheet metal at least 0.022 in. (0.56 mm) thick, and
(b) the masonry units are arranged so that the hollow cores will permit air circulation through them.

(3) Except as provided in Sentence (6), a solid-fuel-fired *forced-air furnace* may be mounted on any type of floor provided the blower compartment
(a) occupies the entire area beneath the combustion chamber and is at least 18 in. (457 mm) in height, and
(b) has at least 1 metal baffle between the combustion chamber and the base of the *appliance.*

(4) Except as provided in Sentence (6), a solid-fuel-fired hot water *boiler* may be mounted on any type of floor provided the water chamber extends under the whole of the ash pit and combustion chamber, or under the whole of the combustion chamber if there is no ash pit.

(5) Except as provided in Sentence (6), a solid-fuel-fired *boiler* or *furnace* may be mounted on any type of floor provided the *boiler* or *furnace*
(a) is mounted on legs that provide a clear space at least 4 in. (102 mm) high, and
(b) is of a type in which flame or hot gases do not come in contact with its base.

(6) A floor surface of *combustible* material beneath a solid-fuel-fired *boiler* or *furnace* shall be protected by a layer of sheet metal at least 0.022 in. (0.56 mm) thick over ¼-in. (6 mm) asbestos or asbestos millboard for a distance of at least 18 in. (457 mm) beyond the *appliance* on both the firing side and the side where ashes are removed, and extending at least 6 in. (152 mm) beyond the *appliance* on the other sides.

Clearances

2.5.5. The minimum clearance between *boilers* or *furnaces* using solid fuel and *combustible* material, whether or not such material is covered with *noncombustible* material such as plaster, shall conform to Table 2.5A., except that where protection is provided as described in Table 2.5.B., the clearance shall conform to that Table. (See Appendix B.)

Table 2.5.A.

Forming Part of Article 2.5.5.

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIAL FOR FURNACES AND BOILERS USING SOLID FUEL				
Type of *Furnace* or *Boiler*	Minimum Clearance, in.			
	Above and Sides of Bonnet or *Plenum*	Jacket Sides and Rear	Front	Projecting *Flue Collar*
Automatically stoker fired, *forced-air furnace* equipped with 250°F temperature high limit control(1) and barometric draft control.(2)	6	6	48	(3)
Steam *boilers* limited to 15 psig max.	6	6	48	(3)
Hot water *boilers* limited to 250°F max. of the water-wall type or having a jacket or lining of masonry or other *approved* insulating material.	6	6	48	(3)
Hot water *boilers* and *forced-air furnaces* not limited to 250°F max.	18	18	48	(3)
Steam *boilers* limited between 15 psig and 50 psig	18	18	48	(3)
Steam *boilers* not limited to 50 psig max. but not over 400,000 Btu/hr rated heat input	18	18	48	(3)
Other *boilers* and *forced-air furnaces.*	36	36	96	36
Column 1	2	3	4	5

Notes to Table 2.5.A.:

(1) Temperature high limit control shall be installed not more than 10 in. (254 mm) above the top surface of the heat exchanger in a supply *plenum* that extends at least 12 in. (305 mm) above the top surface of the heat exchanger.

(2) Barometric draft control shall be operated by draft pressure and permanently set to limit the maximum draft to 0.13 in. (3.3 mm) of water.

(3) The clearances for projecting *flue collars* shall conform to the clearances for *flue pipes* in Sentence 2.8.9.(5).

Table 2.5.B.

Forming Part of Article 2.5.5.

MINIMUM CLEARANCES, IN., TO COMBUSTIBLE MATERIAL WITH SPECIFIED FORMS OF PROTECTION FOR FURNACES AND BOILERS USING SOLID FUEL[1]				
Type of Protection[2]	Where in Table 2.5.A. the minimum clearance is			
	18 in.		6 in.	
	Above and Sides of Bonnet or *Plenum*	Jacket Sides and Rear	Above and Sides of Bonnet or *Plenum*	Jacket Sides and Rear
¼-in. asbestos millboard spaced out 1 in. by *noncombustible* material	15	9	3	2
0.013-in. sheet metal on ¼-in. asbestos millboard	12	9	3	2
0.013-in. sheet metal spaced out 1 in. by *noncombustible* material	9	6	2	2
0.013-in. sheet metal on ⅛-in. asbestos millboard spaced out 1 in. by *noncombustible* material	9	6	2	2
1½-in. asbestos-cement covering on heating *appliances*	9	6	2	1
¼-in. asbestos millboard on 1-in. mineral wool batts reinforced with wire mesh or equivalent	6	6	2	2
0.027-in. sheet metal on 1-in. mineral wool batts reinforced with wire mesh or equivalent	4	3	2	2
¼-in. asbestos-cement board or ¼-in. asbestos millboard	18	18	4	4
¼-in. cellular asbestos	18	18	3	3
Column 1	2	3	4	5

Notes to Table 2.5.B.:

(1) Clearances shall be measured from the outer surface of the *appliance* (or the insulation protecting the *appliance*) to the *combustible* material disregarding protection applied to the *combustible* material.

(2) Applied to the *combustible* material unless otherwise specified and covering all surfaces within the distance specified as the minimum clearance in Table 2.5.A. Thicknesses are minimum.

Controls and Safety Devices

General

2.5.6.(1) Every steam and hot water *boiler* using solid fuel shall be equipped with controls and safety devices in conformance with the appropriate provincial regulations and subject to the approval of the *authority having jurisdiction.*

Stoker controls for steam boilers

(2) Every stoker serving a steam *boiler* using solid fuel shall be equipped with the following controls:

(a) a device for manually stopping the supply of fuel to the stoker located near the entrance to the stoker space,
(b) an automatic device for stopping the stoker motor under conditions of
  (i) low water level,
  (ii) pressure exceeding the design working pressure of the *boiler* or the setting of the pressure relief valve whichever is lower, and
  (iii) failure of a fan providing combustion air,
(c) a device for maintaining a minimum fire, and
(d) at least 1 automatic control to regulate or control the normal operation of the stoker.

Stoker controls for hot water boilers

(3) Every stoker serving a hot water *boiler* using solid fuel shall be equipped with the following controls:

(a) a device for manually stopping the supply of fuel to the stoker located near the entrance to the stoker space,
(b) an automatic device for stopping the stoker motor under conditions of
  (i) low water level,
  (ii) temperatures exceeding the design working temperature of the *boiler* or the setting of the temperature relief valve whichever is lower,
  (iii) failure of a fan providing combustion air, and
  (iv) pressure exceeding the design working pressure,
(c) a device for maintaining a minimum fire, and
(d) at least 1 automatic control to regulate or control the normal operation of the stoker.

Furnace controls

2.5.7.(1) Every *forced-air furnace* using solid fuel and equipped with a mechanical draft fan for the supply of combustion air shall be equipped with a limit control to stop the mechanical draft fan when the temperature in the *furnace* supply *plenum* exceeds 250°F (121°C).

(2) Every hand-fired *forced-air furnace* using solid fuel and operating on natural draft shall be equipped with

(a) a barometric draft control located in the *flue pipe* downstream from the check damper and permanently set to limit the draft to a maximum of 0.13 in. (3.3 mm) water or to the maximum draft for which the *furnace* is designed, whichever is lower, and
(b) a temperature combustion regulator to control the rate of combustion and to prevent the temperature in the *furnace* supply *plenum* from exceeding 250°F (121°C). An electric damper controller of the spring-loaded type, which will close the fire damper and open the check damper in case of power failure, may be used for this purpose. Such a regulator shall be installed as close to the top of the *furnace* supply *plenum* as possible, or at the beginning of the main *supply duct.*

Stoker controls for furnaces

(3) Every stoker serving a *forced-air furnace* using solid fuel shall be equipped with the following controls:

(a) a device for manually stopping the supply of fuel to the stoker located near the entrance to the stoker space,
(b) an automatic device for stopping the stoker motor under conditions of
  (i) temperature exceeding 250°F (121°C) in the *furnace* supply *plenum,* and
  (ii) failure of a fan providing combustion air,

(c) a device for maintaining a minimum fire, and
(d) at least 1 automatic control to regulate or control the normal operation of the stoker.

(4) Every stoker-fired *forced-air furnace* using solid fuel shall be provided with an automatic control to operate the circulating fan when the air temperature in the *furnace* supply *plenum* exceeds 250°F (121°C). Where a manually operated switch is installed in the electric circuit serving the circulating fan, it shall be installed so as to de-energize simultaneously the motors of the circulating fan and the stoker.

Stoves, Ranges, Space Heaters and Service Water Heaters Using Solid Fuel

General

2.5.8.(1) *Stoves, ranges, space heaters* and *service water heaters* using solid fuel shall be installed in a room or space sufficiently large to permit accessibility to the *appliance* and to provide clearances as required in Article 2.5.9.

Mounting

(2) The requirements for the mounting of *stoves, ranges, space heaters* and *service water heaters* using solid fuel shall be as required in Article 2.5.4. for *boilers* and *furnaces* of similar construction. (See Appendix B.)

Clearances

2.5.9. The minimum clearance between *stoves, ranges, space heaters* or *service water heaters* using solid fuel and *combustible* material whether or not such material is covered with *noncombustible* material such as plaster shall conform to Table 2.5.C., except that where protection is provided as described in Table 2.5.D., the clearance shall conform to that Table. (See Appendix B.)

Table 2.5.C.

Forming Part of Article 2.5.9.

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIAL FOR STOVES, RANGES, SPACE HEATERS AND SERVICE WATER HEATERS USING SOLID FUEL					
Appliances	Minimum Clearance, in.				
	Top	Sides	Rear	Front	Flue Pipe
Stoves, ranges and *service water heaters* without refractory lining	36	36(1)	36	48	(2)
Stoves, ranges and *service water heaters* with refractory lining	36	24(1)	12	48	(2)
Space heaters	36	12	12	48	(2)
Column 1	2	3	4	5	6

Notes to Table 2.5.C.:
(1) The clearance from the side of a *range* using solid fuel, other than the fire box side, may be 18 in. (457 mm).
(2) Clearances shall conform to Sentence 2.8.9.(5).

Table 2.5.D.

Forming Part of Article 2.5.9.

MINIMUM CLEARANCES, IN., TO COMBUSTIBLE MATERIAL WITH SPECIFIED FORMS OF PROTECTION FOR STOVES, RANGES, SPACE HEATERS AND SERVICE WATER HEATERS USING SOLID FUEL[1]

Type of Protection[2]	Where the Minimum Clearance in Table 2.5.C. is				
	12 in.	18 in.	24 in.	36 in.	
	Sides and Rear	Sides	Sides	Top	Sides and Rear
¼-in. asbestos millboard spaced out 1 in. by *noncombustible* material	6	9	12	30	18
0.013-in. sheet metal on ¼-in. asbestos millboard	6	9	12	24	18
0.013-in. sheet metal spaced out 1 in. by *noncombustible* material	4	6	8	18	12
¼-in. asbestos millboard on 1-in. mineral wool batts reinforced with wire mesh or equivalent	4	6	8	18	12
0.027-in. sheet metal on 1-in. mineral wool batts reinforced with wire mesh or equivalent	2	4	8	18	12
Column 1	2	3	4	5	6

Notes to Table 2.5.D.:

(1) Clearances shall be measured from the outer surface of the *appliance* to the *combustible* material disregarding protection applied to the *combustible* material.

(2) Applied to the *combustible* material and covering all surfaces within the distance specified in Table 2.5.C. as the minimum clearance. Thicknesses are minimum.

Service water heaters

2.5.10. *Service water heaters* using solid fuel shall conform to Subsection 6.1 of the ACNBC Canadian Plumbing Code 1975.

Fireplaces

2.5.11. Masonry or concrete fireplaces and factory-built fireplaces shall conform to Section 9.22 of Part 9 of the National Building Code of Canada 1975.

Storage Bins

Pipes in storage bins

2.5.12.(1) Service pipes passing through a storage bin for solid fuel shall be protected or so located to avoid damage to the pipes.

(2) Except for fuel-thawing pipes, every pipe designed to operate at a temperature of 120°F (49°C) or more shall be located where fuel cannot be stored in contact with it.

(3) Sewer or drain openings shall not be located under a storage bin for solid fuel.

Construction of fuel bins

(4) The floor and walls of a storage bin for solid fuel shall be constructed of *noncombustible* material.

(5) Solid fuels shall not be stored where the air temperature in the bin or the surface temperature of any part of the floor or walls is 120°F (49°C) or more.

Construction of ash bins

2.5.13.(1) Every ash storage bin shall be constructed of *noncombustible* material. Where the bin is not covered, the ceiling of the room in which it is located shall be of *noncombustible* material.

(2) Every opening in an ash storage bin shall be protected by a tight-fitting metal door with metal frame securely fastened to the bin.

Indirect Service Water Heaters and Unit Heaters

General

2.5.14.(1) *Indirect service water heaters* for installation within the heat exchanger of a *boiler* shall be installed to conform to good engineering practice.

