**B149.1S1-07**

**Supplement No. 1 to**

**CAN/CSA-B149.1-05, Natural gas and propane installation code**

**January 2007**

**Note:** General Instructions for CSA Standards are now called Updates. Please contact CSA Information Products Sales or visit www.ShopCSA.ca for information about the **CSA Standards Update Service**.

**Title:** Natural gas and propane installation code — originally published January 2005

The following revisions have been formally approved and are marked by the symbol double delta (ΔΔ) in the margin on the attached replacement pages:

<table>
<thead>
<tr>
<th>Revised</th>
<th>Contents, Clauses 1.1, 2, 3, 4.3.1, 4.5.5, 4.9.1, 4.14.6, 4.14.7, 4.16.2, 5.2.1.1, 5.2.1.2, 5.2.3, 5.5.7, 5.6.1.3, 6.2.17, 6.16.7, 6.16.8, 6.17.1, 6.17.2, 6.21.1, 6.21.7, 6.22.3, 6.26.1, 7.2, 7.4.4, 7.5.2, 7.26.2, 7.27.3, 8.2.3, 8.4.3, 8.14.8, 8.14.12, 8.16.1, 8.24.2, Tables 5.2 and C.9, and Annex D</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>Clauses 6.16.13, 6.16.14, 7.26.7, 7.26.8, 8.9.5, 8.9.6, and 8.21.6</td>
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<tr>
<td>Deleted</td>
<td>Clause 6.25</td>
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</tbody>
</table>

CAN/CSA-B149.1-05 originally consisted of **286 pages** (xii preliminary and 274 text), each dated **January 2005**. It now consists of the following pages:

|--------------|--------------------------------------------------------------------------------------------------|

- Update your copy by inserting these revised pages.
- Keep the pages you remove for reference.

**IMPORTANT NOTICE**

Please consult with the appropriate authority having jurisdiction regarding the applicability of this Supplement.
Contents

The Interprovincial Gas Advisory Council  vii

The CSA B149 Installation Code Committee  ix

Preface  xi

1 Scope  1

2 Reference publications  2

3 Definitions  5

4 General  18
  4.1 Application  18
  4.2 Approval of appliances, accessories, components, equipment, and material  18
  4.3 Responsibilities of the installer  18
  4.4 Training and quality of labour  19
  4.5 Suitability of use  20
  4.6 Meter and service regulator installations  20
  4.7 Electrical connections and components  20
  4.8 Mobile homes  21
  4.9 Hazardous locations  21
  4.10 Smoking  21
  4.11 Isolation of safety devices  21
  4.12 Leak detection  21
  4.13 Appliance clearances to combustible material  22
  4.14 Accessibility  25
  4.15 Outdoor installations  26
  4.16 Appliances in garages  26
  4.17 Appliance ductwork connections  26
  4.18 Combined heating systems  26
  4.19 Appliances protected by automatic fire-extinguishing systems  27
  4.20 Control of appliances with self-energized pilots  27
  4.21 Defective heat exchangers  27
  4.22 High-altitude installations  27
  4.23 Protection of appliances from physical damage  28
  4.24 Odorization of propane  28

5 Pressure controls  28
  5.1 Gas system pressure  28
  5.2 Pressure regulators  29
  5.2.1 General  29
  5.2.2 Additional requirements for pressure regulators for propane applications  30
  5.2.3 Additional requirements for pressure regulators for natural gas applications  30
  5.3 Relief devices  30
  5.4 Hydrostatic relief devices for propane applications  31
  5.5 Venting of pressure control devices  31
  5.6 Appliance and pilot pressure regulators  33
  5.6.1 Appliance and pilot pressure regulators in propane applications  33
  5.6.2 Appliance and pilot pressure regulators in natural gas applications  33
6 Piping and tubing systems, hose, and fittings 33
6.1 General 33
6.2 Material 34
6.3 Size 35
6.4 Volume of gas to be used for sizing piping and tubing systems 36A
6.5 Allowable pressure and pressure drop 37
6.6 Extensions 37
6.7 Location 37
6.8 Piping practices 38
6.9 Joints and connections 39
6.10 Branch piping outlets 40
6.11 Appliance connections 40
6.12 Piping outlets 40
6.13 Drip and dirt pockets 41
6.14 Prohibited practices 41
6.15 Underground piping and tubing 42
6.16 Protection of piping and tubing 43
6.17 Identification of piping or tubing 44A
6.18 Manual shut-off valves 45
6.19 Manual-reset valves 46
6.20 Hose and hose fittings 46
6.21 Connectors 47
6.22 Testing of piping, tubing, hose, and fittings 48
6.23 Purging of piping and tubing systems and hose after leak testing 50
6.24 Purging gas from a piping or tubing system 51
6.25 Deleted
6.26 Rooftop gas piping and tubing 51
6.27 Inspection 51

7 Installation of specific types of appliances 52
7.1 Boilers 52
7.2 Generators, compressors/pressure boosters, stationary engines, and turbines (for natural gas only) 52
7.2.1 General requirements 52
7.2.2 Generators 53
7.2.3 Compressors/pressure boosters 53
7.2.4 Stationary gas engines and turbines 54
7.2.5 Propane-fuelled engines in buildings 54B
7.3 Carbon dioxide generators 54C
7.4 Commercial-type clothes dryers 54D
7.5 Domestic-type clothes dryers 54D
7.6 Conversions 54E
7.7 Conversion burners 55
7.8 Conversion of warm air furnaces 55
7.9 Conversion of ranges 56
7.10 Counter appliances 56
7.11 Direct-vent appliances 56
7.12 Furnaces used with cooling units 56
7.13 Central furnaces 57
7.14 Downflow furnaces 58
7.15 Duct furnaces 58
7.16 Horizontal furnaces 58
7.17 Wall furnaces (recessed heaters) 59
7.18 Construction heaters and torches 59
7.19 Direct-fired door air heaters 60
7.20 Direct-fired make-up air heaters (DFMAH) 60
7.21 Non-recirculating direct gas-fired industrial air heaters (DFIAH) 62
7.22 Infrared heaters 63
7.23 Room heaters 65
7.24 Decorative appliances and gas logs 65
7.25 Swimming pool heaters 66
7.26 Water heaters 67
7.27 Unit heaters 68
7.28 Hotplates 68
7.29 Incinerators 68A
7.30 Lighting 69
7.31 Commercial cooking appliances 69
7.32 Residential-type ranges 70
7.33 Refrigerators 70
7.34 Stationary gas engines 71
7.35 Propane-fuelled engines in buildings 72

8 Venting systems and air supply for appliances 74
8.1 General 74
8.2 Air supply determination for central-heating furnaces, boilers, and hot-water heaters 74
8.3 Air-supply openings and ducts 80
8.4 Air-supply requirements for appliances having a total input exceeding 400 000 Btuh (120 kW) 81
8.5 Air-supply dampers, louvres, and grilles 81
8.6 Conditions created by exhaust fans, air-supply fans, circulating fans, or fireplaces 82
8.7 Engineered installations 82
8.8 Air supply by mechanical means 82
8.9 Appliance venting 82
8.10 Methods of venting appliances 83
8.11 Vent and chimney requirements 85
8.12 Chimneys 85
8.13 Vent and chimney sizing 86
8.14 Vent and chimney termination 87
8.15 Vent and chimney support 90
8.16 Vents and chimneys serving two or more appliances 90
8.17 Vents outside buildings 90
8.18 Vent connectors 91
8.19 Chimney connections 94
8.20 Size and height of interconnected vent connectors 94
8.21 Multi-storey venting 94
8.22 Dampers and attachments 95
8.23 Draft hoods 95
8.24 Venting arrangements 96
8.25 Draft regulators 96A
8.26 Automatic vent damper or automatic flue damper 97
8.27 Manually operated flue dampers 97
8.28 Installation of draft-control devices 98
8.29 Induced- or forced-draft devices 98
8.30 Venting of appliances into canopies 98
8.31 Heat reclaimers 99

9 Natural gas compressors and cylinders 99
9.1 Installation of compressors 99
9.2 Requirements for cylinders 99
9.3 Cylinder filling and cylinders 100
9.4 Cylinder storage 101
9.5 Cylinders connected for use 101

10 Vehicle refuelling appliances (VRA) without storage (for natural gas only) 102
10.1 Installation 102
10.2 Pressure relief devices and other vents and vent lines 103
10.3 Piping, tubing, and hose 103
10.4 Testing of piping, hose, and fittings 103
10.5 Installation of safety equipment, signs, and/or symbols 104
10.6 Refuelling of vehicles 104

Annexes
A (informative) — Sizing and capacities of piping and tubing for natural gas 105
B (informative) — Sizing and capacities of piping and tubing for propane 141
C (informative) — Vent sizing tables for Category I natural gas and propane appliances 168
D (informative) — Customer’s meter and regulator installations 233
E (informative) — Example of piping design sizing (imperial and metric) 235
F (informative) — Suggested general dimensions for draft hoods 239
G (informative) — Piping expansion and flexibility 242
H (normative) — Purging of piping and tubing systems where a readily accessible burner is not available or where an appliance is not equipped with a continuous pilot 244
I (informative) — General information 248

Tables
4.1 — Appliance clearance reductions with specified forms of protection 23
5.1 — Pressure inside buildings 28
5.2 — Clearance from discharge, ft (m) 32
6.1 — Maximum allowable pressure drop 36
6.2 — Spacing of supports for piping 38
6.3 — Pressure test requirements 49
8.1 — Combustion/dilution air requirements for appliances having draft-control devices when the combined input is up to and including 400,000 Btuh (120 kW) and the structure complies with Clause 8.2.1(a) or (b) 76
8.2 — Combustion air requirements for appliances not having draft-control devices when the combined input is up to and including 400,000 Btuh (120 kW) and the structure complies with Clause 8.2.1(a) or (b) 77
8.3 — Combustion/dilution air requirements for appliances having draft-control devices when the combined input is up to and including 400,000 Btuh (120 kW) and the structure does not comply with Clause 8.2.1(a) or (b) 78
8.4 — Combustion air requirements for appliances not having draft-control devices when the combined input is up to and including 400,000 Btuh (120 kW) and the structure does not comply with Clause 8.2.1(a) or (b) 79
8.5 — Type of venting system to be used 84
8.6 — Appliance vent connector clearances 92
8.7 — Vent connector clearance reductions with specified forms of protection 93

Figures
8.1 — Vent passing through a pitched roof 88
CAN/CSA-B149.1-05
Natural gas and propane installation code

1 Scope

1.1 This Code applies to the installation of
(a) appliances, equipment, components, and accessories where gas is to be used for fuel purposes;
(b) piping and tubing systems extending from the termination of the utility installation or from the
distributor's propane tank;
(c) vehicle-refuelling appliances and associated equipment meeting the requirements of a
general-purpose appliance to fill a natural-gas-fuelled vehicle; and
(d) stationary gas engines and turbines.

1.2 This Code does not apply to
(a) marine or pipeline terminals;
(b) petroleum refineries;
(c) gas where used as a feedstock in chemical plants;
(d) utility pipeline distribution and transmission pipelines;
(e) storage and handling of liquefied natural gas or underground reservoirs for natural gas;
(f) the installation of NGV fuel systems, containers, and refuelling stations;
(g) the storage and utilization of compressed natural gas on boats;
(h) the installation of vehicle-refuelling appliances where NGV storage containers are installed as part of
the system;
(i) refrigerated storage or underground reservoirs for propane;
(j) propane used on boats;
(k) propane used as a propellant in aerosol containers;
(l) butane fuel cylinders of 150 g capacity or less; and
(m) the installation of containers and equipment to be used for propane in distribution locations and
filling plants and on tank trucks, tank trailers, and cargo liners.

1.3 Where the term “gas” is used, the requirements of this Code include, and apply equally to, any of the
following gases or mixtures of them: natural gas, manufactured gas, or mixtures of propane gas and air,
propane, propylene, butanes (normal butane or isobutane), and butylenes.

1.4 This Code and any Standards referenced in it do not make or imply any assurance or guarantee with
respect to the life expectancy, durability, or operating performance of equipment and materials
referenced in the Code.

1.5 The values given in yard/pound units are the standard. This Code contains SI (metric) equivalents to
yard/pound units so that the Code can be used in SI (metric) units. SI (metric) equivalents may be
approximate.
1.6
In this Code, unless approved otherwise by the authority having jurisdiction, “shall” indicates a mandatory requirement; “should” indicates a recommendation or that which is advised but not mandatory; “may” indicates an advisory or optional statement. Notes to the text do not include mandatory or alternative requirements. The purpose of a note is to separate from the text explanatory or informative material that is not properly a part of this Code. Notes to figures and tables, however, are considered part of the figure or table and are written as mandatory requirements. Legends to figures are also written as mandatory requirements.

2 Reference publications
This Code refers to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.

CSA (Canadian Standards Association)
Note: CGA Standards, Recommended Practices, and Codes are now published by CSA.

Connectors for Gas Appliances

Vented Gas Fireplaces

Connectors for Movable Gas Appliances

Connectors for Outdoor Gas Appliances and Manufactured Homes

Line Pressure Regulators

Gas Convenience Outlets and Optional Enclosures

ANSI Z83.4-1999/CSA 3.7-M99
Non-Recirculating Direct Gas-Fired Industrial Air Heaters

ANSI Z83.11-2002/CSA 1.8-2002
Gas Food Service Equipment

Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (CSST)

CGA 2.17-M91 (R1999)
Gas-Fired Appliances for Use at High Altitudes

CAN1-6.2-M81 (R2001)
Draft Hoods

6.18-02
Service Regulators for Natural Gas

6.19-01
Residential Carbon Monoxide Alarming Devices

CAN/CGA-8.1-M86 (R2001)
Elastomeric Composite Hose and Hose Couplings for Conducting Propane and Natural Gas

January 2007
(Replaces p. 2, January 2005)
CAN1-8.3-M77 (R2001)
Thermoplastic Hose and Hose Couplings for Conducting Propane and Natural Gas

12.6-04
Vehicle Refuelling Appliances

CGA Certification Laboratory Requirement LAB-009-1989 (revised 1994)
Flexible Gas Tubing for Interior Natural and Propane Gas Piping Systems

B51-03
Boiler, Pressure Vessel, and Pressure Piping Code

B108-05
Natural gas fuelling stations installation code

CAN/CSA-B137 Series-02, Thermoplastic Pressure Piping Compendium:
  CAN/CSA-B137.4-02
  Polyethylene Piping Systems for Gas Services
  CAN/CSA-B137.4.1-02
  Electrofusion-Type Polyethylene Fittings for Gas Services

CAN/CSA-B149.2-05
Propane storage and handling code

CAN/CSA-B149.3-05
Code for the field approval of fuel-related components on appliances and equipment

CAN/CSA-B365-01
Installation Code for Solid-Fuel-Burning Appliances and Equipment

C22.1-02
Canadian Electrical Code, Part I

CAN/CSA-W117.2-01
Safety in Welding, Cutting, and Allied Processes

CAN/CSA-Z240 MH Series-92 (R2001), Mobile Homes:
  CAN/CSA-Z240.4.1-92 (R2001)
  Installation Requirements for Gas-Burning Appliances in Mobile Homes

Z662-03
Oil and Gas Pipeline Systems

ANSI/ASME (American National Standards Institute/American Society for Mechanical Engineers)
B1.20.1-1983 (R2001)
Pipe Threads, General Purpose (Inch)

B16.3-1998
Malleable-Iron Threaded Fittings, Classes 150 and 300

B36.10-2000
Welded and Seamless Wrought Steel Pipe
**ASTM (American Society for Testing and Materials)**
A 53/A 53M-02
*Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless*

A 106-02a
*Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service*

A 179/A 179M-90a (2001)
*Standard Specification for Seamless Cold-Drawn Low-Carbon Steel Heat Exchanger and Condenser Tubes*

B 88-03
*Standard Specification for Seamless Copper Water Tube*

B 837-01
*Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems*

**CGSB (Canadian General Standards Board)**
CAN/CGSB-3.13-M88
*Liquefied Petroleum Gas (Butanes)*

CAN/CGSB-3.14-M88
*Liquefied Petroleum Gas (Propane)*

**Government of Canada**
*Transportation of Dangerous Goods Act, S.C. 1992, c. 34, and the Transportation of Dangerous Goods Regulations, as amended from time to time*

*Weights and Measures Act, R.S.C. 1985, c. W-6*

**NRCC (National Research Council Canada)**
*National Building Code of Canada, 1995*

**UL (Underwriters Laboratories Inc.)**
959-2001
*Medium Heat Appliance Factory-Built Chimneys*

144-2001
*LP-Gas Regulators*

**ULC (Underwriters’ Laboratories of Canada)**
C536-1998
*Guide for the Investigation of Flexible Metallic Hose*

CAN/ULC-S110-M86
*Standard Methods of Test for Air Ducts*

CAN4-S114-M80 (R1997)
*Standard Method of Test for Determination of Non-Combustibility in Building Materials*

CAN4-S604-M91
*Standard for Factory-Built Type A Chimneys*

CAN/ULC-S605-M91
*Standard for Gas Vents*

S609-M89
*Standard for Low Temperature Vents Type L*
**Direct-vent appliance** — an appliance constructed so that all the combustion air is supplied directly from, and the products of combustion are vented directly to, the outdoors by independent enclosed passageways connected directly to the appliance.

