



**Summary of Substantive Changes
between the 2015 and 2020 editions of
CSA B149.1 “Natural Gas and Propane Installation Code”**

Presented to the IAPMO Standards Review Committee on June 15, 2020

General: The technical content was changed and there may be an impact on current listings. The substantive changes are:

- Revised scope exclusions, and excluded the use of propane as refrigerant (see Section 1.2)
- Added definitions for clarification (see Section 3)
- Revised requirements for electrical connections and components (see Sections 4.7.3, and 4.7.4)
- Revised requirements for high-altitude installations (see Section 4.22).
- Revised requirements for delivery pressure (see Section 5.1).
- Revised requirements for pressure regulators (see Section 5.2).
- Revised requirements for overpressure protection devices (see Section 5.3).
- Revised requirements for venting of pressure control devices and added requirements for venting exemptions for line pressure regulators (see Sections 5.5.2, 5.5.3, and 5.5.4).
- Added new Section 5.6 for termination of vents (see Section 5.6)
- Revised material requirements (see Sections 6.2.2, 6.2.3, and 6.2.5).
- Revised sizing requirements (see Sections 6.3.2 and 6.3.3).
- Added requirements for piping practices (see Section 6.8.10).
- Revised requirements for joints and connections (see Sections 6.9.1 and 6.9.4).
- Revised requirements for manual shut-off valves (see Section 6.18.1).
- Revised requirements for gas connectors (see Sections 6.21.8 and 6.21.9).
- Revised requirements for purging of gas piping systems after leak testing (see Section 6.23).
- Revised requirements for compressors/pressure boosters (see Section 7.2.2).
- Revised requirements for emergency generators (see Section 7.2.3).
- Revised requirements for non-motive engines and turbines (see Section 7.2.4).
- Revised requirements for additional requirements for gas engines and turbines in buildings (see Sections 7.2.5.1 and 7.2.5.3).
- Revised requirements for direct gas-fired process air heaters (DFPAH) (see Sections 7.22.6, 7.22.7, 7.22.8, 7.22.9, 7.22.11, 7.22.12, 7.22.13, 7.22.16, 7.22.17, and 7.22.18).
- Revised requirements for lighting (see Section 7.31.4).
- Added requirements for operation of appliances at shows, exhibitions, or other similar events (see Section 7.35).
- Revised requirements for air-supply requirements for appliances having a total input exceeding 400,000 Btu/h (120 kW) (see Sections 8.4.2, 8.4.3, and 8.4.4).
- Revised requirements for air-supply dampers, louvres, and grilles (see Sections 8.5.4 and 8.5.6).
- Revised requirements for cylinder storage (see Sections 9.4.3 and 9.4.4).
- Revised requirements for residential fueling appliances (RFAs) and vehicle fueling appliances (VFAs) used for natural gas without storage (see Sections 10.1.1, 10.1.2, and 10.1.3).
- Added new Annex J for acceptance criteria for visual inspection of welds.
- Added new Annex K for pressure regulators and overpressure protection devices.



- Added new Annex L for recommended requirements for automatic safety shut-off valves and automatic vent valves installed on gas turbines having capacities greater than 12.5 MMBtu/h (3.66 MW) and inlet pressures greater than 150 PSI.

Section 1, Scope: Revised scope exclusions, and excluded the use of propane as refrigerant as follows:

1.2

This Code does not apply to

- marine or pipeline terminals;*
- gas where used as a feedstock in petroleum refineries or chemical plants;*
- utility pipeline distribution and transmission pipelines;*
- storage and handling of liquefied natural gas or underground ~~reservoirs~~ formations for natural gas;*
- the installation of NGV fuel systems, containers, and refueling stations;*
- the storage and utilization of compressed natural gas on boats;*
- the installation of vehicle-refueling appliances when NGV storage containers are installed as part of the system;*
- refrigerated storage or underground ~~reservoirs~~ formations for propane;*
- propane used on boats;*
- propane used as a propellant in aerosol containers;*
- butane fuel cylinders of 6.2 oz (~~150~~ 175 g) capacity or less;*
- 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; and*
- propane used as refrigerant.*

Section 2, Reference publications: Reference standards were added, deleted or updated as follows:

CSA Group

Note: *CGA Standards, Recommended Practices, and Codes are now published by CSA Group.*

ANSI Z21.13-~~2014~~2017 • CSA 4.9-~~2014~~2017

Gas-fired low pressure steam and hot water boilers

ANSI Z21.21-~~2012~~2019 • CSA 6.5-~~2012~~2019

Automatic valves for gas appliances

ANSI Z21.24-~~2006~~2015 • CSA 6.10-~~2006~~2015

Connectors for gas appliances

ANSI Z21.50-~~2014~~2016 • CSA 2.22-~~2014~~2016

Vented gas fireplaces

~~CAN/CGA-8.1-M86(R2011)~~15

Elastomeric composite hose and hose couplings for conducting propane and natural gas

~~CAN1-8.3-77(R2011)~~15

Thermoplastic hose and hose couplings for conducting propane and natural gas

ANSI Z21.54-2014 • CSA 8.4-2014

Gas hose connectors for portable outdoor gas-fired appliances

ANSI Z21.69-~~2009~~2015 • CSA 6.16-~~2009~~ (~~R2014~~)2015

Connectors for moveable gas appliances



ANSI Z21.75-~~2007~~[2016](#) • CSA 6.27-~~2007~~[2016](#)
Connectors for outdoor gas appliances and manufactured homes

ANSI Z21.80-~~2011~~[2019](#) • CSA 6.22-~~2003 (R2011)~~[2019](#)
Line pressure regulators

ANSI Z21.90-~~2001~~[2015](#) • CSA 6.24-~~2001 (R2011)~~[2015](#)
Gas convenience outlets and optional enclosures

ANSI Z21.101-~~2012~~[2018](#) • CSA 8.5-~~2012~~[2018](#)
Gas hose connectors for portable and moveable gas appliances

ANSI Z83.4-~~2013~~[2017](#)/CSA 3.7-~~2013~~[2017](#)
Non-recirculating direct gas-fired ~~industrial air heaters~~ [heating and forced ventilation appliances for commercial and industrial application](#)

ANSI Z83.11-~~2006~~[2016](#)/CSA 1.8-~~2006 (R2011)~~[2016](#)
Gas food service equipment

ANSI Z83.25-~~2008~~[2017](#)/CSA 3.19-~~2008~~[2017](#)
Direct gas-fired process air heaters

[ANSI/CSA NGV 5.1-2016](#)
[Residential fueling appliances](#)

[ANSI/CSA NGV 5.2-2017](#)
[Vehicle fueling appliances](#)

ANSI/LC 1-~~2014~~[2018](#)/CSA 6.26-~~2014~~[2018](#)
Fuel gas piping systems using corrugated stainless steel tubing (CSST)

ANSI/LC-4-2012/CSA 6.32-2012 [\(R2017\)](#)
Press-connect metallic fittings for use in fuel gas distribution systems

CAN/[CSA](#) 1-3.7-1977 (R1986)
Direct gas-fired non-recirculating make-up air heaters (withdrawn)

CSA 2.17-~~M91 (R2009)~~[2017](#)
Gas-fired appliances for use at high altitudes

CSA 6.18-02 ~~(R2008)~~[\(R2017\)](#)
Service regulators for natural gas

~~CAN/CGA~~ [CSA](#) 8.1-M86 ~~(R2011)~~[\(R2016\)](#)
Elastomeric composite hose and hose couplings for conducting propane and natural gas

CAN1-8.3-77 [\(R2016\)](#)
Thermoplastic hose and hose couplings for conducting propane and natural gas

CSA/ANSI NGV 5.2-2017
Vehicle fueling appliances [\(VFA\)](#)

CGA Certification Laboratory Requirement LA8-009-1989 (revised 1994)
Flexible gas tubing for interior natural and propane gas piping systems

B51-~~14~~[19](#)
Boiler, pressure vessel, and pressure piping code

~~CAN/CSA~~ B108-~~14~~[18](#)
Natural gas [refuelling](#) stations installation code

B137 Series-~~13~~[17](#)
Thermoplastic pressure piping compendium:

B137.4-~~13~~[17](#)
Polyethylene (PE) piping systems for gas services

B137.4.1-~~13~~[17](#)