Relief valves

(2) Where *indirect service water heaters* are supplied by a cold water line containing a check valve, a pressure relief valve shall be installed downstream from the check valve. No valve or other closure shall be installed between the relief valve and the heater.

Plumbing requirements

(3) When *indirect service water heaters* form a part of a potable water system, their installation shall conform to Subsection 6.1 of the ACNBC Canadian Plumbing Code 1975.

Clearances

2.5.15. Every *indirect service water heater* and *unit heater* using either steam or hot water as the heating medium shall be installed so as to provide a clearance of at least 1 in. (25 mm) between the *appliance* and adjacent *combustible* material. The steam and hot water piping shall be installed to conform to Subsection 2.6.

Radiators and Convectors

2.5.16. Every steam or hot water radiator and convector located in a recess or concealed space or attached to the face of a wall of *combustible construction* shall be provided with a *noncombustible* lining or backing.

SUBSECTION 2.6 PIPING FOR HEATING AND COOLING SYSTEMS

Materials

2.6.1. Every pipe used in a heating or air-conditioning system shall be designed to have adequate strength and durability. Nonmetallic piping shall not be used unless *approved.*

Expansion and contraction

2.6.2. Every pipe used in a heating or air-conditioning system shall be installed to allow for expansion and contraction due to temperature changes.

Supports and anchors

2.6.3. Supports and anchors for piping in a heating or air-conditioning system shall be designed in conformance with good engineering practice and to ensure that undue stress is not placed on the supporting structure.

Insulation and coverings

2.6.4.(1) Insulation and coverings on pipes shall be composed of material suitable for the operating temperature of the system to withstand deterioration from softening, melting, mildew and mold.

(2) Insulation and coverings on pipes in which the temperature of the fluid exceeds 250°F (121°C)

(a) shall be composed of *approved noncombustible* material, or

(b) shall not flame, glow, smoulder or smoke when tested in accordance with the method of test ASTM C411-61, "Hot-Surface Performance of High-Temperature Thermal Insulation," at the maximum temperature to which such insulation or covering is to be exposed in service.

(3) Where *combustible* insulation is used on piping in a *horizontal* or *vertical service space,* the insulation and coverings on such pipes shall have a *flame-spread rating* throughout the material not exceeding 25 in *buildings* of *noncombustible construction* and not exceeding 75 in *buildings* of *combustible construction,* except that no *flame-spread rating* limitation is required when located as described in Clauses (a), (b) and (c) of Sentence (5).

(4) Insulation and coverings on piping located in rooms and spaces other than the *service spaces* described in Sentence (3) shall have a *flame-spread rating* not exceeding that required for the interior finish of the room or space, except that no *flame-spread rating* limitation is required when located as described in Clauses (a), (b) and (c) of Sentence (5).

(5) Where *combustible* insulation and covering is used on piping in *buildings* described in Subsection 3.2.6. of Part 3 of the National Building Code of Canada 1975, they shall have smoke developed classification of not more than 50, except where such pipe is

(a) located within a concealed space in a wall,
(b) located in a floor slab, or
(c) enclosed in a *noncombustible* raceway or conduit.

(6) Pipes that are exposed to human contact shall be insulated so that the exposed surface does not exceed 160°F (71°C). (See Appendix B.)

2.6.5. Clearances between *combustible* material and bare pipes carrying steam or hot water shall conform to Table 2.6.A. Clearances

Table 2.6.A.

Forming Part of Article 2.6.5.

Steam or Water Temperature, °F	Minimum Clearance, in.
up to 250	½
above 250	1
Column 1	2

2.6.6.(1) Where a pipe carrying steam or hot water at a temperature in excess of 250°F (121°C) passes through a *combustible* floor, ceiling or wall, the construction shall be protected by a sleeve of metal or other *noncombustible* material at least 2 in. (51 mm) larger in diameter than the pipe. Sleeves

(2) Steam or hot water pipes that pass through a storage space shall be insulated with at least 1 in. (25 mm) of *approved noncombustible* material or otherwise protected to prevent direct contact between the surface of the pipe and the material stored. Pipes in storage spaces

2.6.7. Where piping for heating or air-conditioning systems is enclosed in a shaft, the requirements for shafts of Article 3.5.3.1. of Part 3 of the National Building Code of Canada 1975 shall apply. Pipes in shafts

SUBSECTION 2.7 REFRIGERATING SYSTEMS AND EQUIPMENT FOR AIR-CONDITIONING

Separation

2.7.1. Fuel-fired *appliances* for space cooling shall be separated from the remainder of the *building* in conformance with Section 3.5 of Part 3 of the National Building Code of Canada 1975.

Refrigeration code

2.7.2.(1) Mechanical refrigerating systems and equipment shall conform to CSA B52-1965, "Mechanical Refrigeration Code."

Cooling units combined with furnaces

(2) Where a cooling unit is combined with a fuel-fired *furnace* in the same duct system, the cooling unit shall be installed

(a) in parallel with the heating *furnace,*

(b) upstream of the *furnace* provided the *furnace* is designed for such application, or

(c) downstream of the *furnace* provided the cooling unit is designed to prevent excessive temperature or pressure in the refrigeration system.

SUBSECTION 2.8 CHIMNEYS AND VENTING EQUIPMENT

Scope

2.8.1.(1) Except as provided in Sentences (2) and (3), this Subsection applies to the construction and installation of

(a) *masonry chimneys, concrete chimneys, metal chimneys, factory-built chimneys* and *chimney flues* serving all fuel-fired *appliances,* and

(b) *flue pipes* and *breechings* serving *appliances* using solid fuel.

(2) The construction and installation of *chimneys* serving fireplaces or *appliances* using gas or oil having a combined total rated heat input of 400,000 Btu per hr (117.24 kW) or less shall conform to Section 9.21 of Part 9 of the National Building Code of Canada 1975. (See Appendix A.)

General

(3) The venting of gas- or oil-fired *appliances,* including requirements for *flue pipes* and *breechings,* shall conform to the appropriate standard in Sentence 2.3.1.(3).

(4) Every *chimney* shall be capable of providing sufficient draft to vent properly the *appliance* that it serves.

Marking

(5) Every *chimney* or *gas vent approved* for use with an *appliance* using gas but which is not suitable for *appliances* using solid or liquid fuel shall be plainly and permanently marked to that effect.

(6) Every *chimney* or *gas vent approved* for use with an *appliance* using oil but which is not suitable for an *appliance* using solid fuel shall be plainly and permanently marked to that effect.

Tests

(7) The *authority having jurisdiction* may require a test of any *chimney, gas vent* or *flue pipe* to ensure gas-, smoke- and flame-tightness.

Clearances of chimney top

(8) The top of every *chimney* shall be located at least 10 ft (3 m) above the top of any door or window within a horizontal distance of 50 ft (15.2 m) from the *chimney.*

(9) The top of every *chimney* shall be at least

(a) 3 ft (0.9 m) above the highest point at which it comes in contact with the roof, and

(b) 2 ft (0.6 m) above a roof surface or structure within a horizontal distance of 10 ft (3 m) from the *chimney.* (See Appendix B.)

Design and construction

2.8.2.(1) Every *chimney* shall be designed and constructed according to good engineering practice to withstand the forces due to its weight and the design wind, temperature and earthquake conditions conforming to the requirements of Part 4 of the National Building Code of Canada 1975.

(2) Foundations for *chimneys* shall be designed and constructed to conform to Section 4.2 of Part 4 of the National Building Code of Canada 1975. Foundations

(3) Except for *factory-built chimneys,* every *chimney* shall be provided with a cleanout opening at the base of the *flue* equipped with a metal frame and tightfitting metal door. Where the *chimney* is of a size requiring entry for cleaning, the cleanout opening shall be at least 2 ft (0.6 m) by 3 ft (0.9 m).

(4) A protection system for lightning, when used, shall conform to CSA B72-1960, "Code for Installation of Lightning Rods." Lightning protection

(5) Access ladders, when used, shall consist of steel or bronze rungs, built into the walls. In the case of external ladders, such rungs shall begin at least 8 ft (2.4 m) from ground level. Access ladders

Rectangular Brick Masonry Chimneys

2.8.3.(1) Brick and mortar for rectangular brick *masonry chimneys* shall conform to Section 4.4 of Part 4 of the National Building Code of Canada 1975, except that fireclay brick shall be laid with fireclay mortar conforming to ASTM C105-47(1971), "Ground Fire Clay as a Refractory Mortar for Laying up Fireclay Brick," or with other mortar *approved* for use with fireclay brick. Materials

(2) Every rectangular brick *masonry chimney* shall be lined with Liners
(a) *chimney liners* of clay conforming to ASTM C315-56 (1972), "Clay Flue Linings,"
(b) fireclay refractory brick conforming to ASTM C64-72, "Refractories for Incinerators and Boilers,"
(c) hard burned lining brick conforming to ASTM C279-54 (1972), "Chemical-Resistant Masonry Units," or
(d) metal having durability and resistance to corrosion and heat at least equivalent to 0.012-in.-(0.30 mm) thick stainless steel provided the intended flue gas temperature does not exceed 1000°F (538°C).

(3) Every rectangular brick *masonry chimney* shall be constructed so that Construction
(a) the *chimney* lining is installed as the surrounding masonry is constructed,
(b) the *chimney* lining extends from a point at least 2 ft (0.6 m) below the lowest point of a *flue pipe* connection to at least the top of the *chimney* cap, and
(c) *chimney* caps and flashing at junctions with adjacent construction conform to Part 9 of the National Building Code of Canada 1975. (See Appendix A.)

(4) Two or more *flues* in a rectangular brick *masonry chimney* shall be separated by partitions of at least Partitions
(a) 3 in. (76 mm) of solid unit masonry when clay *chimney liners* are used, or
(b) 3½ in. (89 mm) of firebrick when a firebrick lining is used.

(5) A *masonry chimney* may be corbelled provided Corbelling
(a) the wall from which the *chimney* is corbelled is at least 12 in. (305 mm) thick,
(b) the corbelling does not project more than 6 in. (152 mm),
(c) the *chimney* is not supported on a cavity wall or a wall made of hollow units, and
(d) no brick projects more than 1 in. (25 mm) beyond the brick immediately below.

(6) The clearance between *masonry chimneys* and *combustible* framing shall be at least 2 in. (51 mm) for interior *chimneys* and ½ in. (13 mm) for exterior *chimneys.* Clearances

(7) The clearance between a cleanout opening for a *masonry chimney* and *combustible* material shall be at least 6 in. (152 mm).

(8) Spaces between *chimneys* and floor or ceiling assemblies shall be fire stopped with *noncombustible* material. Where such assemblies have wood framing members the fire stopping shall not exceed 1 in. (25 mm) in depth.

(9) The clearance between *masonry chimneys* and flooring shall be at least ½ in. (13 mm).

(10) Wood trim shall be separated from *masonry chimneys* by at least ⅛ in. (3 mm) of asbestos, asbestos millboard or other *noncombustible* material.

Radial Brick Masonry Chimneys

Materials

2.8.4.(1) Radial brick used in the construction of a radial brick *chimney* shall be acid resistant and shall conform to Type I-B, C, D or E brick in CSA A82.1-1965, "Burned Clay Brick," and shall be cut radially with curved inner and outer faces conforming closely to the circular and radial lines of the finished *chimney.*

(2) Mortar used in the construction of a radial brick *chimney* shall consist of a mixture of portland cement, lime and sand conforming to Section 4.4 of Part 4 of the National Building Code of Canada 1975, in the proportion of 1 part cement, 2 parts lime and not less than 5 parts sand by volume, except that other *approved* mortar mixes may be used.

(3) Fireclay brick shall be laid up with fireclay mortar, conforming to ASTM C105-47(1971), "Ground Fire Clay as a Refractory Mortar for Laying up Fireclay Brick," or other mortar *approved* for use with fireclay brick.

Linings

(4) Every radial brick *masonry chimney* shall be lined with a material suitable for the temperature and corrosion conditions to be encountered in service.

Construction

(5) A radial brick *chimney* may be constructed without the masonry outer shell provided

(a) the *chimney* is contained within a *noncombustible* shaft or structure protecting it from the weather,
(b) the lining is laid up with fireclay mortar conforming to ASTM C105-47(1971), "Ground Fire Clay as a Refractory Mortar for Laying up Fireclay Brick," and
(c) the installation is *approved.*

Caps and ladders

(6) Every radial brick *chimney* shall be provided with

(a) a chimney cap of cast iron or reinforced concrete to protect the top of the *chimney* and lining, and
(b) an access ladder conforming to Sentence 2.8.2.(5).

Reinforced Concrete Chimneys

Design and construction

2.8.5.(1) The design and construction of reinforced *concrete chimneys* shall conform to Section 4.5 of Part 4 of the National Building Code of Canada 1975 and to good engineering practice.

Linings

(2) Every reinforced *concrete chimney* shall be lined with material suitable for the temperature and corrosion conditions to be encountered in service.