**Dirt pocket (dust pocket)** — a pocket in a piping system designed for the collection of dirt and from which the dirt can be removed.

**Draft** — the flow of air or combustion products, or both, through an appliance and its venting system.

- **Chimney draft** — the available natural draft of the chimney measured at or near the base of the chimney.

- **Mechanical draft** — a draft produced by a mechanical device, such as a fan, blower, or aspirator, that can supplement natural draft.
  
  - **Forced draft** — a mechanical draft produced by a device upstream from the combustion zone of an appliance.
  
  - **Induced draft** — a mechanical draft produced by a device downstream from the combustion zone of an appliance.

- **Natural draft** — a draft other than a mechanical draft.

**Draft-control device** — either a draft hood or a draft regulator.

- **Draft hood** — a draft-control device having neither movable nor adjustable parts. A draft hood may be built into an appliance, attached to an appliance, or made part of a vent connector. It is designed to
  
  (a) ensure the ready escape of flue gases from the combustion chamber in the event of either no draft or stoppage downstream from the draft hood;
  
  (b) prevent a backdraft from entering the combustion chamber of the appliance; and
  
  (c) neutralize the effect of stack action of either a chimney or a vent upon the operation of the appliance.

- **Draft regulator (barometric damper)** — a draft-control device intended to stabilize the natural draft in an appliance by admitting room air to the venting system. A double-acting draft regulator is one whose balancing damper is free to move in either direction.

**Drip pocket (drip)** — a pocket in a piping system designed for the collection of condensate and from which the condensate can be removed.

**Dust pocket** — see **Dirt pocket**.

**Dwelling unit** — a housekeeping unit used or intended to be used as a domicile by one or more persons, and usually containing cooking, eating, living, sleeping, and sanitary facilities.

**Emergency use generators (generators)** — engines that operate to provide power to critical operational support such as protection of property, fire fighting activities, and building evacuation.

**Enclosure** — a secondary structure (room) within or attached to a structure (building) in which an appliance is installed.

**Engine** — a device that performs mechanical work that is used to operate other machinery and equipment.
**Reciprocating engine** (also known as a piston engine) — an engine that utilizes one or more pistons in order to convert pressure into a rotating motion.

**Turbine engine** — a rotary engine that extracts energy from a flow of combustion gas. It has an upstream compressor coupled to a downstream turbine and a combustion chamber in between. (Gas turbine may also refer to the turbine element.)

**Equipment** — a device, other than an appliance, accessory, or component, that is connected to a piping or tubing system.

**Excess air** — see Air supply.

**Expanding pilot** — see Pilot.

**Factory-built chimney** — see Chimney.

**False ceiling space** — ceiling space that is enclosed with tiles or panels that are removable without the use of a tool. A typical type is the T-bar-constructed suspended ceiling.

**Fan-assisted burner** — see Burner.

**Fan-assisted combustion system** — an appliance equipped with an integral mechanical means to either draw or force products of combustion through the combustion chamber and/or heat exchanger. See Annex C.

**FAN Max** — the maximum appliance input rating of a Category I appliance with a fan-assisted combustion system that could be attached to the vent. See Annex C.

**FAN Min** — the minimum appliance input rating of a Category I appliance with a fan-assisted combustion system that could be attached to the vent. See Annex C.

**FAN+FAN** — the maximum combined input rating of two or more fan-assisted appliances attached to the common vent. See Annex C.

**FAN+NAT** — the maximum combined input rating of one or more fan-assisted appliances and one or more draft-hood-equipped appliances attached to the common vent. See Annex C.

**Fast-closing valve** — see Valve.

**Fireplace** — a device for burning solid fuel that has the major portion of one or more essentially vertical sides open or openable for refuelling and for the visual effects of the burning fuel.

**Fitting** — an item in a piping or tubing system that is used as a means of connection, such as an elbow, return bend, tee, union, bushing, coupling, or cross, but does not include such functioning items as a valve or pressure regulator.

**Flame baffle** — see Baffle.

**Flame safeguard** — see Combustion safety control.

**Flame-sensing device** — that component of a combustion safety control that senses flame.

**Flammable liquid** — a liquid that has a flashpoint below 100°F (38 °C) and that has a vapour pressure not exceeding 40 psia (276 kPa absolute) at 100°F (38 °C).
**Flashpoint** — the minimum temperature at which a liquid within a container gives off vapour in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

**Flexible connector** — see **Connector**.

**Flexible metallic hose** — an all-metallic flexible gas conduit.

**Floor furnace** — a furnace that is suspended from the floor of the space being heated and that supplies warm air to such space through integral floor or wall grilles without the use of ducts.

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

**Flue baffle** — see **Baffle**.
Chassis-mounted camper — an accommodation body that attaches onto a truck chassis and is not intended for removal.

Motorized home — a vehicular portable structure of self-propelled design.

Slide-in camper — an accommodation body that fits into a standard vehicle and is designed to be easily removable.

Tent trailer — a vehicular portable structure built on its own chassis and having a rigid or canvas top and side walls that may be folded or otherwise condensed for transit.

Travel trailer — a vehicular portable structure intended to be towed by a motor vehicle and that does not fold up or reduce in size for transit.

Regulator —

Appliance regulator — a pressure regulator located in the valve train of an appliance.

Line pressure regulator — a gas pressure regulator intended for installation in a gas distribution system between the utility service regulator or 2 psi propane regulator and gas utilization equipment.

Lock-up (positive shut-off) regulator — a regulator that is capable of maintaining a reduced outlet pressure when the fuel flow condition is static.

Pressure regulator — a device, either adjustable or nonadjustable, for controlling and maintaining, within acceptable limits, a uniform outlet pressure.

Service regulator — a pressure regulator installed on a service line to control the pressure of the gas delivered to the customer.

Relief device — a device designed to open to prevent a rise of gas pressure in excess of a specified value due to an emergency or abnormal conditions.

Residential appliance — an appliance commonly used in, but not restricted to use in, a dwelling unit.

Residential building — see Building.

Safety limit control — a safety control intended to prevent an unsafe condition of temperature, pressure, or liquid level.

Safety shut-off valve — see Valve.

Secondary air — see Air supply.

Semi-rigid connector — see Connector.

Set pressure — the start-to-discharge pressure for which a relief valve is set and marked.

Structure — the entire building in which an appliance is installed.

Tank (with respect to NGV/propane storage) — the class of container for the storage and transportation of gas, designed and fabricated in accordance with CSA B51.

Two-stage regulation — a propane gas vapour delivery system that utilizes a first-stage regulator and a second-stage regulator(s), or utilizes an integral two-stage regulator or automatic changeover regulator.
Valve — a device by which the flow of a fluid can be started, stopped, or regulated by a movable part that opens or obstructs passage.

Back check valve — a valve that is normally closed and allows flow in only one direction.

Cylinder valve — a valve fitted to a cylinder.

Emergency shut-off valve — a valve that is part of a system that is designed to limit and shut down the flow of propane in the event that a vehicle moves away from a transfer point with the transfer hose or swivel-type piping connected to it.

Excess-flow valve — a valve designed to close when the liquid or vapour passing through it exceeds a prescribed flow rate as determined by a pressure drop across the valve.

Fast-closing valve — an automatic valve that has a closing time of less than 5 s upon being de-energized.

Hydrostatic relief valve — a pressure relief valve installed in a liquid propane line.

Internal excess-flow valve — an excess-flow valve that remains functional within the tank when any portion of the valve external to the tank’s perimeter is sheared off or otherwise damaged. An internal excess-flow valve can be integral to another valve.

Note: The perimeter of the tank is taken to mean not only the surface of the tank’s shell and ends but also the outline of any boss, spigot, or nozzle welded to the tank so as to project outwards from it. The outline of welded brackets, mountings, guards, subcompartments, and the like are not considered part of the perimeter for the purpose of this definition.

Internal relief valve — a pressure relief valve that is built into the body of the diaphragm assembly of a pressure regulator.

Internal valve — a valve designed and installed so that its seat is within a tank and the arrangement of the parts of the valve is such that damage to the parts outside the tank will not prevent effective seating of the valve.

Line relief valve — a relief valve installed in the piping or tubing system downstream of a final-stage pressure regulator that is not equipped with an internal relief valve.

Lubricated-plug-type valve — a manually operated valve of the plug and barrel type that is
(a) provided with means for maintaining a lubricant between its bearing surfaces;
(b) so designed that the lapped bearing surfaces can be lubricated and the lubricant level maintained without removing the valve from service;
(c) so constructed that the lubricant can be stored in a reservoir so as to be distributed evenly over the entire lapped bearing surfaces of the valve when the plug is rotated; and
(d) equipped with built-in stops to limit the rotation of the plug to one quarter turn when fully opening or fully closing the valve.

Safety shut-off valve — a valve that automatically shuts off the supply of gas when de-energized by a combustion safety control, safety limit control, or loss of actuating medium.

Stop-fill valve — a device in a container that is intended to automatically shut off the flow of liquid into the container when a predetermined fixed level is achieved.
Test firing valve (firing valve) — a manually operated, lubricated-plug-type, quarter-turn valve that has stops in the open and closed positions and has an attached handle or loose-fitting key or extended handle wrench, and that is located downstream of all safety shut-off valves on the valve train and as close to the burner as is practicable.

Valve train — the combination of valves, controls, and piping and tubing of an appliance upstream from the manifold through which gas is supplied to the appliance and by which gas is controlled.

Vaporizer — an appliance for converting liquid propane to vapour by means other than atmospheric heat transfer through the surface of the container.

Direct-fired vaporizer — a vaporizer in which heat furnished by a flame is directly applied to a heat-exchange surface in contact with the liquid propane to be vaporized.

Indirect vaporizer — a vaporizer in which heat furnished by steam, hot water, or another heating medium is applied to a vaporizing chamber’s tubing, pipe coils, or other heat-exchange surface containing the liquid propane to be vaporized. The heating of the medium being used occurs at a point remote from the vaporizer.

Vent — that portion of a venting system designed to convey flue gases directly to the outdoors from either a vent connector or an appliance when a vent connector is not used.

Type B vent — a vent complying with CAN/ULC-S605 and consisting entirely of factory-made parts, each designed to be assembled with the others without requiring field fabrication, and intended for venting gas appliances.

Type BH vent — a vent complying with ULC S636 and consisting entirely of factory-made parts, each designed to be assembled with the others without requiring field fabrication, and intended for venting gas appliances.

Type BW — a vent complying with CAN/ULC-S605 and consisting entirely of factory-made parts, each designed to be assembled with the others without requiring field fabrication, and intended for venting only wall furnaces for use with this type of vent.

Type L — a vent complying with ULC S609 and consisting of factory-made parts, each designed to be assembled with the others without requiring field fabrication.

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

Ventilated space — a space where there is an air change by means of natural ventilation or mechanical means, or where the space communicates with the rest of the structure by means of permanent openings.

Ventilation (with respect to the space in which an appliance is installed) — the removal of inside air, leaked or spilled products of combustion, or flue gases from the space in which an appliance is installed to outside the space, and the replacement of same by air from outside the space.

Ventilation air — see Air supply.

Venting system — a system for the removal of flue gases to the outdoors by means of a chimney, vent connector, vent, or a natural or mechanical exhaust system.

Special venting system — a venting system certified with the appliance and either supplied or specified by the appliance manufacturer.
VRA — vehicle refuelling appliance.

Wash-mobile — a mobile outdoor unit that uses propane-heated water, or a solution, for the purpose of cleaning.

Zero governor — a regulating device that is adjusted to deliver gas at atmospheric pressure within its flow rating.

4 General

4.1 Application

4.1.1 For the purpose of this Code, the requirements contained in CAN/CGSB-3.14 for propane or CAN/CGSB-3.13 for butane shall apply.

4.1.2 When a specification or document referenced in Clause 2 contains a requirement that conflicts with a requirement in this Code, the requirement in this Code shall govern.

4.1.3 An appliance, accessory, component, equipment, or any other item shall be installed in accordance with the manufacturer’s certified instructions and this Code.

4.1.4 Where a conflict exists between the manufacturer’s certified installation instructions and this Code, the requirements of this Code shall prevail unless otherwise approved.

4.2 Approval of appliances, accessories, components, equipment, and material

4.2.1 An appliance, accessory, component, equipment, or material used in an installation shall be of a type and rating approved for the specific purpose for which it is employed.

4.2.2 When deviation from or postponement of these requirements is necessary, permission in writing shall be obtained from the authority having jurisdiction before the work proceeds, and this permission shall apply only to the particular installation for which it is given.

4.2.3 The approval of the assembly or construction of an appliance is subject to the authority having jurisdiction. (CAN/CSA-B149.3 contains provisions for the assembly and construction of appliances.)

4.3 Responsibilities of the installer

4.3.1 Before leaving installations, installers shall ensure that the appliance, accessory, component, equipment, or piping and tubing they installed complies with the Code requirements, and the person initially activating the appliance shall ensure that the appliance is in safe working order.
4.3.2 Installers shall instruct the user in the safe and correct operation of all appliances or equipment that they install.

4.3.3 The installer shall ensure that the manufacturer’s instructions supplied with the appliance are left with the user.

4.3.4 Before installing any replacement part of an appliance, the installer shall ensure that the replacement part provides operational characteristics at least equivalent to those of the original part.