Caps and ladders

(3) Reinforced *concrete chimneys* shall be provided with a chimney cap conforming to Sentence 2.8.4.(6) and an access ladder conforming to Sentence 2.8.2.(5).

Metal Chimneys

Supports

2.8.6.(1) Except as provided in Sentence (2), every *metal chimney* shall be supported by a foundation as described in Sentence 2.8.2.(2).

(2) A *metal chimney* may be supported by *noncombustible* material provided

(a) the supports are independent of the *appliance* it serves unless otherwise *approved,* and

(b) the supports have at least a 4-hr *fire-resistance rating,* except as provided in Sentence (3).

(3) The *fire-resistance rating* required for the supports described in Sentence (2) need not apply below the floor of the room containing the *appliance.*

(4) The thickness of metal in every *metal chimney* shall be at least 0.127 in. (3.2 mm) and shall be adequate to resist all stresses. Material

(5) A *metal chimney* shall be constructed of Corrosion protection
(a) corrosion-resistant alloy,
(b) galvanized metal provided the design temperature of the flue gases entering the *chimney* does not exceed 600°F (316°C), or
(c) other metal provided the exterior of the *chimney* is painted with an *approved* paint to protect it against corrosion.

(6) Joints of every *metal chimney* shall be riveted, bolted or welded, and such joints shall be at least as corrosion resistant as the sheets or plates so joined. Joints

(7) Every *metal chimney* in which the design temperature of the flue gases entering the *chimney* is greater than 1000°F (538°C) shall be lined with at least 4½ in. (114 mm) of firebrick set in fireclay mortar. Other suitable refractory lining providing equivalent temperature protection may be used. Such lining shall extend at least 25 ft (7.6 m) above the *flue pipe* or *breeching* connection and to a point where the flue gas temperature is not more than 1000°F (538°C). Linings

(8) The minimum clearance between an exterior *metal chimney* and
(a) *combustible* material shall be 3 ft (0.9 m),
(b) an opening in a wall or a means of egress shall be 6 ft (1.8 m), and
(c) a masonry or concrete wall shall be 4 in. (102 mm).

(9) Except as provided in Sentence (10), every interior *metal chimney* shall have a clearance of at least 3 ft (0.9 m) to *combustible* material within the *storey* in which the heating *appliance* is contained. Clearances for interior chimneys

(10) Where a *metal chimney* passes through a *combustible* roof assembly, the clearance between the *chimney* and the nearest *combustible* material may be reduced to 12 in. (305 mm) provided the *metal chimney* is guarded by a metal thimble extending at least 9 in. (229 mm) above and 9 in. (229 mm) below the roof construction. Such thimbles shall have double cylindrical walls with a ventilated space between the walls and between the *metal chimney* and thimble, and the clearance between the metal thimble and *combustible* material shall be at least 6 in. (152 mm).

(11) Unless otherwise *approved,* every interior *metal chimney* that passes through more than 1 *storey* or through an *attic space* shall be enclosed above the room in which the heating *appliance* is located by a *noncombustible fire separation* extending through the roof having a *fire-resistance rating* of at least 4 hr. Such *fire-resistance rating* shall apply to the enclosure only and not to its supporting structure. Enclosures

(12) The space between the enclosing *fire separation* and the *metal chimney* shall be
(a) sufficient to permit examination and repair of the *chimney,*
(b) ventilated to the outside air at the top, and
(c) provided with suitable air inlets below the required *fire separation.*

Factory-built Chimneys

2.8.7.(1) Every *factory-built chimney* shall be designed, constructed and installed to conform to good engineering practice.

(2) *Factory-built chimneys* shall conform to ULC-S604-1963, "Chimneys, Factory-Built."

Chimney Flues

General

2.8.8.(1) A *chimney flue* serving a fuel-fired *appliance* shall

(a) be contained in a *chimney,*

(b) not have an offset inclined more than 45 deg. to the vertical, and

(c) have a cross-sectional area sufficient to vent the *appliance* which it serves in accordance with good engineering practice.

(2) The width of a rectangular or oval *chimney flue* shall be at least ⅔ its breadth.

(3) A *chimney flue* serving a fireplace or incinerator shall not serve any other fuel-fired *appliance.*

Multiple connections

(4) Two or more fuel-fired *appliances,* other than fireplaces or incinerators, may be connected to the same *chimney flue* provided

(a) adequate draft (negative *flue* outlet pressure) is maintained at each *appliance,*

(b) every *appliance* is equipped with individual draft control, unless otherwise *approved,* so as to maintain the over-fire draft (over-fire pressure) for which the *appliance* is designed,

(c) the *flue pipes* or *breechings* of the *appliances* are connected directly to a common *flue pipe* or *breeching* of adequate cross-sectional area and as close to the *chimney* as practical, or directly to the *chimney flue* so that

(i) where all *appliances* utilize the same fuel, the *flue pipe* from the smallest *appliance* is on top, and

(ii) where different fuels are used, the *flue pipe* serving a gas-fired *appliance* is on top, that serving an oil-fired *appliance* is in the middle and that serving a solid-fuel fired *appliance* is at the bottom, and

(d) the *chimney flue* is capable of venting the flue gas by natural draft when all *appliances* are firing at the same time or a mechanical flue gas exhauster (draft inducer) is used.

Installation

(5) The installation of *flue pipes* for oil-fired and gas-fired *appliances* shall conform to the appropriate standard in Sentence 2.3.1.(3).

Flue Pipes and Breechings for Appliances Burning Solid Fuel

Material

2.8.9.(1) A *flue pipe* or *breeching* serving 1 or more solid-fuel-burning *appliances* shall be constructed of steel, masonry or other *approved noncombustible* material with a melting point of not less than 2000°F (1093°C). Galvanized steel may be used provided the design temperature of the flue gas does not exceed 600°F (316°C). Tile shall not be used as a *flue pipe.*

Minimum metal thickness

(2) The thickness of metal used in steel *flue pipes* for solid-fuel-burning *appliances* shall conform to Table 2.8.A.

Installation

(3) A *flue pipe* or *breeching* serving a solid-fuel-fired *appliance* shall not pass through

(a) an *attic or roof space,* closet or similar concealed space, or

(b) a floor, ceiling, wall or *partition* of *combustible construction.*

(4) A *flue pipe* or *breeching* serving a solid-fuel-fired *appliance* shall

(a) be securely supported by metal or other *noncombustible* supports,

(b) be as short and straight as possible,

(c) be designed and constructed to allow for expansion,

(d) be sloped upward toward the *chimney* at least ¼ in. per ft (21 mm per m) of horizontal run,

Table 2.8.A.

Forming Part of Sentence 2.8.9.(2)

Diameter of *Flue Pipe*, in.	Minimum Thickness of Metal, in.	
	Uncoated Steel	Galvanized Steel
Below 6	0.016	0.016
6 to 8 (incl.)	0.021	0.019
Over 8 to 10	0.027	0.024
Over 10 to 12	0.033	0.030
Over 12 to 16	0.043	0.036
Over 16	0.067	0.058
Column 1	2	3

Table 2.8.B.

Forming Part of Sentence 2.8.9.(5)

Type of Protection(1)	Minimum Clearance with Protection, in.(2)
¼-in. asbestos millboard spaced out 1 in. by *noncombustible* material	12
0.013-in. sheet metal on ¼-in. asbestos millboard	12
0.013-in. sheet metal spaced out 1 in. by *noncombustible* material	9
0.013-in. sheet metal on ⅛-in. asbestos millboard spaced out 1 in. by *noncombustible* material	9
1½-in. asbestos-cement or mineral wool covering on *flue pipe* or *breeching*	9
0.027-in. sheet metal on 1 in. mineral wool batts reinforced with wire mesh or equivalent	3
Column 1	2

Notes to Table 2.8.B.:

(1) Applied to the *combustible* material unless otherwise specified, and covering all surfaces within 18 in. of the *flue pipe* or *breeching*. Thicknesses are minimum.

(2) Clearances shall be measured from the outer surface of the *flue pipe* or *breeching* (or the insulation protecting the *flue pipe* or *breeching*) to the *combustible* material, disregarding protection applied to the *combustible* material.

(e) have a cross-sectional area not less than
  (i) the area of the *flue* outlet of the *appliance* served by a *flue pipe*, or
  (ii) the combined area of the *flue* outlets of all the *appliances* served by a *breeching*,
(f) enter the side of a *chimney* through a metal thimble or masonry *flue* ring,
(g) not extend into the *chimney flue*, and
(h) have a tight connection with the *chimney*.

Clearances

(5) The minimum clearance between a *flue pipe* or *breeching* serving a solid-fuel-fired *appliance* and *combustible* material, whether or not such material is covered with *noncombustible* material such as plaster, shall be 18 in. (457 mm), except that where protection is provided as described in Table 2.8.B., the clearance shall conform to that Table. (See Appendix B.)

APPENDIX A

EXTRACTS FROM PART 9
(HOUSING AND SMALL BUILDINGS)
of the
National Building Code of Canada 1975

(This Appendix contains the requirements for heating, ventilating and air-conditioning from Part 9.)

SECTION 9.21 CHIMNEYS AND FLUES

SUBSECTION 9.21.1. GENERAL

Chimney design

9.21.1.1. Where a *chimney* exceeds 40 ft in height or where the cross-sectional area of a *flue* exceeds 126 sq in or where the capacity of an *appliance* connected to a *flue* has a rated input exceeding 400,000 Btu per hr, the requirements in the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975 shall apply.

9.21.1.2. *Metal chimneys* consisting of a single thickness of metal shall conform to the requirements in the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975.

9.21.1.3. *Factory-built chimneys* shall conform to ULC-S604-1963, "Chimneys, Factory-Built."

9.21.1.4. Where a metal *gas vent* is used for venting of gas-burning *appliances,* such *appliances* shall be vented in accordance with CSA B149.1-1971, "Installation Code for Natural Gas Burning Appliances and Equipment" and Supplement No. 1-1973, or CSA B149.2-1969, "Installation Code for Propane Burning Appliances and Equipment" and Supplement No. 2-1973.

Dampers and draft regulators

9.21.1.5. Dampers and draft regulators in *flue pipes* serving oil-fired *appliances* shall conform to CSA B139-1971, "Installation Code for Oil Burning Equipment."

Gas vents

9.21.1.6. *Chimneys* or *gas vents approved* for gas *appliances* but not suitable for solid- or liquid-fuel-fired *appliances* shall be plainly and permanently marked to that effect.

Testing of chimney, vent or flue pipe

9.21.1.7. The *authority having jurisdiction* may require a *chimney,* vent or *flue pipe* to be tested for gas, smoke and flame tightness.

SUBSECTION 9.21.2. CHIMNEY FLUES

Chimney flue limitation

9.21.2.1. A *chimney flue* serving a fireplace or incinerator shall not serve any other *appliance.*

9.21.2.2. Two or more fuel-burning *appliances,* other than fireplaces, may be connected to the same *flue* provided adequate draft is maintained for the connected *appliances* and the connections are made at different elevations.

Angle of chimney flue

9.21.2.3. *Chimney flues* shall not be inclined more than 45 deg. to the vertical.

Size of chimney flue

9.21.2.4. The size of a *chimney flue* for a *masonry or concrete chimney* shall conform to Table 9.21.2.A. unless calculations are provided to show that smaller sizes can be justified.

9.21.2.5. The width of an oval *chimney flue* shall not be less than ⅔ its breadth.

Table 9.21.2.A.

Forming Part of Article 9.21.2.4.

FLUE SIZES		
Maximum Rated Input[1] of One or More *Appliances*, Btu/hr	Minimum Size of *Flue*[2]	
	Round	Rectangular
105,000 175,000 280,000 400,000	6-in. diam. 7-in. diam. 8-in. diam. 9-in. diam.	8 in. x 8 in. nom. 8 in. x 8 in. nom. 8 in. x 8 in. nom. 8 in. x 12 in. nom.
Column 1	2	3

Notes to Table 9.21.2.A.:

(1) Minimum size required for fireplace *flues* shall be 9 in. in diam. for round *flues* and 8 in. by 12 in. for rectangular *flues*.

(2) Where the *flues* serve only one *appliance*, the *flue* area shall be at least equal to that of the *flue pipe* connected to it.

SUBSECTION 9.21.3. CHIMNEY LINING

Chimney lining

9.21.3.1. Every *masonry or concrete chimney* shall have a lining of clay, firebrick, asbestos-cement or other *approved* material.

Clay liner specifications

9.21.3.2. Clay liners shall conform to ASTM C315-56 (1972), "Clay Flue Linings." Such liners shall be not less than ⅝ in. thick and shall be capable of resisting, without softening or cracking, a temperature of 2000°F.

Firebrick liner specifications

9.21.3.3. Firebrick liners shall conform to ASTM C64-72, "Refractories for Incinerators and Boilers." Such firebrick shall be laid with fireclay mortar or high temperature cement mortar.

9.21.3.4. Asbestos-cement *chimney liners* shall conform to CGSB 34-GP-11b (1970) "Pipe: Asbestos Cement, Flue." Such liners shall not be used where the flue gas temperature exceeds 700°F.

Installation of chimney liners

9.21.3.5. *Chimney liners* shall be installed when the surrounding masonry or concrete is placed. Spaces between the liner and surrounding masonry shall not be filled with mortar where the *chimney* walls are less than 7½ in. in thickness.

9.21.3.6. *Chimney liners* shall extend from a point not less than 8 in. below the lowest *flue pipe* connection to a point not less than 2 in. above the *chimney* cap.

SUBSECTION 9.21.4. MASONRY AND CONCRETE CHIMNEY CONSTRUCTION

Unit masonry chimney

9.21.4.1. Unit masonry shall conform to Section 9.20.

Concrete for chimneys

9.21.4.2. Concrete shall conform to Section 9.3.

Footings for chimneys

9.21.4.3. Footings for *masonry chimneys* and *concrete chimneys* shall conform to the requirements in Section 9.15.

9.21.4.4. A *chimney flue* shall extend not less than 3 ft above the highest point at which the *chimney* comes in contact with the roof, and not less than 2 ft above the highest roof surface or structure within 10 ft of the *chimney.* Not more than 8 in. of *chimney flue* above the top of the *chimney* cap may be considered in computing this height. *Chimneys* shall be braced when necessary to provide lateral stability. Height of chimney flues

9.21.4.5. The top of a *chimney* shall have a waterproof cap of concrete, metal or other *approved* material. The cap shall slope from the lining and be provided with a drip not less than 1 in. from the chimney wall. Jointed *masonry chimney* caps shall have flashing installed beneath the cap extending from the liner to the drip edge. Chimney caps

9.21.4.6. A cleanout opening equipped with a metal frame and a tight-fitting metal door shall be installed near the base of the *chimney flue.* Chimney flue cleanout

9.21.4.7. The walls of a *masonry chimney* shall be built of solid units not less than 3 in. thick. Masonry chimney wall thickness

9.21.4.8. *Flues* in the same *chimney* shall be separated by not less than 3 in. of solid masonry or concrete exclusive of liners where clay liners are used, or 3½ in. of firebrick where firebrick liners are used. Separation of chimney flues

9.21.4.9. Junctions with adjacent materials shall be adequately flashed to shed water. Junction flashing

SUBSECTION 9.21.5. FLUE PIPES

9.21.5.1. *Flue pipes* connecting a fuel-burning *appliance* to a *chimney flue* shall be made of metal conforming to Table 9.21.5.A. Flue pipe specification

9.21.5.2. *Flue pipes* shall be as short and as straight as possible.

9.21.5.3. The cross-sectional area of the *flue pipe* shall not be less than the area of the *flue* outlet of the *appliance,* except that a tapered reduction in the section of the *flue* adjacent to the *chimney* is permitted provided adequate draft is maintained.

Table 9.21.5.A.

Forming Part of Article 9.21.5.1.

WALL THICKNESS OF FLUE PIPES					
Maximum Diameter of *Flue Pipe,* in.	Minimum Metal Thickness, in.				
	Galvanized Steel		Uncoated Steel		Aluminum
	Oil and Gas Fuels	Solid Fuels	Oil and Gas Fuels	Solid Fuels	Gas Fuels
4	0.013	0.016	0.013	0.016	0.012
5	0.013	0.016	0.013	0.016	0.016
8	0.016	0.019	0.016	0.021	0.016
10	0.019	0.024	0.021	0.027	0.021
Column 1	2	3	4	5	6

9.21.5.4. The *flue pipe* connection with the *chimney* shall be made by a metal thimble or masonry *flue* ring. The connection shall be tight and made so that the *flue pipe* does not extend into the *chimney flue.* Flue pipe connection

Flue pipe support

9.21.5.5. A *flue pipe* shall be supported by metal or other *noncombustible* supports.

Restriction on flue pipe installation

9.21.5.6. No *flue pipe* shall pass through an attic, closet, concealed space or floor.

SUBSECTION 9.21.6. CLEARANCE FROM COMBUSTIBLE CONSTRUCTION

Clearance from combustible construction

9.21.6.1. The clearance between *masonry or concrete chimneys* and *combustible* framing shall be not less than 2 in. for interior *chimneys* and ½ in. for exterior *chimneys.*

9.21.6.2. A clearance of not less than 6 in. shall be provided between a cleanout opening and *combustible* material.

9.21.6.3. All spaces between *masonry or concrete chimneys* and *combustible* framing shall be sealed top or bottom with *noncombustible* material.

Flooring and wood trim separation

9.21.6.4. Flooring shall have not less than a ½-in. clearance from *masonry or concrete chimneys.* Wood trim shall be separated from *masonry or concrete chimneys* by not less than ⅛ in. of asbestos, asbestos millboard or other *noncombustible* material.

Clearance from unprotected combustible material

9.21.6.5. The clearance between *flue pipes* and unprotected *combustible* material shall be not less than 18 in., except that where the flue gas temperature does not exceed 750°F, the clearance may be reduced to 9 in. Where an 18-in. clearance is required, it may be reduced to the values shown in Table 9.21.6.A. where *combustible* material is protected.

Table 9.21.6.A.

Forming Part of Article 9.21.6.5.

CLEARANCE BETWEEN A FLUE PIPE AND PROTECTED COMBUSTIBLE MATERIAL	
Type of protection applied to the *combustible* material unless otherwise specified and covering all surfaces within 18 in. of the *flue pipe*	Clearance between *flue pipe* and *combustible* material, in.
¼-in. asbestos millboard spaced out 1 in. by *noncombustible* material	12
0.013-in. sheet metal on ¼-in. asbestos millboard	12
0.013-in. sheet metal spaced out 1 in. by *noncombustible* material	9
0.013-in. sheet metal on ⅛-in. asbestos millboard spaced out 1 in. by *noncombustible* material	9
1½-in. asbestos-cement covering on *flue pipe*	9
0.027-in. sheet metal on 1-in. mineral wool batts reinforced with wire mesh or equivalent	3
Column 1	2

9.21.6.6. Joists or beams may be supported on masonry walls which enclose *chimney flues* provided the *combustible* members are separated from the *flue* by a minimum of 12 in. of solid masonry.

SECTION 9.33 VENTILATION

SUBSECTION 9.33.1. SCOPE

9.33.1.1. This Section applies to the ventilation of rooms and spaces in *residential occupancies* by natural ventilation and mechanical ventilation where the rated fan capacity does not exceed 4000 cfm. — Ventilation

9.33.1.2. Where the rated fan capacity exceeds 4000 cfm, mechanical ventilation shall conform to the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975. — Mechanical ventilation

9.33.1.3. Ventilation of rooms and spaces in other than *residential occupancies* shall be in accordance with good engineering practice. — Ventilation of rooms and spaces

(The procedures described in the ASHRAE Guide and Data Books and the ASHRAE Handbooks shall be considered as good engineering practice.)

9.33.1.4. A garage for parking more than 5 cars shall be ventilated in accordance with Part 3 of this Bylaw. — Ventilation of garages

SUBSECTION 9.33.2. GENERAL

9.33.2.1. Rooms and spaces in *buildings* of *residential occupancy* shall be ventilated by natural means in accordance with Subsection 9.33.3. or by mechanical means in conformance with Subsection 9.33.4. — Ventilation of residential occupancies

9.33.2.2. A space that contains a fuel-fired heating *appliance* shall have natural or mechanical means of supplying the required combustion air.

9.33.2.3. Where the ventilation system forms part of the heating system, Section 9.34 shall also apply.

9.33.2.4. Air contaminants released within *buildings* shall be removed insofar as possible at their points of origin and shall not be permitted to accumulate in unsafe concentrations. — Air contaminants

9.33.2.5. Every *building* in which dust, fumes, gases, vapour or other contaminants tend to create a fire or explosion hazard shall be provided with an exhaust ventilation system designed to conform with the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975, and shall be provided with explosion relief devices and vents or other protective measures to conform with Part 3 of this Bylaw. — Exhaust ventilation system

SUBSECTION 9.33.4. MECHANICAL VENTILATION

(For requirements for Natural Ventilation see Subsection 9.33.3. of Part 9 of the National Building Code of Canada 1975.)

9.33.4.1. Where rooms or spaces are mechanically ventilated, the system shall be capable of providing at least 1 air change per hour. Where a kitchen space is combined with a living area, natural or mechanical ventilation shall be provided in the kitchen area. — Mechanical ventilation

9.33.4.2. No air from any *dwelling unit* shall be circulated directly or indirectly to any other *dwelling unit, public corridor* or public stairway. — Air from dwelling unit

Exhaust ducts from toilet room and kitchen

9.33.4.3. *Exhaust ducts* from rooms containing water closets, urinals, showers, slop sinks or domestic cooking equipment shall not be connected to duct systems serving other areas of a *building* except at the inlet of the exhaust fan. Where such a connection is made, devices shall be installed to prevent the circulation of exhaust air through the *dwelling units* when the fan is not operating.

Contamination from exhaust outlets

9.33.4.4. Air intakes shall be located so as to avoid contamination from exhaust outlets or other sources in concentrations greater than normal in the locality in which the *building* is located.

Exhaust discharge

9.33.4.5. *Exhaust ducts* shall discharge directly to the outdoors. Where the *exhaust duct* passes through or is adjacent to unheated space, the duct shall be insulated to prevent moisture condensation in the duct.

Access to ventilation equipment

9.33.4.6. Ventilation equipment shall be accessible for inspection, maintenance, repair and cleaning. Kitchen *exhaust ducts* shall be designed and installed so that the entire duct can be cleaned where the duct is not equipped with a filter at the intake end.

Air intake shield

9.33.4.7. Outdoor air intake and exhaust outlets shall be shielded from weather and insects. Screening shall be of rust-proof material.

Automatic damper

9.33.4.8. Outdoor air intake openings into the cold air return system shall be provided with a manually operated or automatic damper. Air intake openings larger than 5 in. diam. shall be equipped with a manually operated closure if the system is gravity type, or an automatic closure if the system is mechanically operated.

9.33.4.9. Where a duct enters or passes through a wall, floor or ceiling, the space between the duct and surrounding construction shall be closed off with *noncombustible* material.

9.33.4.10. Except as provided in Article 9.33.4.11., every ventilating duct shall conform to the requirements of Section 9.34 for *supply ducts.*

9.33.4.11. An *exhaust duct* that serves only a bathroom or water-closet room and that is contained entirely within a *dwelling unit* or space that is common to no other *dwelling unit,* may be of *combustible* material provided the duct is reasonably air tight and constructed of a material impervious to water.

9.33.4.12. Underground ventilating ducts shall be adequately drained. Such ducts shall have no sewer connections and shall be provided with access for inspection and cleaning.

SECTION 9.34 HEATING AND AIR-CONDITIONING

SUBSECTION 9.34.1. SCOPE

9.34.1.1. This Section applies to the design and installation of heating systems in which the heat input does not exceed 400,000 Btu per hr and to air-conditioning systems in which the rated fan capacity does not exceed 4000 cfm.

Heat input exceeding 400,000 Btu/hr

9.34.1.2. Where the heat input of a heating system exceeds 400,000 Btu per hr or the rated fan capacity of an air-conditioning system exceeds 4000 cfm, the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975 shall apply.

SUBSECTION 9.34.2. GENERAL

9.34.2.1. The design, including heat loss and heat gain calculations, for the construction and installation of heating and air-conditioning systems, shall conform to good engineering practice. Design

(The procedures described in the ASHRAE Guide and Data Books, the ASHRAE Handbooks, the HRA Digest and the Hydronics Institute Manuals may be considered as good engineering practice.)

9.34.2.2. Equipment forming part of a heating or air-conditioning system except for concealed or embedded pipes or ducts shall have easy access for inspection, maintenance and cleaning. Access to equipment

9.34.2.3. Oil-burning, gas-burning and electric equipment shall be installed to conform to the following: Installation codes

CSA B51-1972, "Code for the Construction and Inspection of Boilers and Pressure Vessels,"
CSA B52-1965, "Mechanical Refrigeration Code,"
CSA B139-1971, "Installation Code for Oil Burning Equipment,"
CSA B149.1-1971, "Installation Code for Natural Gas Burning Appliances and Equipment," and Supplement No. 1-1973,
CSA B149.2-1969, "Installation Code for Propane Burning Appliances and Equipment," and Supplement No. 2-1973, and
CSA C22.1-1972, "Canadian Electrical Code, Part I."

9.34.2.4. The installation of solid-fuel-burning *appliances,* including mounting, clearances and requirements for safety devices, shall conform to the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975.