4.3.5 When the installation or conversion of an appliance constitutes a conversion from another form of energy, the installer shall advise the user of the appliance, at the time of installation or conversion, to have the former form of energy either removed or left safe and secure from accidental activation; for example, the user shall be advised

(a) in the case of a fuel oil supply tank
   (i) to remove the fill pipe, and cap or plug the exposed fill pipe opening to an inside tank;
   (ii) to shut off the tank outlet valve, remove the filter, and plug or cap the valve outlet; and
   (iii) where the tank is located outdoors, to disconnect all exposed piping or tubing, and cap or plug the piping or tubing as close as practicable to the tank;
(b) in the case of a fuel oil central distributing system
   (i) to shut off the fuel oil supply line valve located within the building; and
   (ii) to disconnect the fuel oil supply line immediately downstream of the meter, and cap or plug the outlet of the meter;
(c) in the case of a propane system
   (i) to shut off the cylinder or tank valve; and
   (ii) to disconnect and cap or plug the propane supply piping or tubing outdoors; and
(d) in the case of an electrical appliance
   (i) to shut off the power supply to the electrical appliance at the switch; and
   (ii) to ensure that the overcurrent protection, fuse, or circuit breaker has been removed or put in the off position.

4.3.6 The installer installing the installation or conversion, as specified in Clause 4.3.5, shall advise the user of the appliance in writing of the procedures to be followed in discontinuing the supply of the former form of energy.

4.3.7 It shall be the responsibility of the installer of a piping or tubing system to perform pressure tests in accordance with Clause 6.22.2 and to ensure that the piping or tubing system is gas-tight at the completion of the tests.

4.3.8 It shall be the responsibility of the installer of an appliance to perform tests in accordance with Clause 6.22.3 and to ensure that the system is gas-tight at the completion of the tests.

4.4 Training and quality of labour

4.4.1 All work shall be done in a skillful, thorough manner. Careful attention shall be paid not only to the mechanical execution of the work but also to the arrangement of the installation.
4.4.2
Personnel performing installation, operation, and maintenance work shall be properly trained in such functions.

4.5 Suitability of use

4.5.1
An appliance shall not be installed unless it is designed for use with the type of gas to which it is to be connected and is suitable for the pressure supplied.

4.5.2
The use of an appliance, accessory, component, equipment, or material shall be prohibited where a hazard is created.

4.5.3
When an appliance is converted from the gas or fuel specified on the rating plate, the conversion shall be in accordance with the manufacturer’s certified instructions. If there are no manufacturer’s instructions for conversion of the appliance, the converted appliance shall be approved.

4.5.4
If an appliance is converted from one gas to another, the gas to which it is converted shall be marked on the appliance rating plate by the fitter making the conversion.

4.5.5
Appliances, accessories, components, and equipment that have been exposed to fire, explosion, flood, or other damage shall not be offered for sale, installed, reactivated, or reconnected to the supply until the appliance, accessory, component, or equipment has been inspected by a person acceptable to the authority having jurisdiction.

4.5.6
A used appliance shall be inspected and determined to be safe for continued use by the installer before reconnection to supply piping or tubing.

4.6 Meter and service regulator installations

4.6.1
Meter and service regulator installations shall be in accordance with CSA Z662. (See Annex D.)

4.6.2
No person other than an employee or person authorized by the supplier or distributor shall perform any alterations, repairs, tests, services, removals, changes, installations, connections, or any other type of work on the supplier’s or distributor’s system.

4.7 Electrical connections and components

4.7.1
Electrical connections between an appliance and building wiring shall comply with the local electrical code or, in the absence of such, with the Canadian Electrical Code, Part I.
4.7.2
An electrical circuit employed for operating an automatic main control valve, automatic pilot, room-temperature thermostat, safety limit control, or another electrical device used with an appliance shall be in accordance with the appliance wiring diagram.

4.8 Mobile homes

4.8.1
The installation of gas-burning appliances and supply piping in mobile homes shall be in accordance with CAN/CSA-Z240.4.1.

4.8.2
When a vehicle ceases to be used as a mobile home or recreational vehicle and is placed at a location in a permanent fixed manner, the system shall comply with all applicable requirements of this Code.

4.8.3
An appliance in the application described in Clause 4.8.2 shall not be required to be certified specifically for use within a mobile home.

4.9 Hazardous locations

4.9.1
An appliance shall not be installed in a location that has an environment corrosive to an appliance or venting system.

4.9.2
An appliance, unless certified for installation in a hazardous location, shall not be installed in any location where a flammable vapour, combustible dust or fibres, or an explosive mixture is present.

4.10 Smoking
Smoking or providing any other source of ignition shall not be permitted in the area where work is being done on piping, tubing, or equipment that either contains or has contained gas unless the piping, tubing, or equipment has been purged of all gas as outlined in Clause 6.23.

4.11 Isolation of safety devices
Isolating or rendering inoperative a safety shut-off valve, safety limit control, or relief valve shall be prohibited.

4.12 Leak detection

4.12.1
A match, candle, flame, or other source of ignition shall not be used to check for a gas leak.

4.12.2
A light, including a flashlight, used in connection with a search for gas leakage shall be of the Class I, Group D type.

4.12.3
An electric switch either in or adjacent to an area of gas leakage shall not be operated unless it is a Class I, Group D type.
4.13 Appliance clearances to combustible material

4.13.1 The clearances required in Clause 7 between an appliance and combustible material shall be considered the minimum without protection and shall be measured from the appliance, disregarding either the burner or any other projecting component.

4.13.2 The clearances to combustible material specified in Clause 7 shall not be reduced unless
(a) such reduced clearance is certified as safe by a nationally recognized certification organization acceptable to the authority having jurisdiction, and so marked on the appliance nameplate; or
(b) protection is provided for the combustible material, and such protection and such reduced clearance are in accordance with Table 4.1.

4.13.3 An appliance with an input up to and including 400 000 Btuh (120 kW) and certified for installation on noncombustible flooring may be installed on a floor constructed of combustible material, provided that
(a) the floor is protected with at least two continuous courses of 4 in (90 mm) thick hollow masonry units covered with sheet metal at least 0.0195 in (0.56 mm) thick;
(b) the masonry units are arranged so that the hollow cores will permit air circulation through them; and
(c) the base as specified in Items (a) and (b) extends not less than 6 in (150 mm) beyond the sides of the appliance.

4.13.4 A heater located in an aircraft storage or servicing area shall be installed so that no portion of an aircraft that can occupy the area is within the clearance to combustible material, as marked on the appliance rating plate. Clearances specified in Table 4.1 shall not apply.
4.14 Accessibility

4.14.1
An *appliance* shall be installed so that it is accessible for servicing.

4.14.2
An *appliance* shall be installed with a minimum service clearance of 24 in (600 mm) to any side, top, or bottom where service could be necessary, except where
(a) a greater distance is indicated on the *appliance* rating plate; or
(b) the distance is not sufficient for the removal, replacement, or repair of a *component*, an *accessory*, or any *equipment* either forming an integral part of the *appliance* or connected to the *appliance*, in which case minimum service clearance that is adequate to effect such removal, replacement, or repair shall be provided.

All measurements shall be taken between the outermost projection of the *appliance* and surrounding *structure* or property line after the *appliance* has been installed.

4.14.3
An access opening with minimum dimensions of 24 × 30 in (600 × 750 mm) shall be provided to the space in which an *appliance* is located.

4.14.4
A clear and unobstructed passageway at least 36 in (900 mm) high and 36 in (900 mm) wide shall be provided to each *appliance*.

4.14.5
An *appliance* shall not be installed on a roof
(a) exceeding 13 ft (4 m) in height from grade to roof elevation unless fixed access to the roof is provided; and
(b) exceeding 26 ft (8 m) in height from grade to roof elevation unless permanent fixed access to the roof by means of either a stairway or a stairway leading to a ladder not exceeding 13 ft (4 m) in height is provided.

4.14.6
When an *appliance* is installed on a roof,
(a) the *appliance* shall be installed on a well-drained surface. When water stands on the roof, either at the *appliance* or in the passageways to the *appliance*, or when the roof is sloped or has a water seal, a suitable anti-skid walkway shall be provided. Such a walkway shall be located adjacent to the *appliance* and control panels, and when the *appliance* is located on a sloped roof, the walkway shall extend from the *appliance* to the point of access and be equipped with guardrails so that the *appliance* can be safely accessed and serviced;
(b) the clearance between the *appliance* and the edge of the roof or other hazard shall be at least 6 ft (2 m); and
(c) if the *appliance* is enclosed, such an *enclosure* shall permit easy entry and movement, be of reasonable height, and have at least 2 ft (600 mm) clearance on either side of the service access panel of each *appliance* in the *enclosure*.

4.14.7
An *appliance* installed at a distance of 10 ft (3 m) or more from either the floor or finished grade level, as measured from the lowest point of the *appliance*, shall be provided with either
(a) a permanent accessible service platform that permits access to all parts of the *appliance* requiring service; or
(b) other *approved* means of service access.
4.15 Outdoor installations

4.15.1 An appliance installed outdoors shall be approved for outdoor use.

4.15.2 An appliance installed outdoors shall be located to prevent circulation of flue gases into the combustion air inlet or circulating airstream of an adjacent appliance.

4.15.3 A space-heating or pool-heating appliance installed outdoors at grade level shall be placed on a base consisting of poured-in-place concrete or a reinforced concrete slab of the preformed type, extending at least:
   (a) 6 in (150 mm) beyond all sides of the appliance; and
   (b) 2 in (50 mm) above grade level.
   The ground shall first be prepared and provided with gravel for drainage.

4.16 Appliances in garages

4.16.1 An appliance in a garage shall be protected against damage.

4.16.2 In a storage garage, except for an appliance certified as flammable vapours ignition resistant (FVIR), an appliance shall be installed so that a component capable of igniting a flammable vapour is located not less than 18 in (450 mm) above the floor.

4.16.3 In a repair garage, an appliance shall be installed so that a component capable of igniting a flammable vapour is located not less than 4.5 ft (1400 mm) above the floor.

4.17 Appliance ductwork connections

4.17.1 Ductwork shall not be connected to an appliance unless the appliance is approved for use with ductwork.

Δ 4.17.2 Return air ducts installed in an enclosure shall be in accordance with the provisions set out for duct systems in the National Building Code of Canada.

4.18 Combined heating systems

4.18.1 Air heated by either an appliance or fireplace that burns a solid fuel shall not be introduced into any part of the ductwork system of a gas-fired appliance except where either:
   (a) a certified combination gas and solid-fuel-fired appliance is installed; or
   (b) a certified solid-fuel-fired appliance downstream series add-on furnace is installed.

4.18.2 The installation of a solid-fuel-fired portion of the appliance referred to in Clause 4.18.1(a), and the installation of a solid-fuel-fired add-on furnace referred to in Clause 4.18.1(b), shall conform to the applicable provincial or territorial building code or, in its absence, to CAN/CSA-B365.
5.1.2
In a residential application using propane, propane vapour pressure in either a piping or tubing system between the first-stage and second-stage regulator shall not be higher than 10 psig (70 kPa). In other applications using propane, means shall be provided to prevent liquefaction of propane.

5.1.3
Propane shall not be piped into or within any building in the liquid phase, except when
(a) the building is used exclusively to house appliances or equipment for vaporization (including grain dryers), pressure reduction, propane/air mixing, or distribution;
(b) the building is a container-filling building;
(c) the fire-separated portion of the building is used exclusively for housing an internal combustion engine or industrial process; or
(d) the fire-separated portion of the building is occupied exclusively by research and experimental laboratories.

5.1.4
For applications using propane, a line pressure regulator installed within a one- or two-family dwelling or row housing shall not be located more than 3 ft (1 m) from the point where the propane supply enters the dwelling.

5.2 Pressure regulators

5.2.1 General

5.2.1.1 Every regulator shall be certified and be of sufficient size to provide the required flow of gas at the extremes of inlet pressures to which the regulator can be exposed. Recognized Standards for certifying regulators include
(a) ANSI Z21.80/CSA 6.22;
(b) UL 144; and
(c) CSA 6.18.

5.2.1.2 The minimum clearance specified in Clauses 7.4.4 and 7.5.2 between a pressure regulator and the moisture-exhaust duct shall be maintained.

5.2.1.3 A pressure regulator shall not be bypassed.

5.2.1.4 When a line pressure regulator is required and the inlet supply pressure to the regulator exceeds 0.5 psig (3.5 kPa), it shall be of the positive shut-off type.

5.2.1.5 A line pressure regulator shall have
(a) a manual shut-off valve installed upstream of the regulator; and
(b) either a line relief device or an overpressure protection device. The regulator vent and relief device vent shall terminate outdoors.
5.2.2 Additional requirements for pressure regulators for propane applications

5.2.2.1
A regulator shall be firmly secured to the container valve, or the regulator bracket on the wall or hood, or in some other appropriate manner. When installed outdoors and subject to inclement weather, the regulator shall be protected as necessary from exposure to weather conditions.

5.2.2.2
Not less than two-stage regulation shall be utilized on all permanent propane installations.

5.2.2.3
A regulator installed outdoors or in an unheated area shall be positioned so that the bonnet vent opening discharges vertically downward, except that
(a) when installed within a container dome, the vent opening shall be positioned downward not less than 15º from the horizontal; and
(b) a single-stage regulator of a capacity not exceeding 150 000 Btuh (45 kW) may be installed in a horizontal position, provided that it is protected from inclement weather.

5.2.2.4
When used on a system operating at 2 psig (14 kPa) or less, a line pressure regulator equipped with a leak limiting system orificed for 1 ft³/h (0.0283 m³/h) shall be exempt from the requirement of Clause 5.2.1.5(b).
A regulator with vent limiting means shall be installed in a ventilated space only.

5.2.3 Additional requirements for pressure regulators for natural gas applications

5.2.3.1
When used on a system operating at 2 psig (14 kPa) or less, a line pressure regulator equipped with a leak limiting system orificed for 2.5 ft³/h (0.0706 m³/h) shall be exempt from the requirement of Clause 5.2.1.5(b).
A regulator with vent limiting means shall be installed in a ventilated space only.

5.2.3.2
For systems with inlet pressures above 2 psig (14 kPa), a pressure regulator equipped to limit the escape of gas from the vent openings, even in the event of a main diaphragm failure, to less than 2.5 ft³/h (0.0706 m³/h), having an overpressure cut-off (OPCO) device set to a pressure either below 2 psig (14 kPa) or 2 times the delivery pressure on the system and certified to CSA 6.18, is exempt from compliance with Clause 5.2.1.5(b) of this Code.

5.3 Relief devices
Except as specified in Clauses 5.2.2.4 and 5.2.3, when a line pressure regulator is not equipped with an internal relief device, it shall have immediately downstream an overpressure protection device or a line relief device as required in Clause 5.2.1.5(b), with a discharge setting of either
(a) not less than 2 times and not more than 3 times the delivery pressure on systems operating up to 5 psig (35 kPa); or
(b) not less than 1.5 times and not more than 2 times the delivery pressure on systems operating at more than 5 psig (35 kPa).
The relieving pressure setting of the line relief device shall be not higher than that of the lowest-rated component or accessory located downstream.
5.4 Hydrostatic relief devices for propane applications

5.4.1
A hydrostatic relief device (to relieve at a safe location outdoors) shall be installed between each pair of shut-off valves on propane liquid piping. The start-to-discharge pressure setting of such a hydrostatic relief device shall be neither less than 375 psig (2500 kPa) nor more than 500 psig (3500 kPa).

5.4.2
Discharge lines from two or more hydrostatic relief devices may run into a common discharge header, provided that the cross-sectional area of the header is at least equal to the sum of the cross-sectional areas of the individual discharge lines and that the header is not connected to any vent or bleed line.

5.5 Venting of pressure control devices

5.5.1
Except as specified in Clauses 5.5.2, 5.5.3, and 5.6.2 for natural gas and Clauses 5.5.3, 5.5.10, and 5.6.1.3 for propane, when an automatic valve, diaphragm valve, combination control, pressure regulator without internal relief, or other control device (excluding a gas overpressure relief valve) that requires venting is installed, it shall be vented separately to a safe location outdoors by a vent line
(a) of steel pipe, copper, seamless aluminum, or steel tubing that complies with Clause 6.2; and
(b) of a size at least equal to the nominal pipe size of the vent outlet of the valve, combination control, pressure regulator, or control device, but in no case shall the inside diameter be less than 0.25 in (6 mm).

5.5.2
For natural gas applications, when a diaphragm valve or combination control is installed on an appliance with an inlet supply pressure not in excess of 0.5 psig (3.5 kPa) and using a gas lighter than air, it may be vented into the appliance combustion chamber adjacent to the continuous pilot provided that the terminus of the bleed vent is in a burner tip having a melting point in excess of 1450°F (790 ºC) that is securely held in a fixed position relative to the pilot flame and that will not adversely affect the operation of the thermal element.

5.5.3
When two or more, or any combination of, automatic valves, diaphragm valves, combination controls, other control devices (excluding gas overpressure relief valves), or pressure regulators without internal relief that require venting are installed, they may be connected into a single vent, provided that
(a) there is compliance with
   (i) Clause 5.5.1(a) and (b) for inlet pressure not in excess of 0.5 psig (3.5 kPa); or
   (ii) Clause 5.5.4(a) and (b) for inlet pressure in excess of 0.5 psig (3.5 kPa); and
(b) the single vent line has an area of not less than twice the total area of the connected bleed vents.

5.5.4
Except as specified in Clause 5.5.5, when a gas overpressure relief valve or a pressure regulator with internal relief is installed, it shall be vented separately to a safe location outdoors by a vent line
(a) of steel pipe, copper, or seamless steel tubing that complies with Clause 6.2; and
(b) of the following size:
   (i) the nominal pipe size of the vent outlet of the valve or regulator increased as specified by the manufacturer’s instructions; or
   (ii) in the absence of manufacturer’s instructions, the nominal pipe size of the vent outlet of the valve or regulator increased by one pipe size diameter for every 50 ft (15 m) or part thereof that the vent line extends beyond the initial 50 ft (15 m). This increase shall be made at the connection on the device.
5.5.5
When two or more gas overpressure relief devices are installed, they may be connected into a single vent line, provided that
(a) there is compliance with Clause 5.5.4(a) and (b);
(b) the single vent line has an area equal to the largest relief device opening or pressure regulator opening plus 50% of the total area of the other relief device openings;
(c) the variance between the inlet pressures of the overpressure relief valves does not exceed 10%; and
(d) the variance between the outlet pressures of the overpressure relief valves does not exceed 10%.

5.5.6
The outdoor vent termination of regulators and line relief devices shall be equipped with a means to prevent the entry of water, insects, or foreign material.

5.5.7
A vent line shall be of sufficient size and configuration to prevent impedance upon a regulator.

5.5.8
A safety limit or a safety relief device shall not be isolated, bypassed, or in any way made ineffective by a valve or other device.

5.5.9
The discharge from relief devices shall terminate outdoors with the clearances specified in Table 5.2.

Table 5.2
Clearance from discharge, ft (m)
(See Clauses 5.5.9 and 10.1.7.)

<table>
<thead>
<tr>
<th></th>
<th>Natural gas (CSA 6.18 certified OPCO (overpressure cut-off) regulators with limited relief of 50 scf/h (1.5 m³/h) or less)</th>
<th>Relief capacity</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>Natural gas over 1900 scf/h (55 m³/h)</td>
</tr>
<tr>
<td>Building opening</td>
<td>1 (0.3)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Appliance vent outlet*</td>
<td>1 (0.3)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Moisture exhaust duct†</td>
<td>3 (1)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Mechanical air intake</td>
<td>3 (1)</td>
<td>10 (3)</td>
</tr>
<tr>
<td>Appliance air intake</td>
<td>1 (0.3)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Source of ignition</td>
<td>1 (0.3)</td>
<td>3 (1)</td>
</tr>
</tbody>
</table>

*See also Clause 8.14.8.
†Applies to gas or electric dryer termination.

5.5.10
For propane applications, except as specified in Clause 5.6.1.3, a pressure regulator, line relief device, or hydrostatic relief device on an appliance using gas heavier than air shall be equipped with a vent line
(a) in accordance with Clause 5.5.4(a) and (b); and
(b) terminating outdoors in accordance with Clause 5.5.9.
5.5.11
For propane applications, a regulator vent, line relief device, or hydrostatic relief device discharging vertically upward shall be provided with a loose-fitting rain cap. When discharging downward, it shall be provided with a protective screen.

5.6 Appliance and pilot pressure regulators

5.6.1 Appliance and pilot pressure regulators in propane applications

5.6.1.1
An appliance that can be subjected, through supply pressure, design, creepage, or fluctuation, to propane pressure in excess of that for which it is rated shall be equipped with an appliance pressure regulator.

5.6.1.2
When an appliance pressure regulator is required by Clause 5.6.1.1, the propane supply to the pilot or group of pilots shall be regulated by an approved pressure regulator independent of the main burner propane supply.

5.6.1.3
When an appliance pressure regulator without internal relief having an inlet pressure not in excess of 2 psig (14 kPa) is installed on an appliance, it shall be vented to the outdoors unless it is constructed or equipped with a device to limit the escape of gas from the vent opening in the event of diaphragm failure, and the opening in the device shall restrict the escape of gas to not more than 1 ft³ (0.0283 m³) per hour of a gas having a specific gravity of 1.53. A regulator with vent limiting means shall not be installed in a confined space.
Note: For the purposes of installation of pressure regulators with a leak limiting system, a ventilated space should not be considered a confined space.

5.6.2 Appliance and pilot pressure regulators in natural gas applications

5.6.2.1
When an appliance pressure regulator without internal relief having an inlet pressure not in excess of 2 psig (14 kPa) is installed on an appliance, it shall be vented to the outdoors unless it is constructed or equipped with a device to limit the escape of gas from the vent opening in the event of diaphragm failure, and the opening in the device shall restrict the escape of gas to not more than 2.5 ft³ (0.0706 m³) per hour of a gas having a specific gravity of 0.6. A regulator with vent limiting means shall be installed in a ventilated space only.

6 Piping and tubing systems, hose, and fittings

6.1 General

6.1.1
A gas piping or tubing system shall be of steel, copper, or plastic.

6.1.2
If removed from a gas installation, piping, tubing, and fittings shall not be reused unless thoroughly cleaned, inspected, and ascertained to be equivalent to new material. Piping, tubing, or fittings previously used with other gases may be reused with natural gas, provided that
(a) it is ascertained that the piping, tubing, or fittings to be used are equivalent to new material; and
(b) the piping, tubing, or fittings to be used are cleaned, inspected, and tested.
6.2 Material

6.2.1 Piping shall comply with ASTM A 53/A 53M or A 106.

6.2.2 A fitting used with steel pipe shall be of either malleable iron or steel and shall comply with ANSI/ASME B16.3.

6.2.3 Natural gas piping or propane vapour phase piping with operating pressures up to and including 125 psig (860 kPa) shall be at least Schedule 40. Natural gas piping or propane vapour phase piping with operating pressures exceeding 125 psig (860 kPa) and all liquid piping shall be at least Schedule 80 if joints are either threaded or threaded and back welded. At least Schedule 40 shall be used if joints are either welded or welded and flanged.

6.2.4 Copper tubing used for gas systems shall be Type G, K, or L, and shall meet the requirements of one of the following Standards, as applicable:
   (a) Type G tube shall meet ASTM B 837; or
   (b) Types K and L tube shall meet ASTM B 88.

6.2.5 Flared nuts shall be forged.

6.2.6 Tubing fittings shall be rated for a working pressure of not less than 125 psig (860 kPa) for operating pressures of 125 psig (860 kPa) or less. For higher operating pressures, tubing and fittings shall be rated for a minimum of 250 psig (1725 kPa).

6.2.7 Copper tubing for underground use shall be either Type L or G, externally coated with extruded polyethylene or PVC resin at the time of manufacture, or Type K, and any portion of the copper tubing that extends above ground shall be protected against physical damage.

6.2.8 Tubing shall be one of the following:
   (a) corrugated stainless steel tubing (CSST);
   (b) seamless copper; or
   (c) seamless steel.

6.2.9 Except as permitted in Clause 6.2.10, every hose and hose fitting shall have a minimum working pressure of 350 psig (2400 kPa) and shall comply with CSA Standard CAN/CGA-8.1 or CSA Standard CAN1-8.3.

6.2.10 Every hose and hose connection used in cutting or welding systems shall comply with CAN/CSA-W117.2.

6.2.11 Seamless steel tubing shall comply with ASTM A 179/A 179M.
6.2.12
Materials not specified in Clause 6.2 may be used if they conform to a nationally recognized standard or to a test report of a nationally recognized certification organization.

6.2.13
Plastic piping and tubing shall comply with CAN/CSA-B137.4.

6.2.14
Fittings for plastic piping and tubing systems shall comply with CAN/CSA-B137.4 or CAN/CSA-B137.4.1.

6.2.15
Plastic pipe shall not be used in a liquid propane system.

6.2.16
Except as mentioned in Clause 6.2.19, plastic piping or tubing shall only be used for outdoor underground service.

ΔΔ 6.2.17
Plastic pipe shall not be used for, as a minimum, the first 10 ft (3 m) of piping on the downstream side of a vaporizer in a propane application and shall not exceed the temperatures specified in Clause 6.2.18.

6.2.18
Plastic piping or tubing shall not be used at ambient temperatures exceeding 122°F (50 ºC) or where the steady-state operating temperature of the materials will exceed 86°F (30 ºC).

6.2.19
Plastic piping or tubing may terminate above ground and outside the building, provided that
(a) the aboveground portions are completely encased with a certified metallic sheathing or anodeless riser that extends a minimum of 6 in (15 cm) below grade; and
(b) the plastic piping or tubing is not subject to external loading stresses created by other piping, appliances, or equipment.

6.2.20
Corrugated stainless steel tubing (CSST) and associated fittings shall comply with ANSI/IAS LC1/CSA 6.26 or CSA publication CGA Certification Laboratory Requirement LAB-009.

6.3 Size

6.3.1
Piping, tubing, and hose shall be of sufficient size to provide a supply of gas to meet the requirements of volume and pressure at the point of use.

6.3.2
A piping or tubing system supplied at pressures up to and including 14 in w.c. (3.5 kPa) shall be designed to prevent the loss in pressure between the appliance and either the termination of the utility installation or the last-stage regulator from exceeding the maximum allowable pressure drop specified in Table 6.1. The minimum size of pipe, tubing, and fittings shall be determined in accordance with good engineering practice, such as
(a) by the use of Tables A.1 and A.8 of Annex A for natural gas, which include allowance for a reasonable number of fittings, when the maximum allowable pressure drop is 0.5 in w.c. (0.125 kPa);
(b) by the use of Tables A.2 and A.9 in Annex A for natural gas or Tables B.1 and B.6 in Annex B for propane, which include allowance for a reasonable number of fittings, when the maximum allowable pressure drop is 1 in w.c. (0.25 kPa); or

(c) by the method of calculation outlined in Annex A for natural gas or Annex B for propane.

### Table 6.1
**Maximum allowable pressure drop**
*(See Clause 6.3.2.)*

<table>
<thead>
<tr>
<th></th>
<th>Piping and tubing system supply pressure</th>
<th>Maximum allowable pressure drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>Less than 7 in w.c. (1.75 kPa)</td>
<td>0.5 in w.c. (0.125 kPa)</td>
</tr>
<tr>
<td>Natural gas/propane</td>
<td>7 in w.c. (1.75 kPa) up to 14 in w.c. (3.5 kPa)</td>
<td>1 in w.c. (0.25 kPa)</td>
</tr>
</tbody>
</table>

6.3.3
A piping or tubing system operating at a pressure exceeding 14 in w.c. (3.5 kPa) shall be designed to ensure an adequate supply of gas to each appliance served at the respective designated pressure rating, and to ensure that the appliance will not be overpressured under conditions of no flow. The minimum size of pipe, tubing, and fittings shall be determined in accordance with Clause 6.3.4 for 2 psig (14 kPa) systems or good engineering practice, such as

(a) by the use of the applicable tables in Annex A for natural gas or Annex B for propane, making allowance for fittings as necessary; or

(b) by the method of calculation outlined in Annex A for natural gas or Annex B for propane.

6.3.4
The piping or tubing system shall be designed to provide adequate gas pressure to the 2 psig (14 kPa) pressure regulator to match downstream load requirements. Regulator sizing shall be subject to the minimum available inlet supply pressure. See Tables A.3, A.4, A.10, and A.11 in Annex A for natural gas or Tables B.2 and B.7 in Annex B for propane, which include allowance for a reasonable number of fittings.

6.3.5
Plastic piping shall be sized

(a) by the use of Tables A.1 to A.7 in Annex A for natural gas or Tables B.1 to B.5 in Annex B for propane; or

(b) by the method of calculation outlined in Annex A for natural gas or Annex B for propane.

**Note:** See Table A.17 for natural gas and Table B.12 for propane.

6.3.6
Annex A is based on natural gas of 0.60 relative density. For natural gas having a relative density other than 0.60, the multipliers given in Table A.15 in Annex A shall be applied to the capacities listed. Annex B is based on propane of 1.52 relative density.

6.3.7
Annexes A and B give the resistance of bends, fittings, and valves as equivalent length of straight pipe in ft (m) to be added to the actual length to obtain the total equivalent length on which pressure loss calculations shall be based. See Tables A.16 and B.11.
6.3.8

6.3.8.1
For natural gas, threaded piping less than NPS 1/2 used in a piping system shall be Schedule 80.

6.3.8.2
For propane, piping less than NPS 1/2 shall not be used indoors, except that NPS 3/8 piping may be used as a branch line not exceeding 25 ft (7.5 m) in length.

6.3.9
Piping less than NPS 1/2 shall not be used in a concealed location.

6.4 Volume of gas to be used for sizing piping and tubing systems

6.4.1
The total volume of gas required shall
(a) be determined as the total volume for all appliances supplied, except as permitted in Clause 6.4.3; and
(b) include an allowance for known future extensions.
6.15.9  
A watertight seal shall be provided at any point where piping or tubing passes through an outside wall below ground level.

6.15.10  
When piping or tubing is laid under pavement and an entry to a building is made above ground level, a sleeve shall be inserted to protect the piping or tubing where it comes through the pavement to permit free movement of the soil and covering without placing strain on the piping or tubing.

6.15.11  
A vent pipe inspection point shall be installed adjacent to a building either when the entire piping or tubing is covered with paving or when paving extends 25 ft (8 m) or more from the building unless other approved provisions have been made for venting the area surrounding the piping.

6.15.12  
An approved transition fitting shall be used for connecting piping or tubing of either steel or copper to plastic.

6.15.13  
The gas supply to underground plastic piping or tubing shall be controlled by a shut-off valve situated above ground.