9.34.2.5. Residential *buildings* intended for use in the winter months on a continuing basis shall be equipped with heating facilities capable of maintaining an indoor air temperature of 72°F at the outside winter design temperature, except as provided in Article 9.34.2.6. All other *buildings* shall be equipped with heating facilities of sufficient capacity to maintain the desired indoor air temperature commensurate with the use of the *building* at the outside winter design temperature. Winter design temperatures shall be determined on the basis of the January 2½ per cent design temperature as listed in NBC Supplement No. 1, "Climatic Information for Building Design in Canada 1975." Temperature in residential buildings; Temperature in other buildings

9.34.2.6. Heating facilities shall be provided which shall be capable of maintaining a temperature not less than 65°F in an unfinished basement or cellar in *buildings* of *residential occupancy.* Crawl spaces need not be heated. Temperature in basement or cellar

SUBSECTION 9.34.3. HEATING SUPPLY DUCTS

9.34.3.1. The size of *supply ducts* shall conform to good engineering practice.

9.34.3.2. Except for heating *supply ducts* serving not more than 1 *dwelling unit* and encased in concrete slabs-on-ground, heating *supply ducts* shall be *noncombustible* or shall be Class 1 ducts installed in conformance with the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975. *Combustible* ducts in concrete slabs-on-ground that are connected to a *furnace* supply *plenum* shall be located not closer than 2 ft from that *plenum,* and not less than 2 ft from its connection to a riser or register. Ducts in or beneath concrete slabs-on-ground shall be water tight, corrosion-resistant, decay-resistant and mildew-resistant.

9.34.3.3. Galvanized steel, aluminum or tin plate *supply ducts* shall conform to Table 9.34.3.A. Other metals shall have equivalent strength and durability. Rectangular panels in *plenums* and ducts greater than 12 in. wide shall be shaped to provide sufficient stiffness.

Table 9.34.3.A.

Forming Part of Article 9.34.3.3.

MINIMUM METAL THICKNESS OF DUCTS, in.				
Shape and Location of Duct	Size of Duct, in.	Galvanized Steel	Aluminum	Tin Plate
All round ducts and enclosed rectangular ducts	14 or under over 14	0.013 0.016	0.012 0.016	0.015 —
Exposed rectangular ducts	14 or under over 14	0.016(1) 0.019(1)	0.016 0.019	— —
Column 1	2	3	4	5

Note to Table 9.34.3.A.:

(1) In systems serving a single *dwelling unit,* thickness may be reduced to 0.013 in. for ducts 14 in. or smaller in size and to 0.016 in. for ducts over 14 in. in size, where the permissible duct clearance is ½ in. or less.

9.34.3.4. Where the installation of heating *supply ducts* in walls, floors and *partitions* creates a space between the duct and construction material, the space shall be sealed with *noncombustible* material at each end.

Vertical ducts in closets or rooms

9.34.3.5. Vertical *supply ducts* located in closets or rooms shall be covered with not less than ¼-in. cellular-asbestos insulation or *noncombustible* insulation.

Duct supports

9.34.3.6. Ducts shall be securely supported by metal hangers, straps, lugs or brackets, except that where zero clearance is permitted as described in Articles 9.34.3.8. and 9.34.3.9., wooden brackets may be used.

Minimum clearance of furnace plenums

9.34.3.7. The clearance of *furnace plenums* from *combustible* material shall conform to one of the following:

CSA B139-1971, "Installation Code for Oil Burning Equipment,"

CSA B149.1-1971, "Installation Code for Natural Gas Burning Appliances and Equipment," and Supplement No. 1-1973,

CSA B149.2-1969, "Installation Code for Propane Burning Appliances and Equipment," and Supplement No. 2-1973, or

The ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975 for solid-fuel-burning *furnaces.*

Clearance of supply ducts

9.34.3.8. *Supply ducts* from warm-air *furnaces* having a required *plenum* clearance of 3 in. or less shall maintain this clearance from *combustible* material where the duct leaves the main *plenum.* This may be gradually reduced to ½-in. clearance at a distance of not less than 18 in. from the *furnace plenum,* and to zero beyond a bend or offset in the duct sufficiently large to shield the remainder of the duct from direct radiation from the *furnace* heat exchanger.

9.34.3.9. *Supply ducts* from warm-air *furnaces* having a required *furnace plenum* clearance of over 3 in. but not more than 6 in. shall maintain this clearance from *combustible* material at the main *furnace plenum* and for a horizontal distance of 6 ft from the *furnace plenum.* This may be reduced to ½-in. clearance beyond this point and to zero clearance beyond a bend or offset in the duct sufficiently large to shield the remainder of the duct from direct radiation from the *furnace* heat exchanger.

9.34.3.10. *Supply ducts* from warm-air *furnaces* having a required *plenum* clearance of more than 6 in. shall have a clearance from *combustible* material equal to that specified for the *furnace plenum.* This clearance shall be maintained for a horizontal distance of not less than 3 ft from the *furnace plenum.* This may be reduced to 6-in. clearance beyond this point and to 1-in. clearance at a horizontal distance of 6 ft from the *furnace plenum.* This may be further reduced to 5/16-in. clearance beyond a bend or offset in the duct sufficiently large to shield the remainder of the *supply duct* from direct radiation from the *furnace* heat exchanger.

Clearance for boots and register boxes

9.34.3.11. Clearances for boots and register boxes shall be as described for *supply ducts* when the boot or box is not separated from *combustible* material, except that no clearance is required when not less than ¼ in. of cellular-asbestos insulation is provided.

Register over pipeless furnace

9.34.3.12. Where a register is installed in a floor directly over a pipeless *furnace,* a double walled register box with not less than 4 in. between walls, or a register box with the warm-air passage completely surrounded by the cold-air passage, shall be permitted in lieu of the clearances listed in Articles 9.34.3.8. to 9.34.3.10.

Pipe joints

9.34.3.13. All round pipe joints shall be lapped not less than 1 in. and shall have a snug fit without undue crimping or distortion. Such joints need not be screw fastened or taped.

Rectangular duct connections

9.34.3.14. Rectangular duct connections shall be made with S and drive cleats, or equivalent mechanical connection. Such connections need not be taped if reasonably airtight.

Trunk ducts

9.34.3.15. Trunk ducts shall be securely supported by metal hangers, straps, lugs or brackets. The ducts shall not be nailed directly to wood members. Branch pipes shall be supported at suitable spacing to maintain alignment and prevent sagging.

SUBSECTION 9.34.4. SUPPLY OUTLETS FOR WARM-AIR DUCTS

Supply outlet required

9.34.4.1. A warm-air supply outlet shall be provided in each finished room in a *dwelling unit.* When rooms are located adjacent to exterior walls such outlets shall be located so as to bathe at least 1 exterior wall with warm air, except in bathrooms, utility rooms or kitchens where this may not be practical.

Supply outlet in basement

9.34.4.2. A warm-air supply outlet per 400 sq ft shall be provided in unfinished basements serving *dwelling units,* located so as to provide adequate distribution of warm air.

Supply outlet in crawl space

9.34.4.3. No fewer than 4 supply outlets shall be provided in crawl spaces used as warm-air *plenums,* and located to direct the air towards the corners of the crawl space. Ducts for such outlets shall be not less than 6 ft in length.

Furnace capacity

9.34.4.4. Except for pipeless *furnaces* and floor *furnaces,* the capacity of warm-air supply outlets serving *dwelling units* shall be not less than the design heat loss from the area served, and shall not exceed 10,000 Btu per hr per outlet. In basements and heated crawl spaces, the calculated heat gain from the *supply ducts* and *plenum* surfaces may be considered in the calculations.

Registers in garages

9.34.4.5. Registers for warm-air supply outlets in garages shall be located not less than 4 ft above the floor, and be fitted with an automatic damper to prevent garage vapours entering the heating system.

Temperature of supply air

9.34.4.6. The temperature of supply air at the warm-air supply outlets shall not exceed 160°F.

Slab installation of supply systems

9.34.4.7. Warm-air supply systems for residential *buildings* built on concrete slabs-on-grade shall be installed in the slab. Such systems shall be of the perimeter loop type or radial perimeter type.

SUBSECTION 9.34.5. REGISTERS, DIFFUSERS, GRILLES AND FITTINGS FOR WARM-AIR HEATING

Design of fittings for ducts

9.34.5.1. The design of fittings for ducts shall conform to CSA B228.1-1968, "Pipes, Ducts and Fittings for Residential Type Air Conditioning Systems," except that metal thickness requirements shall conform to those in Table 9.34.3.A.

Diffusers for supply outlets

9.34.5.2. Warm-air supply outlets located in finished areas or on the *furnace plenum* or extended *plenum* shall be provided with a diffuser and adjustable opening.

Adjustable damper

9.34.5.3. All branch *supply ducts* which are not fitted with diffusers with an adjustable balance stop shall be supplied with an adjustable damper, and fitted with a device to indicate the position of the damper.

Grilles

9.34.5.4. Return-air inlets in finished areas shall be supplied with grilles.

SUBSECTION 9.34.6. INSULATION OF DUCTS

Insulation of supply ducts

9.34.6.1. *Supply ducts* and *return ducts* in exterior walls shall be insulated on the 3 cold sides to provide an "R" value of not less than 1.5. *Supply ducts* and *return ducts* in attic spaces or unheated crawl spaces shall be insulated to provide an "R" value of not less than 7.

SUBSECTION 9.34.7. RETURN-AIR SYSTEMS

Return-air system

9.34.7.1. The return-air system shall be designed to handle the entire air supply.

Fire resistance of return ducts

9.34.7.2. Parts of *return ducts* directly above or within 2 ft of the outside *furnace* casing shall be *noncombustible. Return ducts* in other locations shall be constructed of material having a surface *flame-spread rating* of not more than 150.

Lining of return ducts

9.34.7.3. *Combustible return ducts* shall be lined with *noncombustible* material below floor registers, at the bottom of vertical ducts and under *furnaces* having a bottom return.

Spaces used as return ducts

9.34.7.4. Spaces between studs used as *return ducts* shall be separated from the unused portions of such spaces by tight-fitting metal stops or wood blocking.

Vertical return ducts

9.34.7.5. A vertical *return duct* shall have openings to return air on not more than 1 floor.

Return-air plenum

9.34.7.6. A *public corridor* or public stairway shall not be used as a return-air *plenum.*

Negative pressure

9.34.7.7. The return-air system shall be designed so that the negative pressure from the circulating fan cannot affect the *furnace* combustion air supply nor draw combustion products from joints or openings in the *furnace* or *flue pipe.*

9.34.7.8. Return-air inlets shall not be located in a garage or an enclosed furnace room or in a crawl space where the *furnace* is installed in the crawl space. Return-air inlets

9.34.7.9. Where warm air is exhausted into a garage, special provision shall be made for make-up air from the outside to compensate for this air. Warm air exhaust

9.34.7.10. Return air from a *dwelling unit* shall not be recirculated to any other *dwelling unit.* Recirculation of return air

9.34.7.11. At least 1 return-air inlet shall be provided per *dwelling unit.* Each return shall serve an area having a design heat loss of not more than 60,000 Btu per hr. Return-air inlets required

9.34.7.12. Provision shall be made for the return of air from all rooms by leaving a gap beneath doors, using louvred doors or installing a *return duct* inlet. Provisions for the return of air

9.34.7.13. Except for return-air *plenums* located within a *dwelling unit,* where a ceiling assembly is used as a *plenum,* the requirements of the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975 shall apply for such systems. Ceiling assembly used as plenum

SUBSECTION 9.34.8. STEAM AND HOT WATER HEATING SYSTEMS

9.34.8.1. Every steam and hot water pipe shall be constructed of *noncombustible* material having adequate strength and durability. Steam and hot water heating system

9.34.8.2. Insulation or other covering for steam or hot water pipes shall be *noncombustible,* except that *combustible* insulation may be used, provided such insulation conforms to the requirements in the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975 for *combustible* pipe insulation. Insulation of pipes

9.34.8.3. Clearance between steam or hot water pipes and *combustible* construction shall be at least ½ in. for steam or water temperatures greater than 200°F, but not more than 250°F, and at least 1 in. for temperatures over 250°F. Clearance for steam and hot water pipes

9.34.8.4. The space around pipes passing through a wall or floor construction shall be *fire stopped* with *noncombustible* material. Fire stopping of pipe spaces

9.34.8.5. When pipes are run in a vertical shaft, the *fire-resistance rating* of the shaft shall conform to the requirements contained in Subsection 9.10.12. Such shafts shall have a *noncombustible* lining where the pipes are not insulated. Fire-resistance rating of pipe shafts

9.34.8.6. Steam and hot water pipes shall be designed to allow for expansion and contraction with changes in temperature. Design for expansion and contraction

SUBSECTION 9.34.9. RADIATORS, CONVECTORS AND HEAT EXCHANGERS

9.34.9.1. Every heat exchanger or *unit heater* using hot water or low pressure steam shall be installed with sufficient clearance to ensure that the temperature of any *combustible* material will not exceed its safe limit. Heat exchangers

9.34.9.2. Every steam or hot water radiator or convector attached to a wall or located in a recess or concealed space containing *combustible* material shall be provided with a *noncombustible* backing. Protection from hot water and steam appliances

APPENDIX B

SUPPLEMENTARY MATERIAL for the Canadian Heating, Ventilating and Air-Conditioning Code 1975

(This Appendix contains notes and diagrams that apply to the requirements of this Code. The bold-face reference numbers that introduce each item apply to the requirements in the main body of the Code to which the supplementary material is applicable. The bold-face captions following these reference numbers describe the subjects to which the references apply.)

Sentence 2.3.5.(2) NFPA Publications Pertaining to The Heating, Ventilating and Air-Conditioning of Spaces Containing Hazardous Gases, Dusts or Liquids

NFPA 30-1973 Flammable and Combustible Liquids Code
NFPA 32-1972 Drycleaning Plants
NFPA 33-1973 Spray Finishing Using Flammable and Combustible Materials
NFPA 34-1971 Dip Tanks Containing Flammable or Combustible Liquids
NFPA 35-1971 Manufacture of Organic Coatings
NFPA 36-1973 Solvent Extraction Plants
NFPA 40-1967 Storage and Handling of Cellulose Nitrate Motion Picture Film
NFPA 42-1967 Storage, Handling and Use of Pyroxylin Plastics in Factories
NFPA 43-1967 Storage and Sale of Pyroxylin Plastic in Warehouses and Wholesale, Jobbing and Retail Stores
NFPA 48-1967 Storage, Handling and Processing of Magnesium
NFPA 50A-1973 Gaseous Hydrogen Systems at Consumer Sites
NFPA 50B-1973 Liquefied Hydrogen Systems at Consumer Sites
NFPA 51-1973 Installation and Operation of Oxygen-Fuel Gas Systems for Welding and Cutting
NFPA 51A-1973 Acetylene Cylinder Charging Plants
NFPA 60-1973 The Installation and Operation of Pulverized Fuel Systems
NFPA 61A-1973 Manufacturing and Handling Starch
NFPA 61B-1973 Prevention of Fire and Dust Explosions in Grain Elevators and Bulk Grain Handling Facilities
NFPA 61C-1973 Prevention of Fire and Dust Explosions in Feed Mills
NFPA 62-1967 Prevention of Dust Explosions in the Production, Packaging and Handling of Pulverized Sugar and Cocoa
NFPA 63-1971 Fundamental Principles of Prevention of Dust Explosions in Industrial Plants
NFPA 65-1973 Processing and Finishing of Aluminum
NFPA 66-1973 Pneumatic Conveying Systems for Handling Feed, Flour, Grain and Other Agricultural Dusts
NFPA 68-1954 Guide for Explosion Venting
NFPA 69-1973 Explosion Prevention Systems
NFPA 81-1969 Fur Storage, Fumigation and Cleaning
NFPA 86A-1973 Ovens and Furnaces, Design, Location and Equipment
NFPA 86B-1973 Industrial Furnaces, Design, Location and Equipment
NFPA 88A-1973 Parking Structures
NFPA 88B-1973 Repair Garages
NFPA 91-1973 Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying
NFPA 96-1973 Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment
NFPA 204-1968 Guide for Smoke and Heat Venting
NFPA 303-1969 Marinas and Boatyards
NFPA 307-1967 Recommendations for the Operation of Marine Terminals
NFPA 321-1973 Basic Classification of Flammable and Combustible Liquids
NFPA 325M-1969 Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids
NFPA 395-1972 Storage of Flammable and Combustible Liquids on Farms and Isolated Construction Projects
NFPA 409-1973 Aircraft Hangars
NFPA 416-1973 Construction and Protection of Airport Terminal Buildings
NFPA 481-1972 Production, Processing, Handling and Storage of Titanium
NFPA 482M-1961 Zirconium
NFPA 490-1970 Storage of Ammonium Nitrate
NFPA 651-1972 Prevention of Dust Explosions in the Manufacture of Aluminum Powder
NFPA 652-1968 Explosion and Fire Protection in Plants Producing or Handling Magnesium Powder
NFPA 653-1971 Prevention of Dust Explosions in Coal Preparation Plants

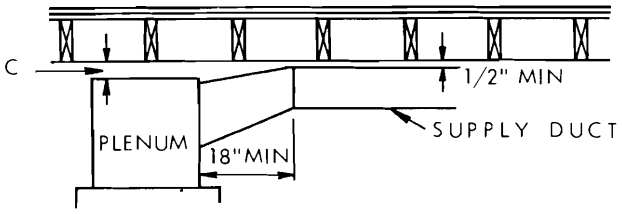
Sentence 2.3.5.(2) (Cont'd.)

NFPA 654-1970 Prevention of Dust Explosions in the Plastics Industry
NFPA 655-1971 Prevention of Sulfur Fires and Explosions
NFPA 656-1971 Prevention of Dust Ignition in Spice Grinding Plants
NFPA 657-1967 Prevention of Dust Explosions in Confectionery Manufacturing Plants
NFPA 664-1971 Prevention of Dust Explosions in Woodworking and Wood Floor Manufacturing Plants.

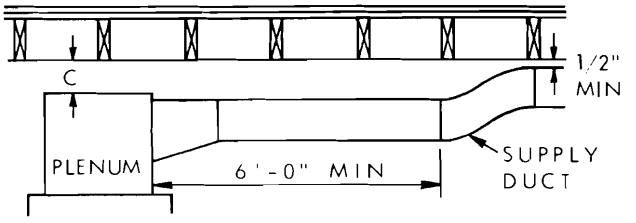
Sentence 2.3.5.(4) GARAGE VENTILATION

Ticket and attendant booths of parking garages should be pressurized with a supply of uncontaminated air. (See also Article 9.33.1.4. in Appendix A.)

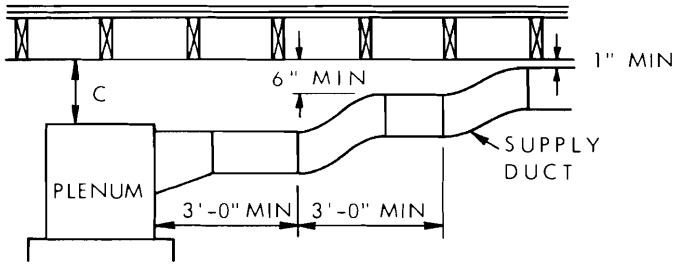
Article 2.4.8. CLEARANCES FOR WARM-AIR SUPPLY DUCTS



(a) APPLICABLE TO FORCED-AIR FURNACES WHERE PERMISSIBLE CLEARANCE C ABOVE PLENUM IS 3 INCHES OR LESS. REFER TO ARTICLE 9.34.3.8 IN APPENDIX A

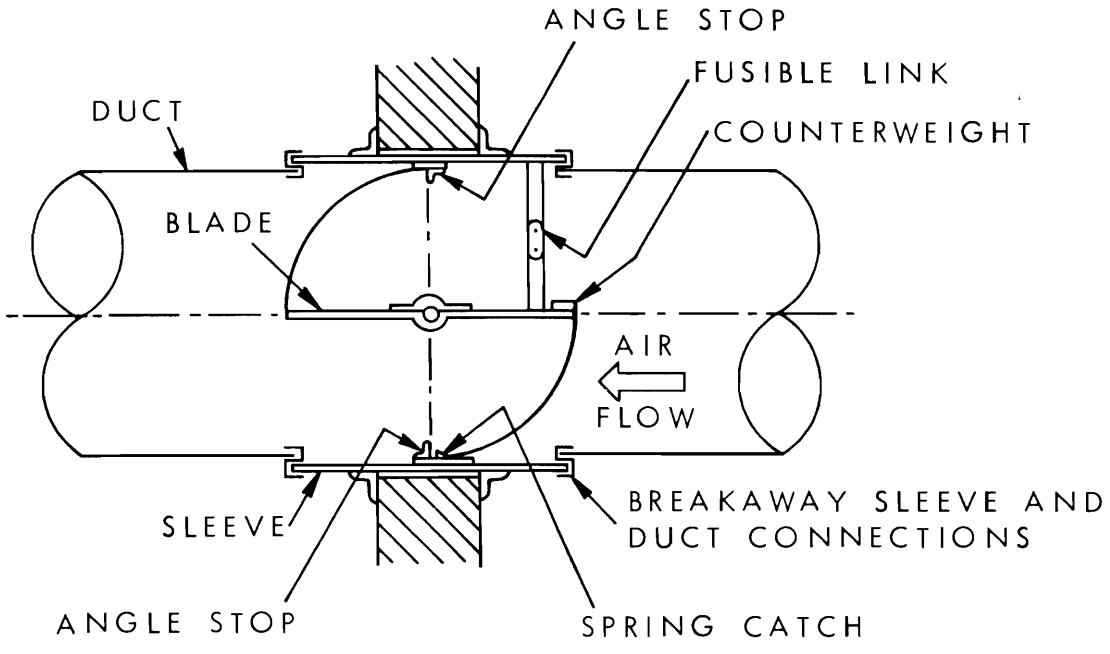


(b) APPLICABLE TO FORCED-AIR FURNACES WHERE PERMISSIBLE CLEARANCE C ABOVE PLENUM IS MORE THAN 3 INCHES BUT NOT MORE THAN 6 INCHES. REFER TO ARTICLE 9.34.3.9 IN APPENDIX A

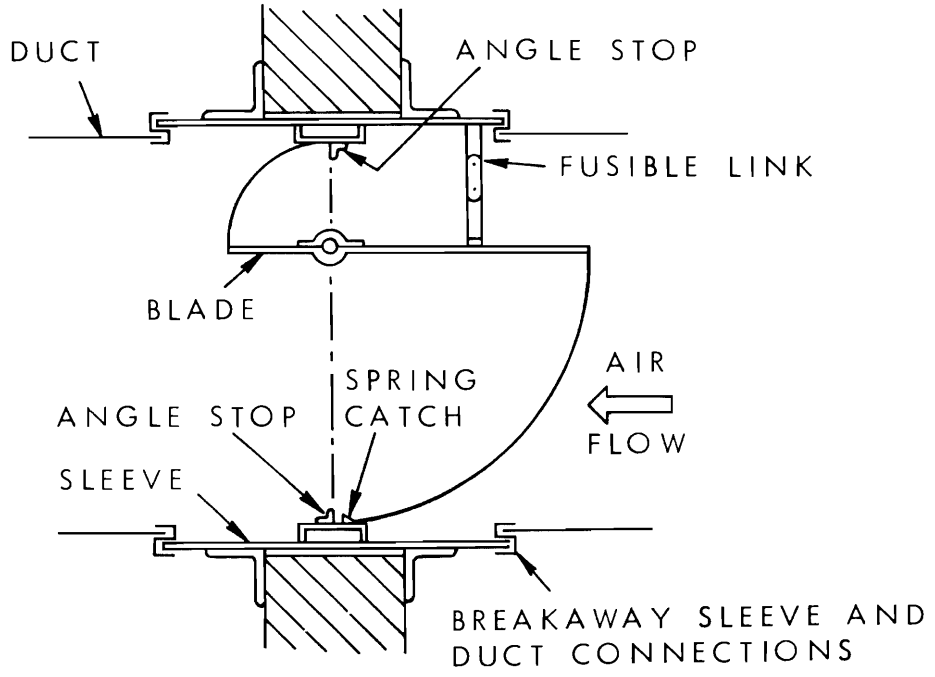


(c) APPLICABLE TO FORCED-AIR FURNACES WHERE PERMISSIBLE CLEARANCE C ABOVE PLENUM IS MORE THAN 6 INCHES. REFER TO ARTICLE 9.34.3.10 IN APPENDIX A