6.15.14  
Plastic piping or tubing shall be accompanied by a tracer wire or equivalent tracing media.

6.16 Protection of piping and tubing

6.16.1  
Outdoor piping or indoor piping and tubing that is exposed to atmospheres that are corrosive to the piping or tubing shall be protected by either painting or coating.

6.16.2  
Piping, tubing, or fittings laid underground shall be protected against corrosion in accordance with good engineering practice or in accordance with the manufacturer’s instructions.

6.16.3  
Piping or tubing shall be mounted, braced, and supported to provide for expansion, contraction, jarring, vibration, and settling, and shall be protected against either damage or breakage due to strain, wear, and mechanical impact.

6.16.4  
Tubing run inside hollow walls or partitions within 1.75 in (43 mm) of the surface shall be protected against physical damage and puncture at the joists, studs, and plates by the use of No. 16 GSG (1.59 mm) plates or sleeves. This provision shall not apply to tubing that passes directly through walls or partitions.

6.16.5  
Piping or tubing shall be located in a position free from the arc of movement of all appliance doors or covers.

6.16.6  
When piping or tubing is run in a sleeve, the sleeve shall be of such material and so installed as to protect the piping or tubing from damage and galvanic action.
6.16.7
When piping or tubing passes through an exterior wall above ground, it shall be sealed watertight and the portion of piping or tubing that runs through the wall shall be sleeved or double wrapped with a waterproof wrap.

6.16.8
When piping or tubing passes through an interior wall of masonry or concrete, the portion of piping or tubing that runs through the wall shall be sleeved or double wrapped with a waterproof wrap.

6.16.9
Care shall be exercised to protect plastic materials from excessive heat and harmful chemicals.

6.16.10
Plastic pipe and tubing shall be adequately supported during storage.

6.16.11
Plastic pipe and tubing shall be protected from exposure to direct sunlight.

6.16.12
Corrugated stainless steel tubing (CSST) and fittings shall be protected against physical damage in accordance with the manufacturer’s certified installation instructions and with this Code.

6.16.13
Piping or tubing entering a building above grade in locations that do not afford protection from damage from vehicles on any street, highway, avenue, alley, or a parking lot, the piping or tubing shall be protected by posts or guardrails in compliance with Clause 6.16.14 unless otherwise approved by the authority having jurisdiction.

6.16.14
The piping or tubing entering a building shall be protected from vehicular damage by one of the following means:
(a) Posts shall be
   (i) not less than 12 in (300 mm) from the riser, regulator, or equipment;
   (ii) spaced not more than 42 in (1050 mm) apart;
   (iii) buried not less than 36 in (900 mm) below grade;
   (iv) extend at least 30 in (750 mm) above grade; and
   (v) one of the following:
       (1) 4 in (100 mm) capped steel pipe;
       (2) 4 in (100 mm) tubing filled with concrete;
       (3) 8 in (200 mm) pressure-treated wood, either square or round; or
       (4) 6 in (150 mm) minimum dimension reinforced concrete.
(b) Guardrails shall be
   (i) not less than 12 in (300 mm) from the riser, regulator, or equipment;
   (ii) of the steel deep beam type, 12 in (300 mm);
   (iii) be supported by 6 in (150 mm) minimum pressure-treated wooden posts located not more than 42 in (1050 mm) apart, centre to centre; and
   (iv) located so that the top of the beam is not less than 24 in (600 mm) nor more than 30 in (750 mm) above grade.
6.17 Identification of piping or tubing

6.17.1 In every care or detention occupancy, commercial, industrial, and assembly building, piping or tubing shall be identified by one of the following:
   (a) the entire piping or tubing system shall be painted yellow;
   (b) the piping or tubing system shall be provided with yellow banding that has a minimum width of one inch (1”); or
   (c) the piping or tubing system shall be labelled or marked “GAS”* or “PROPANE”†, as applicable, utilizing yellow labels or markings.

When identified in accordance with Item (b) or (c), the identification intervals shall not exceed 20 ft (6 m).

*The equivalent French wording is “GAZ”.
†The equivalent French wording is “PROPANE”.

6.17.2 In every care or detention occupancy, commercial, industrial, and assembly building, where the piping or tubing pressure is in excess of 14 in w.c. (3.5 kPa), both the piping or tubing and the pressure shall be identified at the following locations:
   (a) shut-off valves; and
   (b) wall, ceiling, and floor penetrations.

6.17.3 Tubing systems for residential buildings shall be identified in accordance with Clause 6.17.1, except that identification intervals shall not exceed 6 ft (2 m) along their entire length.

6.17.4 Every piping or tubing system that enters a building that has two or more gas meters shall be permanently identified with the room number, apartment number, or the area of the building it serves.
6.20.5

**Flexible metallic hose**

(a) may be used to connect an *appliance* in commercial, industrial, or process applications where vibration, expansion, contraction, or other circumstances of an *appliance* installation warrant its use;
(b) shall not be used in a concealed location;
(c) shall neither extend from one room to another nor pass through any wall, partition, ceiling, or floor; and
(d) when used to connect an *appliance* to rigid supply piping, shall have a shut-off *valve* in the piping immediately upstream of the *flexible metallic hose*.

Δ 6.20.6

When *tanks* or pieces of *equipment* are interconnected, provision shall be made to compensate for vibration and differential settling of the *tanks, equipment*, and interconnecting piping. Where a *flexible hose* is used for this purpose, it shall be a *flexible metallic hose* complying with ULC C536 or a Type II or Type III *hose connector* complying with CSA Standard CAN/CGA-8.1.

6.20.7

When a *hose* is used for transferring liquid propane from one *container* to another, the *hose* shall be protected by a *hydrostatic relief valve* located between the shut-off *valves* on the *hose*.

6.20.8

In propane applications, a *hose* shall not be run from a *tank* and/or *vaporizer* that is installed outdoors to an *appliance* located within a *building* except where the *hose* connects to an *appliance* used for temporary construction-heating purposes.

6.21 Connectors

ΔΔ 6.21.1


6.21.2

A *connector* shall
(a) be protected from damage;
(b) not pass through a wall, floor, ceiling, or partition;
(c) be connected to rigid piping or tubing located in the same area as the *appliance*; and
(d) comply with Clauses 4.5.2 and 4.9.1.

6.21.3

A corrugated *metal connector* may be used to connect
(a) a range, refrigerator, clothes dryer, or built-in counter *appliance* to piping or tubing, provided that the *connector* length does not exceed 6 ft (2 m);
(b) a suspended *appliance* to piping or tubing, provided that the *connector* length does not exceed 2 ft (600 mm); or
(c) a decorative *appliance*, a room heater, or a *direct-vent* wall *furnace* to piping or tubing, except when the *appliance, heater, or furnace* is installed as a free-standing unit, provided that the *connector* length does not exceed 2 ft (600 mm).

6.21.4

*Commercial cooking appliances certified* for use with casters or otherwise subject to movement for cleaning and other large gas utilization *equipment* that can be moved shall be connected by a *certified connector* in accordance with ANSI Z21.69/CSA 6.16.
6.21.5
When the connector described in Clause 6.21.4 is used with a commercial cooking appliance installed on wheels or rollers, a noncombustible restraining device shall be provided to protect the connector, and the installation shall be in accordance with Clause 7.31.4.

6.21.6
A connector not exceeding 2 ft (600 mm) may be used on a vented appliance, such as a free-standing space heater, provided that the appliance is secured to prevent dislodgement of the vent.

6.21.7
Where a mobile home is not on a permanent foundation, the mobile home may be connected by a certified connector in accordance with ANSI Z21.75/CSA 6.27.

6.22 Testing of piping, tubing, hose, and fittings

6.22.1
The source of test pressure shall be isolated while the piping or tubing system is under test, and the system shall retain the test pressure for the minimum duration required in Table 6.3 without showing any drop in pressure.

6.22.2
Before an appliance is connected, a piping and tubing system that contains fittings or joints shall be pressure tested using either air or an inert gas (carbon dioxide) in the following manner:
(a) Appliance shut-off valves not rated for the test pressure being used and meters and regulators shall not be connected to the piping or tubing system under test.
(b) The test pressure shall be measured by either a pressure gauge or equivalent device and, if a gauge is used, the minimum diameter shall be 3 in (75 mm) and the maximum range shall exceed the test pressure by at least 15% but not more than 300%. The pressure gauge or equivalent device shall be calibrated to read in increments of not more than either 2 psig (14 kPa) or 2% of the maximum dial reading of the pressure gauge, whichever is less.
(c) A pressure recorder when used for this test shall be calibrated to the requirements of Item (b).
(d) The pressure and duration of the test shall be in accordance with Table 6.3.
After an appliance is connected, the system shall be tested in the following manner:

(a) Before turning on the gas for the test, a check shall be made to ensure that any opening from which gas can escape is closed.

(b) Immediately after allowing the gas into the piping or tubing system, a test shall be made to determine that no gas is escaping by carefully watching the test dial of the meter or by using a manometer.

(c) Where a meter is not provided, the pressure shall be measured with either a pressure gauge or equivalent device calibrated to read in increments not greater than those specified in Clause 6.22.2(b), with the following exceptions:

(i) for a system where the working pressure is 0.5 psig (3.5 kPa) or less, the pressure gauge or equivalent device shall be calibrated to read in increments of not greater than 1 in w.c. (250 Pa); and

(ii) for a system where the working pressure exceeds 0.5 psig (3.5 kPa) but does not exceed 5 psig (35 kPa), the pressure gauge or equivalent device shall be calibrated to read in increments of not greater than 2 in w.c. of pressure (0.5 kPa).

(d) The test described in Item (b) shall be of a 10 min duration.

Notes:

(1) These test pressures and test durations are minimum requirements. Circumstances can require test pressures and test durations in excess of those shown in the Table.

(2) All wrapped and/or factory-coated piping systems of all sizes and lengths shall be tested at a minimum pressure of 100 psig (700 kPa) in accordance with the time duration in the Table.
(e) Each appliance connection, valve, valve train, and system component shall be checked while under normal operating pressure with either a liquid solution or a leak-detection device to locate any source of a leak.

6.22.4
An addition to an existing piping or tubing system shall be tested as an individual system in accordance with Clause 6.22, except that
(a) where the addition is 20 ft (6 m) or less in length and the normal working pressure is less than 0.5 psig (3.5 kPa), the addition shall be leak tested in accordance with Clause 6.22.3(e); and
(b) where the addition is accomplished using a welded tie-in, and the new system has been tested in compliance with Clause 6.22, the tie-in weld shall be tested in accordance with Clause 6.22.3(e).

6.22.5
When any part of a piping or tubing system is to be enclosed or concealed, the tests specified in Clause 6.22.2 shall precede the work of closing in.

6.23  Purging of piping and tubing systems and hose after leak testing

6.23.1
A piping system, tubing system, or hose containing either air or inert gas shall be purged in a safe manner either
(a) to the outdoors in accordance with Clause 6.23.7; or
(b) to an approved purge burner, except as permitted in Clause 6.23.4.

6.23.2
If the piping is NPS 4 or larger, and air has been used for testing, the piping shall be first purged with carbon dioxide or nitrogen, or a mixture of these, and then purged with gas in accordance with Clause 6.23.7. The person doing the purging shall be in direct control of the purging gas supply during the purging operation by means of a valve having an attached operating handle. The piping for the gas being purged shall either be of a size or be reduced to a size not larger than NPS 1/2 for piping up to NPS 4.

6.23.3
If the piping exceeds NPS 4, purging shall follow engineering practices.

6.23.4
A piping or tubing system or a hose that supplies an appliance having an input up to and including 400 000 Btuh (120 kW) may be purged with the gas ignited at a readily accessible burner, but not at a burner located in a combustion chamber, and a continuously burning flame shall be maintained at the burner port(s) until a stable gas flame is established.

6.23.5
In the absence of a readily accessible burner
(a) an appliance equipped with a pilot shall be purged at the outlet of the pilot valve train after the pilot tubing has been disconnected; or
(b) an appliance not equipped with a continuous pilot shall be purged in accordance with the procedure described in Annex H.

6.23.6
The person doing the purging shall remain in constant attendance.
6.23.7
When a piping or tubing system is to be purged to the outdoors
(a) the purging line shall not terminate closer than 10 ft (3 m) from either a building or air intake;
(b) the purging point shall be under the constant supervision of a competent person who shall control
the purge by a quarter-turn lever handle valve within 5 ft (1.5 m) of the purge point. Such a valve
shall have an attached operating handle. No other valve shall be used to control or terminate the
purge; and
(c) smoking shall not be permitted, and maximum precautions shall be taken to either remove or shut off
any source or potential source of ignition prior to commencing the purge.

6.23.8
When flaring is used to purge a piping or tubing system, an approved purge burner shall be used.

6.23.9
When all piping and tubing systems and hose have been purged, the appliance piping shall be purged
and the pilot burner lighted.

6.24 Purging gas from a piping or tubing system
Carbon dioxide or nitrogen, or a mixture of these, or air shall be used when purging gas from a piping
or tubing system for the purpose of repair, alteration, or abandonment. The applicable procedures in
Clause 6.23 shall apply.

ΔΔ 6.25 — Deleted

6.26 Rooftop gas piping and tubing

ΔΔ 6.26.1
Piping may be supported with treated wood blocks or material having at least equivalent characteristics as
wood blocks and protection against outdoor exposure. The support spacing shall comply with Table 6.2
and support shall be provided for every threaded fitting. Tubing shall be supported according to Table 6.2
and Clause 6.26.2.

6.26.2
Tubing shall be supported continuously with treated wood and planks when it is laid on the rooftop.

6.26.3
Piping and tubing shall be installed in accordance with Clauses 6.16.1 and 6.16.3, and means for
expansion shall be provided. See Annex G.

6.27 Inspection

6.27.1
Plastic piping and tubing shall be inspected before and after installation for defects such as cuts, scratches,
and gouges. Damaged cylindrical pieces shall be cut out and replaced. Inspection shall be adequate to
confirm that sound joints have been made.

6.27.2
Joints in plastic piping and tubing shall be visually checked for evidence of poor bonding. Where inspection
reveals defective joints, they shall be cut out and replaced.
7 Installation of specific types of appliances

7.1 Boilers

7.1.1
A boiler shall conform to the requirements of the provincial boiler and pressure vessel regulations as applicable.

7.1.2
A boiler shall be installed on a
(a) firm and level base; and
(b) noncombustible floor or support, except where the boiler is
   (i) certified for installation on a combustible floor;
   (ii) installed using the boiler manufacturer’s certified special base; or
   (iii) installed as specified in Clause 4.13.3.

7.1.3
Except where permitted by Clause 4.13.2, a boiler shall be installed with the following minimum clearances from combustible material:
(a) vertical — 18 in (450 mm);
(b) sides and rear — 18 in (450 mm); and
(c) front — 48 in (1200 mm).
See also Clause 4.14.2.

7.2 Generators, compressors/pressure boosters, stationary engines, and turbines (for natural gas only)

7.2.1 General requirements

7.2.1.1
The installation of appliances and associated equipment in Clause 7.2 shall comply with this Code, applicable Standards, manufacturer’s instructions, and local requirements, including fire regulations, building codes, and zoning requirements.

7.2.1.2
Engines shall be installed such that all service, maintenance, inspection, and repair as required by the manufacturer can be accomplished.

7.2.1.3
Venting and air supply requirements, as a minimum, shall be provided in accordance with applicable clauses of Clause 8 or designed in accordance with any special requirements contained in the manufacturer’s instructions.
   This requirement shall apply to engines of all inputs, and the ventilation openings shall be arranged to minimize short circuiting of the exhausted and make up air streams.

7.2.1.4
Engine rooms or enclosures shall be constructed in accordance with national or local fire codes.

7.2.1.5
Engine rooms or structures shall have ventilation designed to minimize the possibility of hazardous accumulation of flammable vapours or gases during engine operation or when shut down.
7.2.1.6  
**Engines** shall be installed on a firm level foundation, set on a suitable framework supplied by the manufacturer, or field fabricated in accordance with the manufacturer's instructions.

7.2.1.7  
**Engines** located on rooftops shall comply with Clauses 4.14.5, 4.14.6, and 6.26, and provisions shall be made for oil spill containment.

7.2.1.8  
The installation of **appliances** in Clause 7.2 and associated **equipment** shall be protected by **approved** means against impact, ice build-up, flooding, and blockage of **ventilation**.

7.2.1.9  
The **ventilation** required by Clause 7.2.1.5 shall be interconnected with a gas detector that
(a) is installed in accordance with the detector manufacturer's instructions for the type of gas;
(b) is set to activate at gas detection levels at and above one-fifth of the lower limit of flammability;
(c) upon activation, produces an audible and visual alarm;
(d) is interlocked with the mechanical ventilation system; and
(e) is interlocked to shut off the **appliance**.

7.2.2  Generators

7.2.2.1  
Piping or tubing serving a generator that provides power for safety purposes shall be independent of any other gas supply to the **building** and shall be provided with a manual **valve** identified with a permanent sign. This **valve** shall be at the point of entry of the piping system to the **building**.

7.2.2.2  
When a gas supply to a generator is required for safety purposes, the supply of gas to the generator shall be arranged such that the gas supply to the piping serving other **appliances** can be shut off without interrupting the gas supply to the generator. The **valve** used for this purpose shall be at the point of entry of the piping system to the **building**.

7.2.3  Compressors/Pressure boosters

7.2.3.1  
A compressor/pressure booster shall be approved by the **authority having jurisdiction**.

7.2.3.2  
**Ventilation air** shall be provided to the space occupied by a pressure booster to prevent any accumulation of gas should leakage occur.

7.2.3.3  
A compressor/pressure booster or similar **equipment** capable of reducing pressure in the service piping to a point lower than the required service pressure shall be provided with a low-pressure cut-off device of the manual-reset type.

7.2.3.4  
The following requirements shall apply to all gas piping, **hose**, compressor/pressure boosters, and components operating at an outlet pressure higher than those permitted by Table 5.1:
(a) the installation of all components shall be approved by the **authority having jurisdiction** or they shall be tested in accordance with the manufacturer's instructions;
(b) the service line to the inlet of a compressor shall be tested in accordance with the requirements of Clause 6.22; and

c) discharge piping from a remote compressor that is not directly connected by the manufacturer from the outlet of a compressor shall be installed in accordance with the requirements of the applicable clauses of CSA B51 for pressure piping.

### 7.2.3.5
The compressor shall be installed outdoors unless approved and labelled for indoor installation.

### 7.2.3.6
A compressor shall be isolated from vibration at the inlet or outlet by a flexible metallic **hose** certified in compliance with ULC C536.

### 7.2.3.7
The number of **fittings** used in a supply line, discharge line, or **hose** shall be minimized to reduce the possibility of leakage.

### 7.2.3.8
The discharge piping shall be supported in accordance with the manufacturer’s certified instructions or the requirements of CSA B51 for pressure piping.

### 7.2.3.9
A pressure booster capable of creating an outlet pressure higher than the normal operating pressure shall be equipped with a mechanical bypass around the booster and a high-gas-pressure switch installed in the booster outlet piping set to prevent the system pressure from exceeding the normal operating pressure by 20%.

### 7.2.3.10
It is not necessary to meet the requirements of Clause 7.2.3.2 where a hermetically sealed pressure booster is installed.

### 7.2.3.11
Hermetically sealed compressors used for pressure boosting for the purpose of supplying burners, torches, or cylinder-filling applications shall comply with the requirements of Clause 7.2 and shall not have a capacity greater than 500 scf/h (14.15 m³/h).

### 7.2.3.12
**Cylinder**-filling applications are covered in Clause 9.

### 7.2.4 Stationary gas engines and turbines

#### 7.2.4.1
Supply piping to a gas **engine** shall be sized according to both the maximum rate of gas consumption and the requirements of Clause 6. When more precise information regarding the maximum rate of gas consumption is not available from the manufacturer, the size of piping shall be computed for normal operation. Normal operation shall be considered the provision of 10 000 Btuh (3 kW) per brake horsepower for 4-cycle engines and 13 000 Btuh (4 kW) per brake horsepower for 2-cycle engines. When either overloads or high starting loads are likely to be encountered, the size of piping shall be computed on a basis proportional to the increased input required.
7.2.4.2
A gas engine shall be equipped with
(a) an automatic safety shut-off valve;
(b) an automatic speed governor;
(c) a vacuum switch or low-oil-pressure switch;
(d) a zero-governor-type regulator; and
(e) a flexible hose connector, which shall be of the approved heavy-duty type where the connector is installed on the upstream side of the zero-governor-type regulator.

7.2.4.3
Where the input to an engine is in excess of 1 000 000 Btuh (300 kW), an additional automatic safety shut-off valve shall be provided and shall be piped in series and wired in parallel to the automatic safety shut-off valve required in Clause 7.2.4.2.

7.2.4.4
Engine exhaust gases shall be piped
(a) by the most direct route to an outdoor location where they can neither be trapped nor be drawn into a building through a window, door, or other opening;
(b) to a chimney conforming to Clause 7.2.4.6(b); or
(c) in accordance with the engine manufacturer's certified instructions.

7.2.4.5
An exhaust pipe passing directly through a combustible roof shall be guarded at the point of passage by a ventilated metal thimble that extends not less than 9 in (225 mm) above and 9 in (225 mm) below the roof construction and that is 12 in (300 mm) larger in diameter than the pipe. If a double ventilation metal thimble is used, the same requirements shall apply, except that the thimble shall be at least 6 in (150 mm) larger in diameter than the pipe.

7.2.4.6
An exhaust pipe that passes directly through a combustible wall or partition shall be guarded at the point of passage by
(a) a metal ventilated thimble not less than 12 in (300 mm) larger in diameter than the exhaust pipe; or
(b) a metal or burned fire clay thimble built into either the brickwork or another noncombustible material. The brickwork or other noncombustible material shall provide not less than 8 in (200 mm) of insulation between the thimble and the combustible material.

7.2.4.7
An engine exhaust pipe shall not be installed in a floor, ceiling, attic, or concealed space but may pass through such spaces, provided that it is installed inside either a masonry chimney or a factory-built chimney of appropriate temperature rating and provided that the chimney does not serve any other type of appliance.

7.2.4.8
An engine exhaust pipe shall not discharge into
(a) a gas vent;
(b) a chimney that has a temperature rating less than the maximum temperature of the exhaust gas; or
(c) a chimney that serves another appliance.

7.2.4.9
Where an engine is of an automatic-start type, it shall be equipped with overcrank protection in addition to the requirements of Clauses 7.2.4.2 and 7.2.4.3.
7.2.4.10 Where the gas supply pressure is in excess of 0.5 psig (3.5 kPa), a pressure regulator of the lock-up type shall be provided to the entrance to the valve train.

7.2.4.11 Where all components on the valve train are not pressure rated for the inlet supply pressure, a pressure relief valve shall be provided immediately downstream of the pressure regulator required under Clause 7.2.4.12 and shall be set to prevent pressure build-up exceeding that of the lowest-rated downstream component.

7.2.4.12 Each gas engine shall be provided with a clearly legible, permanent rating plate indicating
(a) the manufacturer’s or vendor’s name;
(b) the fuel to be supplied to the engine;
(c) the electrical rating;
(d) the maximum input rating; and
(e) the inlet pressure at the point of connection to the supply piping.

7.2.5 Propane-fuelled engines in buildings

7.2.5.1 Hermetically sealed compressors used for pressure boosting for the purpose of supplying burners, torches, or cylinder-filling applications shall be in accordance with Clause 7.2 and shall not have a capacity greater than 500 scf/h (14.15 m³/h).

7.2.5.2 A room containing a propane-fuelled engine shall be ventilated at the floor level and shall take air for combustion directly from outdoors.

7.2.5.3 When a propane-fuelled engine is installed within a room that is below grade, mechanical exhaust ventilation shall be provided and operated continuously, and approval of the authority having jurisdiction shall be obtained. The mechanical ventilation shall be electrically interlocked to shut down the engine in the event of failure of the exhaust system, or means shall be provided to purge the room before the engine is started. The mechanical ventilation shall be in operation when the engine is running, and the room shall be ventilated before and during any repairs to the engine.

7.2.5.4 A propane-fuelled engine shall be installed in a room that has a minimum 2 h fire separation from the remainder of the building, and the room shall have a fire door having a 1.5 h fire protection rating on every opening that communicates with other sections of the building. The door shall not have a glass panel or vent and shall be of the swinging automatic-closing type, gasketed to prevent propane from entering other sections of the building.

7.2.5.5 Exhaust gases shall be discharged from the building to the outdoors in a manner that will not create a fire or any other hazard.

7.2.5.6 An engine exhaust pipe shall not discharge into
(a) a gas vent;
(b) a chimney having a temperature rating less than the maximum temperature of the exhaust gas; and
(c) a chimney that serves another appliance.
7.2.5.7
A regulator and relief valve installed in a propane supply system in a building or room containing a propane-fuelled engine shall relieve to the outdoors, and the discharge shall terminate not less than
(a) 5 ft (2 m) from any opening in a building; and
(b) 10 ft (3 m) from any air-handling direct-vent appliance or source of ignition.

The venting of combination regulating and vaporizing equipment shall not be required where a solenoid valve is installed upstream of this equipment.

7.2.5.8
Two solenoid valves installed in series and wired in parallel shall be installed immediately upstream of the flexible hose connector required in Clause 7.2.5.9. They shall be controlled by a vacuum switch, oil pressure switch, or an equivalent device to prevent the flow of propane to the carburetor when the ignition is off or the engine is not running.

7.2.5.9
A flexible hose connector not exceeding 3 ft (1 m) in length shall be installed at the engine end of the propane piping to eliminate the possibility of damage.

7.2.5.10
An engine exhaust pipe passing through a combustible roof shall be insulated at the point of passage by a single ventilated metal thimble that shall extend not less than 9 in (225 mm) above and 9 in (225 mm) below the roof construction and that is 12 in (300 mm) larger in diameter than the pipe. A double ventilated metal thimble may be used if the thimble is at least 6 in (150 mm) larger in diameter than the exhaust pipe.

7.2.5.11
An exhaust pipe passing directly through a combustible wall or partition shall be guarded at the point of passage by either
(a) a metal ventilated thimble, not less than 12 in (300 mm) larger in diameter than the exhaust pipe; or
(b) a metal or burned fire clay thimble built into either the brickwork or another noncombustible material. The brickwork or other noncombustible material shall provide not less than 8 in (200 mm) of insulation between the thimble and the combustible material.

7.2.5.12
An engine exhaust pipe shall not be installed in a floor, ceiling, attic, or concealed space but may pass through such a space, provided that it is installed inside a chimney that does not serve any other type of appliance and meets the requirements of Clause 8.12.1.

7.3 Carbon dioxide generators

7.3.1
A generator used in a greenhouse shall be certified for the application.

7.3.2
A generator used in a produce storage area shall take its combustion air from outside the storage area.

7.3.3
A generator installed for the production of carbon dioxide in a greenhouse may take its combustion air from inside the greenhouse when the rate of combustion does not exceed 20 Btuh/ft³ (0.2 kW/m³) of greenhouse volume, the concentration of carbon dioxide does not exceed 5000 parts per million (ppm), and the concentration of carbon monoxide in the atmosphere does not exceed 35 ppm. The concentration of carbon dioxide and carbon monoxide shall be verified upon initial start-up.
7.4 Commercial-type clothes dryers

7.4.1
A dryer used in a laundromat-type of installation shall be installed such that access to the top of the dryer is screened or otherwise protected to prevent any material coming into contact with the hot surface.

7.4.2
Except where permitted by Clause 4.13.2, a dryer shall have the following minimum clearances from combustible material:
(a) above — 18 in (450 mm);
(b) front — 18 in (450 mm); and
(c) back and sides — 18 in (450 mm).

7.4.3
A certified flexible foil noncombustible-type duct may be used as a transition connection between the dryer exhaust and a rigid moisture duct.

7.4.4
A dryer shall be connected to a metal moisture-exhaust duct that terminates outdoors not less than 3 ft (1 m) from any pressure regulator vent termination and not less than 10 ft (3 m) from a fresh-air intake.

7.4.5
A moisture-exhaust duct shall not be secured with screws and shall not be connected into any vent connector, vent, or chimney.

7.4.6
Provision shall be made for make-up air to the area where the dryer is installed.

7.4.7
A moisture-exhaust duct shall have a clearance of at least 6 in (150 mm) to combustible material but may be installed with a reduced clearance, provided that the combustible material is protected as specified in Table 4.1.

7.5 Domestic-type clothes dryers

7.5.1
A dryer shall be equipped with a moisture-exhaust duct that terminates outside the building, and the duct shall be constructed of a material that is
(a) noncombustible; or
(b) certified as meeting the requirements for Class 1 air ducts contained in CAN/ULC-S110.

7.5.2
A moisture-exhaust duct shall not terminate within 3 ft (1 m) in any direction of any pressure regulator vent termination or fresh-air intake.

7.5.3
A moisture-exhaust duct shall not be secured with screws and shall not be connected into any vent connector, vent, or chimney.
7.5.4
Except where permitted by Clause 4.13.2, a dryer shall have the following minimum clearances from combustible material:
(a) above — 6 in (150 mm);
(b) front — 24 in (600 mm); and
(c) back and sides — 6 in (150 mm).

7.6 Conversions

7.6.1
The minimum clearances from combustible material for a boiler or a furnace converted to gas shall be
(a) for a boiler, as specified in Clause 7.1.3;
(b) for a forced-air furnace,
   (i) from top (casing, bonnet, or plenum) — 1 in (25 mm);
   (ii) the jacket sides and rear — 6 in (150 mm); and
   (iii) front — 24 in (600 mm); and
(c) for a gravity furnace,
   (i) vertical — 6 in (150 mm);
   (ii) sides and rear — 6 in (150 mm); and
   (iii) front — 24 in (600 mm), except as specified in Clause 4.13.2.

7.6.2
An appliance to be converted shall be thoroughly cleaned, leak tested, and examined for serviceability. Any unserviceable parts shall be repaired or replaced.

7.6.3
When an existing vented appliance is to be converted from a solid or liquid fuel, the chimney shall be examined and shall meet the requirements of Clauses 8.12.2 to 8.12.11.
7.25.6
A swimming pool heater of the finned-tube type shall be installed outdoors or in an enclosure that is not normally occupied and does not directly communicate with occupied areas.