Article 2.4.9. Typical Single-Blade Fire Dampers

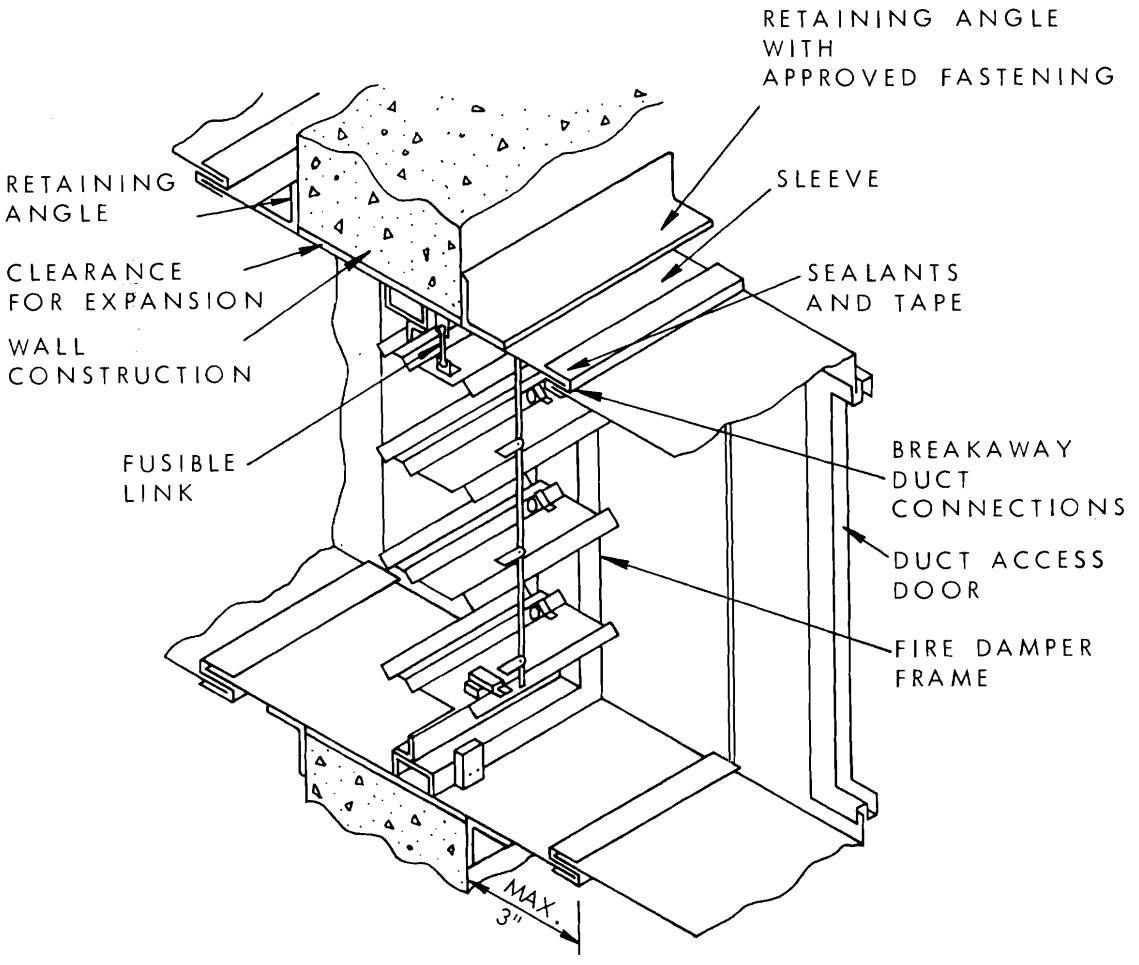


(a) ROUND DUCT

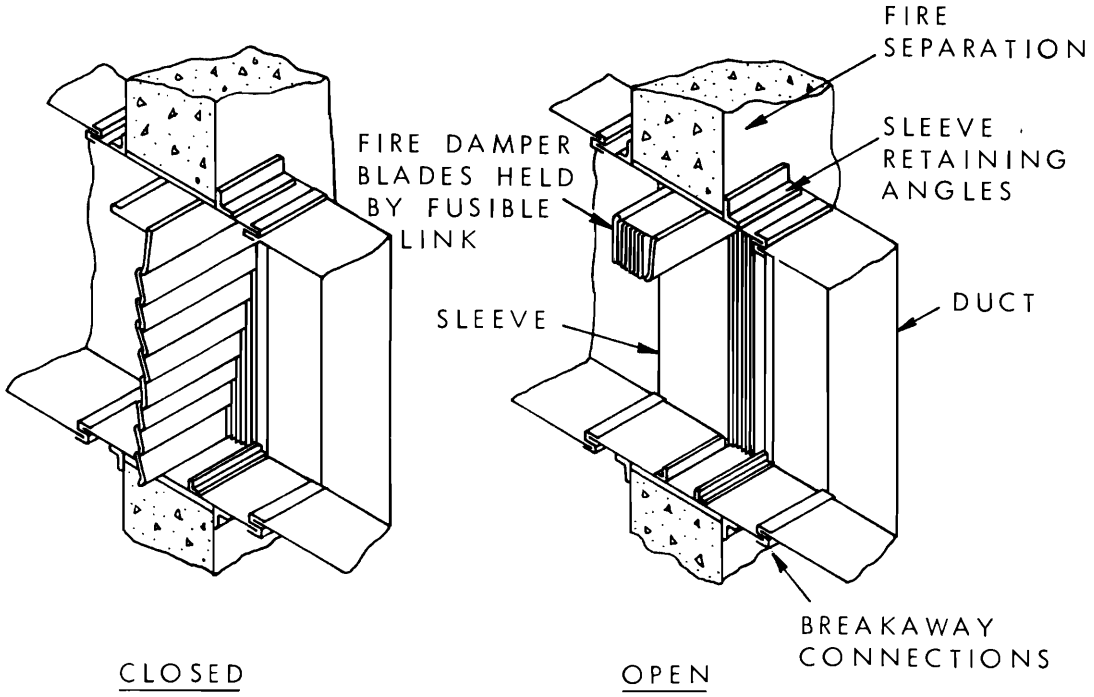


(b) RECTANGULAR DUCT

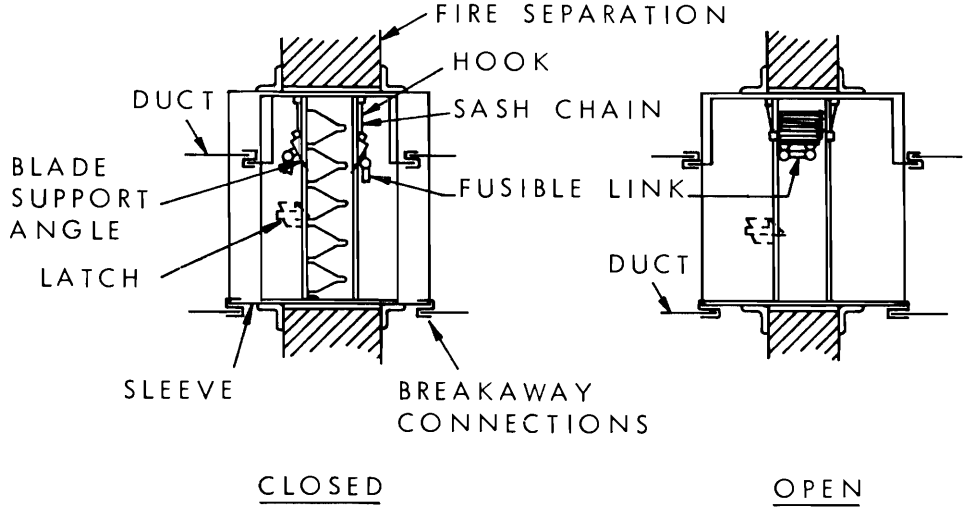
Article 2.4.9. (Cont'd.) TYPICAL MULTIPLE-BLADE FIRE DAMPER



Article 2.4.9. (Cont'd.) TYPICAL CURTAIN-TYPE FIRE DAMPERS

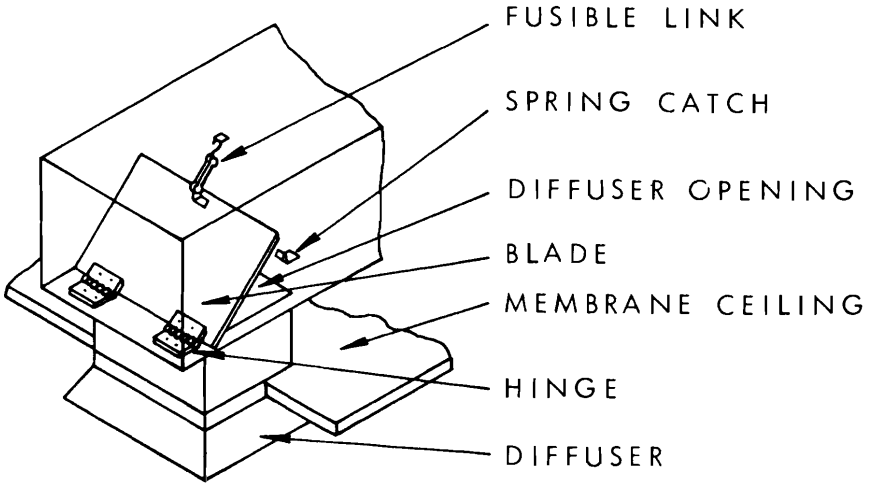


(a) INTERLOCKING BLADE TYPE

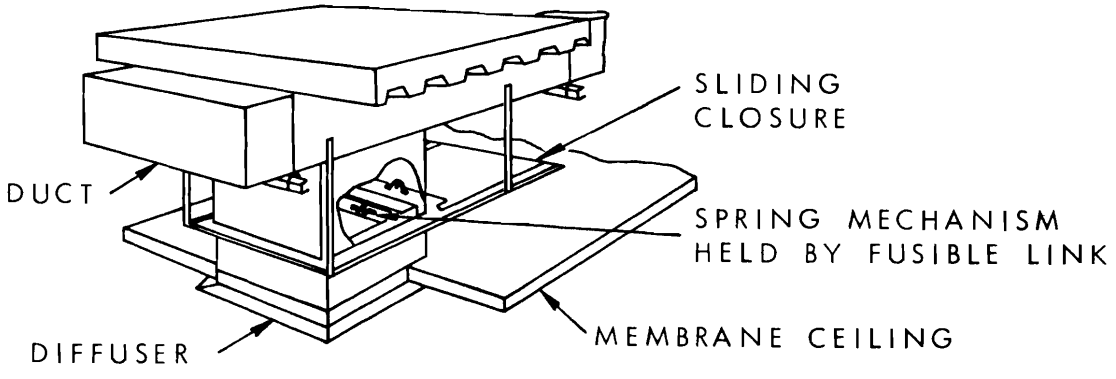


(b) HINGED OR FOLDED TYPE

Sentence 2.4.10.(1) TYPICAL FIRE STOP FLAPS



(a) HINGED TYPE



(b) SLIDING TYPE

Sentence 2.4.13.(1) MAKE-UP AIR FOR EXHAUST SYSTEMS

When make-up air is introduced into a building in cold weather, it should be preheated when the comfort of people in the air path is a consideration.

Clause 2.5.3.(2)(b) AIR OPENINGS FOR COMBUSTION AND VENTILATION

Boiler or furnace room openings for outside air intake are necessary for combustion air and draft requirements. It may be necessary to increase the proportion of required openings to provide ventilation air for the boiler or furnace rooms. In any event, the combustion and ventilation air must not be drawn from an adjoining room or space separated from the boiler or furnace room by a fire door or other door that may become closed, either accidentally or purposely, as in a fire emergency. (See the following table.)

Sentence 2.5.3.(2) AIR OPENINGS FOR COMBUSTION AND VENTILATION FOR INSTALLATIONS NOT EXCEEDING 400,000 BTUH(1) IN ANY ONE ENCLOSURE

Appliance Location	Type of Fuel		
	Oil	Propane and Natural Gas	Solid Fuel
Unconfined space with average construction	none required	none required when natural infiltration provides adequate combustion air and safe ambient air temperatures	1½ sq in per 1000 Btuh(1)
Unconfined space with tight construction	1 sq in/5000 Btuh(1),(2)	1 sq in/5000 Btuh(1)	1½ sq in per 1000 Btuh(1)
Confined space supplied by air within the building	2 openings each at least 1 sq in/1000 Btuh(1)	2 openings each at least 1 sq in/1000 Btuh(1)	1½ sq in per 1000 Btuh(1)
Confined space supplied by air from outdoors either directly or by means of vertical ducts	2 openings each at least 1 sq in/4000 Btuh(1)	2 openings each at least 1 sq in/4000 Btuh(1)	1½ sq in per 1000 Btuh(1)
Confined space supplied by air from outdoors by means of horizontal ducts	2 openings each at least 1 sq in/2000 Btuh(1)	2 openings each at least 1 sq in/2000 Btuh(1)	1½ sq in per 1000 Btuh(1)
Confined space with ventilation air supplied from inside the building and combustion air from outdoors	2 openings each at least 1 sq in/1000 Btuh(1) and 1 opening at least 1 sq in/5000 Btuh(1)		1½ sq in per 1000 Btuh(1)
Column 1	2	3	4

Notes to Table:

(1) Btuh refers to total input rating of 1 or more *appliances.*

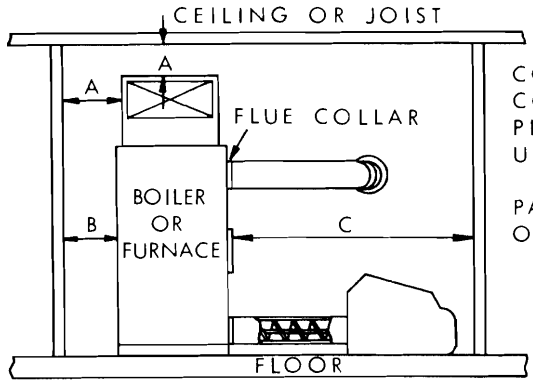
(2) Includes the area of opening allowed for normal infiltration. (See also Article 9.34.2.1. in Appendix A.)

Sentence 2.5.3.(2) AIR OPENINGS FOR COMBUSTION AND VENTILATION FOR INSTALLATIONS EXCEEDING 400,000 BTUH(1) IN ANY ONE ENCLOSURE

Appliance Location	Type of Fuel		
	Oil	Propane and Natural Gas	Solid Fuel
Appliance room adjacent to outside walls where combustion air is provided by natural ventilation from outdoors	1 opening at least 1 sq in/14,000 Btuh(1) and at least 12 sq in		1½ sq in per 1000 Btuh(1)
Appliance room not adjacent to outside walls	Subject to the authority having jurisdiction		1½ sq in per 1000 Btuh(1)
Where combustion air is provided by natural ventilation from outdoors		1 or more openings totalling at least 1 sq in/4000 Btuh(1) up to 400,000 Btuh,(1) and additional area at least 1 sq in/14,000 Btuh(1) in excess of 400,000 Btuh(1)	1½ sq in per 1000 Btuh(1)
Where combustion air is by mechanical draft and there are no draft regulators or draft hoods in the same room		1 or more openings totalling at least 1 sq in/30,000 Btuh(1)	1½ sq in per 1000 Btuh(1)
Column 1	2	3	4

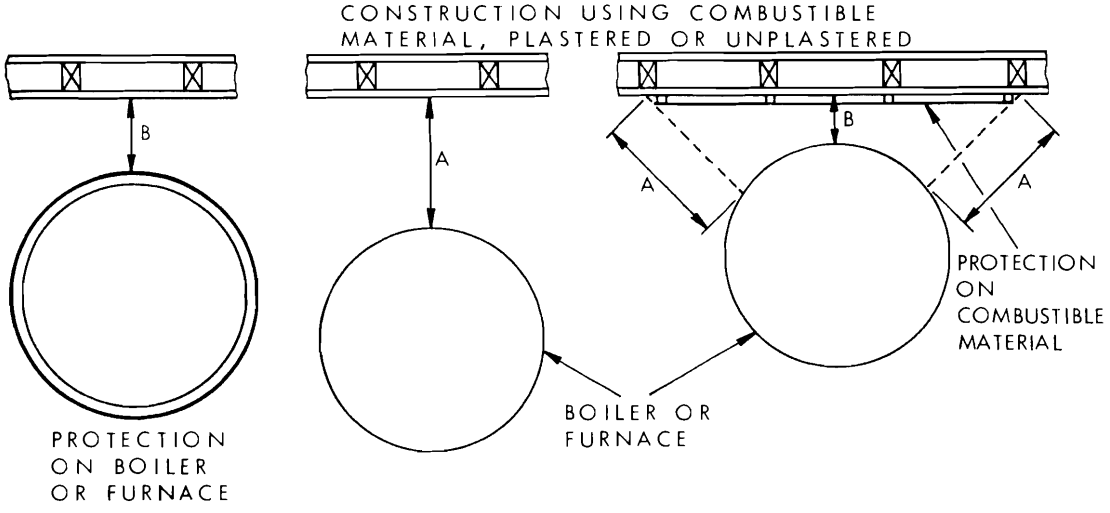
Notes to Table:
(1) Btuh refers to total input rating of 1 or more *appliances.*

Article 2.5.5. Minimum Clearances for Boilers and Furnaces Using Solid Fuel



A ABOVE AND SIDES OF BONNET OR PLENUM
B JACKET SIDES AND REAR
C FRONT

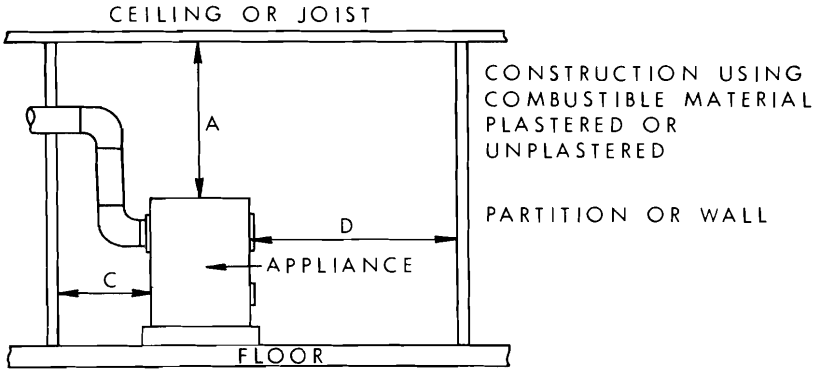
(a) BASIC CLEARANCES (TABLE 2.5.A.)



A = THE REQUIRED CLEARANCE WITH NO PROTECTION, SPECIFIED IN TABLE 2.5.A.
B = THE REDUCED CLEARANCE PERMITTED IN ACCORDANCE WITH TABLE 2.5.B

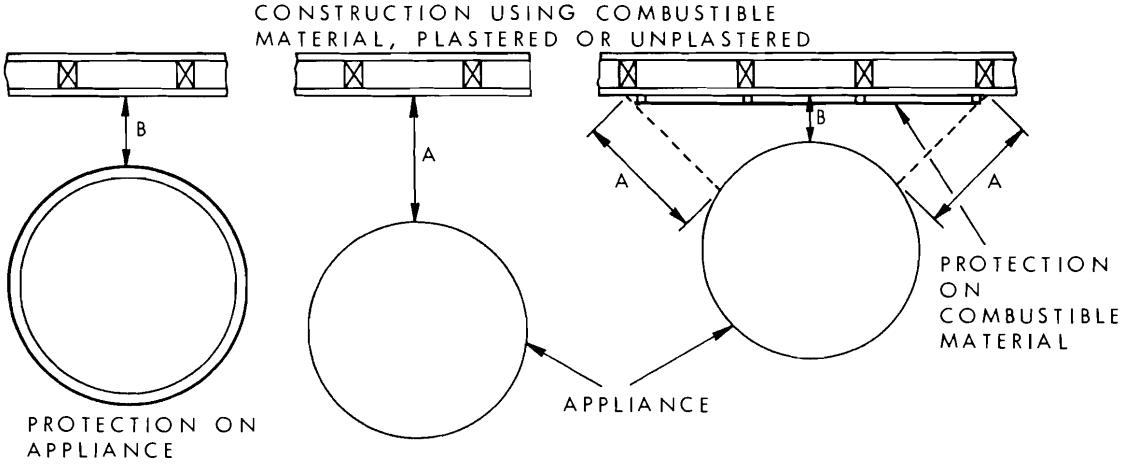
(b) CLEARANCES WITH PROTECTION (TABLE 2.5.B.)

Article 2.5.9. Minimum Clearances for Stoves, Ranges, Space Heaters and Service Water Heaters Using Solid Fuel



A = TOP
B = SIDES (NOT SHOWN)
C = REAR
D = FRONT

(a) BASIC CLEARANCES (TABLE 2.5.C)



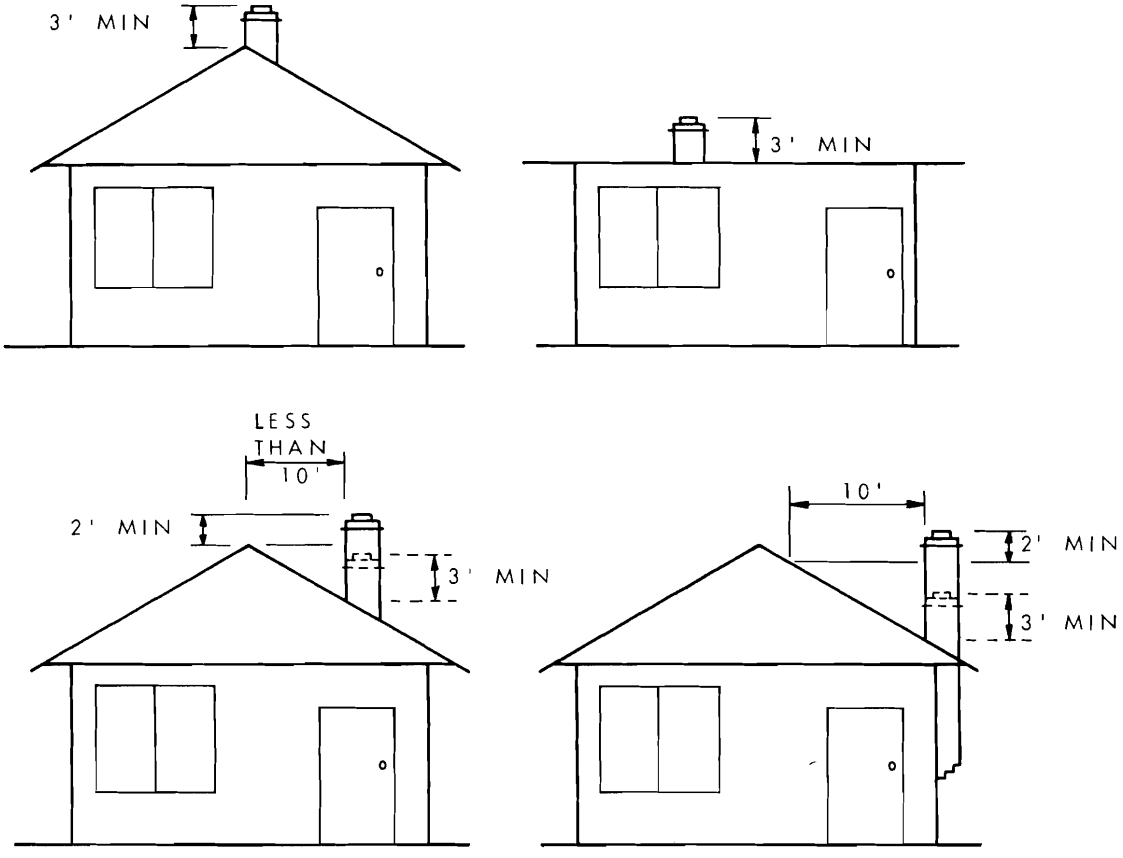
A = THE REQUIRED CLEARANCE WITH NO PROTECTION, SPECIFIED IN TABLE 2.5.C
B = THE REDUCED CLEARANCE PERMITTED IN ACCORDANCE WITH TABLE 2.5.D

(b) CLEARANCES WITH PROTECTION (TABLE 2.5.D)

Sentence 2.6.4.(6) Temperature of Exposed Piping

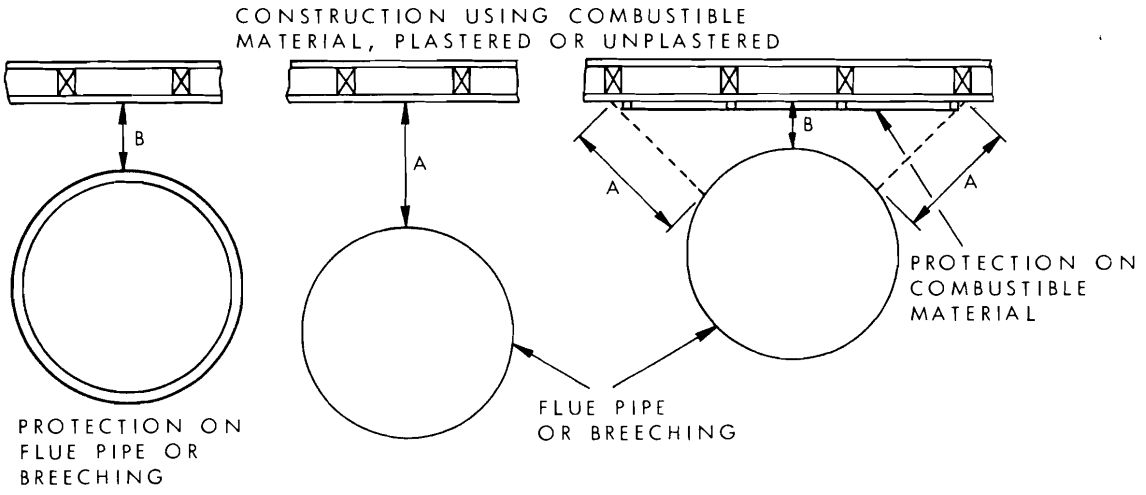
Normally piping carrying steam or high-temperature hot water at pressures above atmospheric (corresponding temperature 212°F or above) will be insulated as an economy measure to reduce heat losses. Above a temperature of approximately 160°F, however, a bare pipe can cause a burn to human flesh coming in contact with the pipe. If pipes above this temperature are normally out of reach of all persons other than maintenance personnel or are properly guarded, it would be expected that no insulation would be needed for public safety.

Sentence 2.8.1.(9) Location of Chimney Top



(See also Article 9.21.4.4. in Appendix A.)

Sentence 2.8.9.(5) Minimum Clearances (with Protection) for Flue Pipes and Breechings Serving Solid-Fuel-Burning Appliances



A = THE REQUIRED CLEARANCE WITH NO PROTECTION, SPECIFIED IN SENTENCE 2.8.9.(5)
B = THE REDUCED CLEARANCE PERMITTED IN ACCORDANCE WITH TABLE 2.8.B

(See also Article 9.21.6.5. in Appendix A.)

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