7.25.7
With prior approval of the authority having jurisdiction, when an existing indoor swimming pool heater is being replaced with a gas-fired swimming pool heater of the finned-tube type and it is neither possible nor practicable to comply with Clause 7.25.6, a gas-fired swimming pool heater of the finned-tube type may be installed indoors in the same location as the heater that is being replaced, provided that
(a) there is compliance with Clauses 7.25.1 and 7.25.2;
(b) any door directly communicating with an area that is normally occupied is equipped with self-closing hardware; and
(c) combustion air is supplied from the outdoors to the space in which the heater is located in accordance with Clauses 8.2.4 and 8.3 or, if applicable, with Clause 8.4.

7.25.8
Where a heater is installed in accordance with Clause 7.25.7, it shall be the responsibility of the owner of the heater to provide maintenance for the heater in accordance with the manufacturer's instructions, but in no case less than once annually.

7.25.9
An outdoor swimming pool heater shall be installed so that the flue discharge is in accordance with Clause 8.14.10.

7.26 Water heaters

7.26.1
A water heater, unless of the direct-vent type, shall not be installed in a bathroom, bedroom, or any enclosure where sleeping accommodation is provided.

7.26.2
The temperature and pressure relief device on a tank type water heater or the pressure relief device provided for an instantaneous (tankless) water heater shall have a discharge pipe of a size at least equal to the nominal size of the device outlet. The discharge pipe shall terminate not more than 12 in (300 mm) above the floor.

7.26.3
An instantaneous-type (tankless) water heater, unless certified for installation on a combustible wall, shall be provided with appropriate protection as specified in Table 4.1. Such protection shall extend the full length and width of the heater and its draft hood.

7.26.4
Except where permitted by Clause 4.13.2, the minimum clearance from combustible material for an underfired storage-type water heater shall be 2 in (50 mm), and the minimum clearance for any other type of water heater shall be 6 in (150 mm). See also Clause 4.14.2.

7.26.5
A direct-vent water heater shall have a minimum access clearance of 3 ft (900 mm) on the burner side.
7.26.6
Before installing an instantaneous-type (tankless) water heater, the installer shall ensure that there is sufficient water supply for proper operation of the heater.

7.26.7
Except for direct vent water heaters, when the water heater is used in a combo heating system, return-air inlets shall not be installed in an enclosure that contains the air handling unit and the water heater and provides combustion air to the water heater.

7.26.8
When the return air duct(s) of an air handling unit in a combo heating system is installed in an enclosure in which any spillage-susceptible appliances are located, it shall be sealed to the air handling unit casing, and joints in the ducting shall be sealed to prevent infiltration of air from the enclosure into the return-air ducting.

7.27 Unit heaters

7.27.1
A suspended unit heater shall be firmly supported with metal hangers or brackets.

7.27.2
The location of either a suspended unit heater or duct attached thereto shall be such that a negative pressure will not be created in the room in which the unit heater is located.

7.27.3
When installed in a garage, a minimum clearance of 8 ft (2.4 m) shall be maintained between the base of the heater and the garage floor. The minimum clearance may be reduced when a substantial guard is provided to prevent vehicles from striking the heater. See also Clause 4.16.

7.27.4
Except where permitted by Clause 4.13.2, all clearances from combustible material shall be a minimum of 18 in (450 mm). See also Clause 4.14.2.

7.28 Hotplates

7.28.1
A hotplate shall be connected with rigid piping and secured to prevent movement.

7.28.2
A hotplate shall not be installed in a bedroom but may be installed in a bed-sitting room, provided that it is not required to be used for space-heating purposes.

7.28.3
Except where permitted by Clause 4.13.2, a hotplate shall have the following minimum clearances from combustible material:
(a) above — 30 in (750 mm);
(b) front — 6 in (150 mm); and
(c) back and sides — 6 in (150 mm).
7.29 Incinerators

7.29.1 An incinerator shall be installed as close as practicable to a chimney.

7.29.2 An incinerator of the wall type shall be installed in a noncombustible wall that communicates directly with a chimney flue.

7.29.3 An incinerator shall not be equipped with a draft hood. When draft control is required, a draft regulator of the single-acting type shall be used.

7.29.4 A vent connector shall be directly connected to a chimney through a separate thimble.
8.2.2
Except as permitted in Clause 8.2.3, the free area of the outdoor air supply required by Clause 8.2.1 shall be determined from Table 8.1 for an appliance having a draft-control device and from Table 8.2 for an appliance not having a draft-control device, using the total input of all appliances in the structure or enclosure. If an appliance with a draft-control device and an appliance without a draft-control device are installed within the same structure or enclosure, the required free area of the air-supply opening shall be the greater of
(a) that required by Table 8.1, using the total input of only those appliances having draft-control devices; or
(b) that required by Table 8.2, using the total input of all appliances.

8.2.3
An outdoor air supply shall not be required for a single water heater with an input of 50 000 Btuh (15 kW) or less within an enclosure or structure where there are no other appliances that require an air supply. Except for direct vent water heaters, when the water heater is contained in an enclosure, permanent openings shall be provided as described in Clause 8.2.5.

8.2.4
An outdoor air supply sized in accordance with Clause 8.2.5 shall be provided for an enclosure or a structure in which an appliance is installed when the enclosure or structure is neither constructed as described in Clause 8.2.1(a) nor complies with Clause 8.2.1(b).

8.2.5
The free area of the outdoor air supply required by Clause 8.2.4 shall be determined from Table 8.3 for an appliance having a draft-control device and Table 8.4 for an appliance not having a draft-control device, using the total input of all appliances in the structure or enclosure. If an appliance with a draft-control device and an appliance without a draft-control device are installed within the same structure or enclosure, the required free area of the air supply opening shall be the greater of
(a) that required by Table 8.3, using the total input of only those appliances having draft-control devices; or
(b) that required by Table 8.4, using the total input of all appliances.
Table 8.1

Combustion/dilution air requirements for appliances having draft-control devices when the combined input is up to and including 400 000 Btuh (120 kW) and the structure complies with Clause 8.2.1(a) or (b)

(See Clauses 8.1.5, 8.2.2, and 8.2.1.2 and Tables 8.3 and 8.4.)

<table>
<thead>
<tr>
<th>Total input of appliances*, thousands of Btuh (kW)</th>
<th>Required free area of air-supply opening or duct, in² (mm²)</th>
<th>Acceptable approximate round duct equivalent† diameter, in (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 (8)</td>
<td>7 (4 500)</td>
<td>3 (75)</td>
</tr>
<tr>
<td>50 (15)</td>
<td>7 (4 500)</td>
<td>3 (75)</td>
</tr>
<tr>
<td>75 (23)</td>
<td>11 (7 000)</td>
<td>4 (100)</td>
</tr>
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<td>100 (30)</td>
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<td>18 (12 000)</td>
<td>5 (125)</td>
</tr>
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<td>150 (45)</td>
<td>22 (14 000)</td>
<td>5 (125)</td>
</tr>
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<td>175 (53)</td>
<td>25 (16 000)</td>
<td>6 (150)</td>
</tr>
<tr>
<td>200 (60)</td>
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<td>225 (68)</td>
<td>32 (21 000)</td>
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<td>7 (175)</td>
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<td>275 (83)</td>
<td>40 (26 000)</td>
<td>7 (175)</td>
</tr>
<tr>
<td>300 (90)</td>
<td>43 (28 000)</td>
<td>7 (175)</td>
</tr>
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<td>325 (98)</td>
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<td>350 (105)</td>
<td>50 (32 000)</td>
<td>8 (200)</td>
</tr>
<tr>
<td>375 (113)</td>
<td>54 (35 000)</td>
<td>8 (200)</td>
</tr>
<tr>
<td>400 (120)</td>
<td>58 (37 000)</td>
<td>9 (225)</td>
</tr>
</tbody>
</table>

*For total inputs falling between listed figures, use next largest listed input.
†These figures are based on a maximum equivalent duct length of 20 ft (6 m). For equivalent duct lengths in excess of 20 ft (6 m) up to and including a maximum of 50 ft (15 m), increase round duct diameter by one size.
8.4 Air-supply requirements for appliances having a total input exceeding 400 000 Btuh (120 kW) (See Clause 8.1.4)

8.4.1 Ventilation of the space occupied by an appliance or equipment shall be provided by an opening for ventilation air at the highest practicable point communicating with outdoors. The total cross-sectional area of such an opening shall be at least 10% of the area required in Clauses 8.4.2 and 8.4.3, but in no case shall the cross-sectional area be less than 10 in² (6500 mm²).

8.4.2 When the air supply is provided by natural airflow from the outdoors for natural-draft, partial fan-assisted, fan-assisted, or power draft-assisted burners, there shall be a permanent air-supply opening having a cross-sectional area of not less than 1 in²/7000 Btuh (310 mm²/kW) up to and including 1 000 000 Btuh, plus 1 in²/14 000 Btuh (155 mm²/kW) in excess of 1 000 000 Btuh. This opening shall be either located at or ducted to a point not more than 18 in (450 mm) or less than 6 in (150 mm) above the floor level. This air-supply opening requirement shall be in addition to the opening for ventilation air required in Clause 8.4.1. See also Clauses 4.1.3 and 4.1.4.

8.4.3 When air supply is provided by natural airflow from outdoors for a power burner, in addition to the opening for ventilation air required in Clause 8.4.1, there shall be a permanent air-supply opening(s) having a total cross-sectional area of not less than 1 in² for each 30 000 Btuh (70 mm² for each kW) of the total rated input of the power burner(s). The location of the opening(s) shall not interfere with the intended purpose of the opening(s) for the ventilation air referred to in Clause 8.4.1. See also Clauses 4.1.3 and 4.1.4.

8.4.4 When air is provided by natural airflow from outdoors into a location containing both types of equipment described in Clauses 8.4.2 and 8.4.3, the cross-sectional area of the opening shall not be less than the total required cross-sectional area for both types of equipment when calculated in accordance with either Clause 8.4.2 or 8.4.3, as applicable. This air-supply opening requirement shall be in addition to the opening for ventilation air required in Clause 8.4.1. See also Clauses 4.1.3 and 4.1.4.

8.4.5 When an air-supply duct is used to meet the requirements of either Clause 8.4.2 or 8.4.3, its discharge opening shall be located where there is no possibility of cold air affecting steam or water pipes and electrical or mechanical equipment.

8.5 Air-supply dampers, louvres, and grilles

8.5.1 The free area of an air-supply opening required in Clauses 8.2 and 8.3 shall be calculated by subtracting the blockage area of all fixed louvres, grilles, or screens from the gross area of the opening.

8.5.2 Apertures in a fixed louvre, grille, or screen shall have no dimension smaller than 0.25 in (6 mm).

8.5.3 Neither a manually operated damper nor manually adjustable louvres shall be used.
8.5.4
An automatically operated damper or automatically adjustable louvre shall be interlocked so that the main burner cannot operate unless either the damper or louvre is in the fully open position.

8.5.5
An automatic combustion air damper installed in the air supply within a dwelling unit shall be certified.

8.6 Conditions created by exhaust fans, air-supply fans, circulating fans, or fireplaces
When it is determined that the operation of another appliance or other equipment, including an exhaust fan, air-supply fan, or circulating fan, adversely affects the venting, combustion, or burning characteristics of a gas appliance, either the condition shall be corrected or the fuel supply to the affected appliance shall be discontinued.

8.7 Engineered installations
Subject to the approval of the authority having jurisdiction, outdoor air-supply provisions other than those described in Clauses 8.2 and 8.3 may be used if designed in accordance with good engineering practice.

8.8 Air supply by mechanical means

8.8.1
When the air supply is provided by mechanical means, an airflow-sensing device shall be installed. It shall be wired into the safety limit circuit of the primary safety control to shut off the gas in the event of air-supply failure. When an appliance is not equipped with a combustion safety control, the restoration of the gas supply shall be by a manual-reset device.

8.8.2
When all the air supply is provided by a make-up air heater and the appliance is interlocked with the heater, the requirements of Clauses 8.1 to 8.6 shall not apply.

8.9 Appliance venting

8.9.1
Every appliance shall be connected to either an effective chimney or a vent, except
(a) for a radiant heater installed in a masonry fireplace with a permanently opened flue;
(b) for an appliance that is approved for use without a vent;
(c) for an appliance installed in accordance with Clause 8.24.5 in a building (other than a residential or care or detention occupancy building) where adequate ventilation is provided by an exhaust fan, by a natural-draft ventilator, or by other means acceptable to the authority having jurisdiction;
(d) for an appliance installed for the production of carbon dioxide in a greenhouse where the rate of combustion does not exceed 3 Btuh/ft³ (30 W/m³) of greenhouse volume and the concentration of carbon dioxide in the atmosphere does not exceed 5000 ppm (0.5%); and
(e) as provided in Clauses 8.14.12, 8.24, and 8.30.

8.9.2
Except for a direct-vent appliance, an appliance requiring venting shall be located as close as practicable to either a chimney or vent.
8.9.3
A venting system shall be firmly attached to either a draft-hood outlet or flue collar by sheet metal screws or mechanical fasteners, or in accordance with the manufacturer’s certified installation instructions. Note: A moisture-exhaust duct from a clothes dryer is not considered to be a connector. See Clauses 7.4 and 7.5.

8.9.4
A venting system shall be securely supported by noncombustible hangers suitable for the weight and design of the materials employed. A slip joint in the horizontal section of a venting system shall be secured either with sheet metal screws or in accordance with the manufacturer’s certified installation instructions to prevent sagging.

8.9.5
Venting systems that employ plastic vents shall be installed such that the first 3 ft (900 mm), or total vent run if less than 3 ft (900 mm) from the appliance flue outlet, is readily accessible for visual inspection.

8.9.6
Vents constructed using plastic piping shall be certified to ULC S636.

8.10 Methods of venting appliances

8.10.1
A vent or chimney shall provide effective venting and shall be designed and constructed to remove all flue gases to the outdoors.

8.10.2
A chimney suitable to the application shall be used for venting the following appliances:

(a) an incinerator, except as provided in Clause 8.10.11;
(b) an appliance that may be readily converted to the use of solid or liquid fuels;
(c) a combination gas- and oil-burning appliance; and
(d) an appliance approved for use with a chimney only.

8.10.3
The type of venting system to be used shall be in accordance with Table 8.5.

8.10.4
A special venting system or a BH venting system shall be installed in accordance with the terms of its listing and the appliance and vent manufacturer’s certified installation instructions.

8.10.5
When used on an appliance having a special venting system, a draft-control device shall be located in a position where positive vent pressures will not occur.

8.10.6
An appliance that operates at a positive vent pressure shall not be connected to a venting system serving any other appliance.

8.10.7
A Type B vent shall only be used with an appliance that is

(a) certified with a draft hood; or
(b) certified and marked for use with a Type B vent.
Table 8.5
Type of venting system to be used
(See Clause 8.10.3.)

<table>
<thead>
<tr>
<th>Gas utilization appliance</th>
<th>Type of venting system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Category I appliance</td>
<td>Type B gas vent*</td>
</tr>
<tr>
<td>Listed equipment with draft hood</td>
<td>Chimney, special venting system*</td>
</tr>
<tr>
<td>Equipment listed for use with Type B gas vent</td>
<td>Listed chimney lining system for gas venting, Type BH or special venting system listed for this appliance*</td>
</tr>
<tr>
<td>Listed vented wall furnace</td>
<td>Type BW gas vent (Clauses 7.17.3, 8.10.8, 8.11) if designed for use with a BW vent</td>
</tr>
<tr>
<td>Category II appliance</td>
<td>Type BH vent or special venting system or as specified or furnished by manufacturer of the listed appliance (Clause 8.10.4)</td>
</tr>
<tr>
<td>Category III appliance</td>
<td>Type BH vent or special venting system or as specified or furnished by manufacturer of the listed appliance (Clause 8.10.4)</td>
</tr>
<tr>
<td>Category IV appliance</td>
<td>Type BH vent or special venting system or as specified or furnished by manufacturer of the listed appliance (Clause 8.10.4)</td>
</tr>
<tr>
<td>Incinerators, indoors</td>
<td>Chimney (Clauses 8.18.2, 8.18.12)</td>
</tr>
<tr>
<td>Incinerators, outdoors</td>
<td>Single-wall metal pipe (Clauses 8.10.11, 8.18.2, 8.18.12)</td>
</tr>
<tr>
<td>Appliance that may be converted to use of solid fuel</td>
<td>1202°F (650 °C) chimney (Clauses 8.12.3, 8.12.6)</td>
</tr>
<tr>
<td>Listed combination gas- and oil-burning appliance</td>
<td>Type L vent or chimney (Clauses 8.10.2, 8.12.4)</td>
</tr>
<tr>
<td>Combination gas- and solid-fuel-burning appliance</td>
<td>1202°F (650 °C) chimney (Clauses 8.10.2, 8.12.2)</td>
</tr>
<tr>
<td>Appliance listed for use with chimneys only</td>
<td>Chimney (Clause 8.12)</td>
</tr>
<tr>
<td>Decorative appliance in vented fireplace</td>
<td>Chimney (Clauses 7.23.3 to 7.23.5)</td>
</tr>
<tr>
<td>Direct-vent appliance</td>
<td>See Clause 8.10.4</td>
</tr>
<tr>
<td>Appliance with integral vent</td>
<td>See Clause 8.10.4</td>
</tr>
<tr>
<td>Appliance in commercial and industrial installations</td>
<td>Chimney, ventilating hood, and exhaust system (Clause 8.30)</td>
</tr>
</tbody>
</table>

*See Clause 8.

8.10.8
A Type BW vent shall only be used with a recessed wall furnace.

8.10.9
Except as specified in Clause 8.10.10, a Type L vent shall only be used with an appliance certified for use with Type L vents.

8.10.10
A Type L vent may be used in lieu of a Type B vent.
8.14.8
A vent shall not terminate
(a) directly above a paved sidewalk or paved driveway that is located between two single-family dwellings and serves both dwellings;
(b) less than 7 ft (2.1 m) above a paved sidewalk or a paved driveway that is located on public property;
(c) within 6 ft (1.8 m) of a mechanical air-supply inlet to any building;
(d) above a meter and regulator assembly within 3 ft (900 mm) horizontally of the vertical centreline of the regulator vent outlet to a maximum vertical distance of 15 ft (4.5 m);
(e) within 3 ft (900 mm) of any gas pressure regulator vent outlet;
(f) less than 1 ft (300 mm) above grade level;
(g) within the following distances of a window or door that can be opened in any building, of any nonmechanical air-supply inlet to any building, or of the combustion air inlet of any other appliance:
   (i) 6 in (150 mm) for inputs up to and including 10 000 Btuh (3 kW);
   (ii) 12 in (300 mm) for inputs from 10 000 Btuh (3 kW) up to and including 100 000 Btuh (30 kW); and
   (iii) 3 ft (900 mm) for inputs exceeding 100 000 Btuh (30 kW); and
(h) underneath a veranda, porch, or deck unless
   (i) the veranda, porch, or deck is fully open on a minimum of two sides beneath the floor; and
   (ii) the distance between the top of the vent termination and the underside of the veranda, porch, or deck is greater than 1 ft (300 mm).

8.14.9
When more than one direct-vent appliance of the same make and model are installed, the clearances between the air-intake and exhaust vent terminals may be reduced from the clearances required by this Code, provided that they have been tested and certified for such reduced clearances. The manufacturer’s certified installation instructions shall specify and illustrate the reduced clearances.

8.14.10
The flue gas discharge opening for an outdoor swimming pool heater shall terminate not less than 10 ft (3 m) from any building opening.

8.14.11
A terminus of a vent shall be fitted with a cap either in accordance with the vent manufacturer’s installation instructions or in accordance with the installation instructions for a special venting system.

8.14.12
A vent from an appliance shall not extend through an exterior wall and terminate adjacent to the exterior wall unless
(a) the appliance is a direct-vent appliance;
(b) the appliance is intended for connection to a special venting system;
(c) the appliance and its complete vent assembly are specifically certified to be installed in this manner;
(d) the venting system is equipped with a certified power venter that complies with Clause 8.29.2; or
(e) the venting system is equipped with a certified power venter that complies with Clause 8.24.2.

8.14.13
The vent from one or more gas-fired appliances may be installed vertically inside a dormant masonry flue, a dormant certified chimney, or a dormant vent, provided that
(a) each appliance is equipped with its own individual vent installed in accordance with the requirements of Clauses 8.12 to 8.14, as applicable; and
(b) spacers are installed to maintain a minimum clearance of 1 in (25 mm) between an active vent and a combustible vent.
8.15 Vent and chimney support

8.15.1 A vent or chimney shall be adequately supported independent of the appliance being served.

8.15.2 A vent or factory-built chimney shall be installed in accordance with the manufacturer’s instructions.

8.15.3 A vent may be directly connected to the flue outlet or draft-hood outlet of the appliance that it serves, provided that the vent is independently supported and the connection is made in accordance with the manufacturer’s certified instructions.

8.15.4 When the vent referred to in Clause 8.15.3 is of double-wall construction, the connection shall be made by the use of a certified double-wall to single-wall adapter, and by
(a) an adjustable telescopic-type fitting, fabricated by the vent manufacturer; or
(b) a single-wall vent connector having a maximum length not exceeding 18 in (450 mm) and a minimum length not less than 12 in (300 mm).

8.15.5 When a single-wall vent connector connects an appliance to a Type B vent
(a) the base fitting shall be accessible for inspection;
(b) the connection shall be by means of a certified double-wall to single-wall adapter; and
(c) the clearance from combustibles as specified in Table 8.6 shall be maintained.

8.16 Vents and chimneys serving two or more appliances

8.16.1 When two or more vent connectors enter either a common vent or common chimney, they shall not enter at the same horizontal plane. The smallest vent connector shall enter at the highest level consistent with the available headroom and clearance from combustible material, except that a vent connector from an incinerator shall be installed at the lowest level. When the vent connectors are of the same diameter, the vent connector serving the appliance with the lowest BTU input shall be connected at the highest level.

8.16.2 When two or more appliances are vented through a common vent connector, the common vent connector shall be located at the highest level consistent with the available headroom and clearance from combustible material.

8.17 Vents outside buildings

8.17.1 When the installation of a vent used in a natural-draft venting system is impracticable inside a building, it may be done outdoors, provided that the vent is
(a) certified for outside installation;
(b) installed in accordance with the manufacturer’s certified installation instructions; and
(c) adequately insulated.

8.17.2 The portion of an indoor-installed Type B or Type L vent that extends above the roof line shall be certified for exterior use, and each length shall be so identified.
(b) have combustion air supplied to the enclosure by means of grilles or ducts that communicate directly with the outdoors, are sized in accordance with the requirements of Table 8.1 or 8.2, and are installed in accordance with Clause 8.3. (See Figure C.13 of Annex C for a practical method of meeting this requirement.) Combustion air shall not be taken from inhabited or occupied spaces within the building.

8.21.3
The requirements of Clause 8.21.2 shall not apply if all appliances served by a common venting system are located within one dwelling unit.

8.21.4
When a forced-air furnace is installed in an enclosure in accordance with Clause 8.21.2, no opening shall be located in the furnace return-air system within the enclosure, and means shall be provided on the return-air system to prevent the infiltration of air from inside the enclosure.

8.21.5
When a common gas vent is used in accordance with Clause 8.21.1, the common gas vent shall be
(a) of a Type B or Type L vent;
(b) sized in accordance with the requirements indicated in Tables C.3 and C.4 and illustrated in Figures C.11 and C.12 of Annex C; and
(c) installed in accordance with the manufacturer’s certified installation instructions.

8.21.6
With approval of the authority having jurisdiction, a common chimney is permissible in multi-storey installations to vent appliances replacing existing appliances, if
(a) new appliances are of the same size (input capacity with similar efficiency range) and venting type (fan-assisted or natural draft) as the original;
(b) the venting system does not include significant changes; and
(c) the venting system provides effective venting and shows no signs of condensation or deterioration.
Evidence shall be provided to authenticate the characteristics of the replaced appliance to the authority having jurisdiction.

8.22 Dampers and attachments
A device or attachment that might in any way impair either the combustion or safe venting of the combustion products shall be prohibited.

8.23 Draft hoods

8.23.1
Except for an incinerator, a dual oven-type combination range, and a direct-vent appliance, an appliance requiring zero over-fire draft for operation shall be installed with a draft hood.

8.23.2
A draft hood shall not be used on an appliance with either positive over-fire draft or an induced draft.

8.23.3
A draft hood either supplied with or forming part of an appliance shall be installed without alteration.

8.23.4
When a draft hood is required and it is not supplied by the appliance manufacturer, it shall be supplied by the installer and it shall be of an approved design. See Annex F.
8.23.5  
The **draft-hood** outlet shall be of the same size as the **appliance flue collar** unless otherwise sized in the **appliance** manufacturer’s installation instructions.

8.23.6  
A **draft hood** shall be in the same room as the **combustion air** opening of the **appliance**. A **draft hood** shall not be installed in a **false ceiling space**, in a room other than the one the **appliance** serves, or in any manner that could permit a difference in pressure between the **draft-hood** relief opening and the **combustion air supply**. The **draft hood** supplied for a conversion **burner** shall be located so that the **burner** is capable of safe and efficient operation.

8.23.7  
A **draft hood** shall be installed in the position for which it was designed with reference to the horizontal and vertical planes, and shall be located so that the relief opening is not obstructed by any part of the **appliance** or adjacent construction. The **appliance** and its draft hood shall be located so that the relief opening is accessible for checking vent operation.

8.23.8  
A **draft regulator** shall not be used as a substitute for a **draft hood**.

8.24 Venting arrangements

8.24.1  
The requirements for a **draft-control device** in Clauses 8.8 to 8.24 shall not apply either to a **direct-vent appliance** or to an **appliance** requiring a **special venting system**.

8.24.2  
A **power venter** may be used in place of a **natural-draft vent**, provided that means are provided to prevent the flow of gas to the main **burner** in the event of failure of the **power venter**. Such a venter shall not be used in conjunction with an incinerator.

8.24.3  
A **vent connector** that serves an **appliance** designed for **natural-draft** venting shall not be connected to any portion of a **venting system** under positive pressure or serving an **appliance** requiring a **special venting system**.

8.24.4  
An exhaust hood or canopy for an **industrial appliance** may be used in place of a direct **flue** connection in certain cases, for instance, when the process itself requires fume disposal. The design of the **venting system** shall conform to the requirements of the **authority having jurisdiction**.

8.24.5  
When located in a large and adequately **ventilated** space, an **appliance** may be operated by discharging the **combustion products** directly into the space, subject to the approval of the **authority having jurisdiction** and provided that the maximum input of the **appliance** does not exceed 20 Btuh/ft\(^3\) (0.2 kW/m\(^3\)) of the space in which the **appliance** is located. An **appliance** designed to produce a controlled atmosphere need not be subject to these conditions.

8.24.6  
A **venting system** that serves one or more **appliances** shall provide adequate venting and shall be sized in accordance with **approved** engineering design.
8.25 Draft regulators
A draft regulator, when used, shall be located so that the relief opening is not obstructed by any part of the appliance or adjacent construction. When used with an incinerator, a draft regulator shall be of the single-acting type. In all other installations, it shall be of the double-acting type.
### Table C.8 (Concluded)

<table>
<thead>
<tr>
<th>Total vent height, H, ft</th>
<th>Combined appliance input rating, thousands of Btuh</th>
<th>Chimney Diameter, D, in</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>+FAN +NAT* (F+N)</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>+FAN +NAT* (F+N)</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>+FAN +NAT* (F+N)</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>+FAN +NAT* (F+N)</td>
<td>12</td>
</tr>
</tbody>
</table>

Note: See Clause 8.12.8.

*FAN = fan assisted appliance
*NAT = natural draft appliance
†DP = depressurization
‡NR = not recommended

### Table C.9
**Single-wall vent connector total length limits for multiple appliance installations**

<table>
<thead>
<tr>
<th>Vent connector diameter, in</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum vent connector length, ft</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

**Notes:**

1. Double-wall vent connectors may exceed these values up to a limit of twice these specified values. However, when these values are exceeded using a Type B vent, the capacity shall be reduced by 10%.

2. For configurations wherein vent connectors are combined prior to entering the common vent, the vent connector length of a vent connector serving a single appliance shall be measured from the appliance draft hood outlet or flue collar to the point where the vent gases meet the vent gases from another appliance.
Annex D (informative)
Customer's meter and regulator installations

Notes:
(1) This informative Annex is written in normative language to facilitate adoption where users of the Code or regulatory authorities wish to adopt it formally as additional requirements to this Code.
(2) This Annex is an extract from Clause 12.4.10 of CAN/CSA-Z662-03.

12.4.10 Customers’ Meters and Service Regulators
Note: Meter location and installation requirements of Clause 12.4.10 apply to meters that are designed and tested to ANSI B109.1 or equivalent.

12.4.10.1
It shall be permissible to locate customers’ meters and service regulators either inside or outside buildings, dependent upon local conditions.

12.4.10.2
For service lines requiring series regulation in accordance with the requirements of Clause 12.4.8.1, Item b), the upstream regulator shall be located outside the building.

12.4.10.3
Where installed within buildings, customers’ meters and regulators shall be in readily accessible locations that afford reasonable protection from thermal stresses and sources of heat, mechanical stresses, and chemical deterioration. Service regulators shall be located near the piping entrance and, where practical, the meters shall be installed at the same locations. For service lines supplying large industrial customers and installations where gas is used at higher than standard service pressure, it shall be permissible to install the regulators at other readily accessible locations.

12.4.10.4
Where located outside buildings, meters and regulators shall be installed in readily accessible locations. Where outside meters and regulators are installed in locations that do not afford reasonable protection from damage, such protection shall be provided.

12.4.10.5
Regulators requiring vents for proper and effective operation, unless manufactured or equipped to limit the escape of gas from their vent opening, even in the event of diaphragm failure, to less than 0.0283 m³/h, shall be vented to the outside atmosphere and shall terminate in rain- and insect-resistant fittings.

12.4.10.6
Where regulator failure would result in the release of gas, open ends of the vents shall be located where the gas can escape freely into the atmosphere and away from any openings in the buildings. Clearances from building openings shall be commensurate with local conditions and the volume of gas that might be released, but shall not be less than those required by CSA B149.1. Where regulators might be submerged during floods, either a special anti-flood-type breather vent fitting shall be installed or the vent line shall be extended above the height of the expected flood waters.

12.4.10.7
Vaults and pits housing meters and regulators shall be designed and constructed to support the loads that may be imposed upon the meters and regulators.
12.4.10.8
Regulator and relief vent piping shall be
(a) capable of withstanding the maximum pressures as defined in Clause 12.4.7;
(b) included in the determination of the relief system capacity described in Clause 4.14.3.2;
(c) of metallic material where installed within buildings; and
(d) designed, fabricated, and installed to prevent static build-up and mechanical damage where plastic materials are used.