Electrofusion-type polyethylene (PE) fittings for gas services

B149.2-~~15~~[20](#)

Propane storage and handling code

B149.3-~~15~~[20](#)

Code for the field approval of fuel-related components on appliances and equipment

CAN/CSA-B365-~~10~~[17](#)

Installation code for solid-fuel-burning appliances and equipment

[B366.1-11 \(R2015\)](#)

[Solid-fuel-fired central heating appliances](#)

C22.1-~~15~~[18](#)

Canadian Electrical Code, Part I

[C282-15](#)

[Emergency Electrical Power Supply for Buildings](#)

[F300-13 \(R2018\)](#)

[Residential depressurization](#)

~~CAN/CSA~~ W117.2:~~12~~[19](#)

Safety in welding, cutting, and allied processes

Z240 MH Series-~~09 (R2014)~~[16](#)

Manufactured homes:

Z240.4.1-~~09~~[16](#)

Installation requirements for gas-burning appliances in manufactured homes

Z240 RV Series-~~08 (R2013)~~[14](#)

Recreational vehicles

Z240.4.2-~~08 (R2013)~~[14](#)

Installation requirements for propane appliances and equipment in recreational vehicles

Z662-~~15~~[19](#)

Oil and gas pipeline systems

[American Gas Association](#)

[Manual for Determination of Supercompressibility Factors for Natural Gas](#)

ASME International

B1.20.1-2013 [\(R2018\)](#)

Pipe Threads, General Purpose (Inch)



[B16 series of standards](#)

B16.3-~~2011~~2016

Malleable Iron Threaded Fittings: Classes 150 and 300

[B31.1-2016](#)

[Process Piping](#)

B36.10M-~~2004~~2018 (withdrawn)

Welded and Seamless Wrought Steel Pipe

ASTM International

A53/A53M-~~07~~18

Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A106/A106M-~~08~~18

Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service

A179/A179M-90a (~~2005~~) [\(R2012\)](#)

Standard Specification for Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes

B88-~~03~~16

Standard Specification for Seamless Copper Water Tube

B837-~~01~~18

Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems

CGA (Canadian Gas Association)

3.7-1976 (withdrawn)

Direct ~~gas-fired~~ **Non-Recirculating** make-up air heaters [\(DFMAH\)](#)

[CAN1-3.7-77 \(R1996\)](#)

[Direct-fired make-up air heaters \(DFMAH\)](#)

[CAN1-3.12-78 \(R1996\)](#)

[Direct Gas-Fired Door Air Heaters](#)

[CR96-001](#)

[Flexible Metallic Hose](#)

[Gas Processors Association](#)

[Engineering Data Book](#)

[Polyflo Computer Company](#)

[B.C. Shebeko, Polyflo Flow Computer, 1974](#)

UL (Underwriters Laboratories Inc.)

144-~~2014~~

LP-Gas Regulators

959-~~2006~~(R2014)

Medium Heat Appliance Factory-Built Chimneys

ULC (Underwriters' Laboratories of Canada)



ULC/ORD C536-98 [\(R2018\)](#)

Flexible Metallic Hose

CAN/ULC-S110-13 [\(R2018\)](#)

Standard Methods of Test for Air Ducts

CAN/ULC-S114:~~05~~ [R2018](#)

Standard Method of Test for Determination of Non-Combustibility in Building Materials

[CAN/ULC-S508:2018](#)

[Standard for the Rating and Fire Testing of Fire Extinguishers](#)

CAN/ULC-S604-~~M91~~:[2016](#)

Standard for Factory-Built Type A Chimneys

CAN/ULC-S605-~~M91~~:[2016](#)

Standard for Gas Vents

CAN/ULC-S609-~~M89~~:[2016](#)

Standard for Low Temperature Vents Type L [and PL](#)

CAN/ULC-S629-~~M87~~:[2016](#)

Standard for 650 °C Factory-Built Chimneys

~~S635-00~~:[2016](#)

Standard for Lining Systems for Existing Masonry or Factory-Built Chimneys and Vents

CAN/ULC-S642-~~07~~:[2016](#)

Standard for Compounds and Tapes for Threaded Pipe Joints

Other publication

[Crocker, S. Piping Handbook, 4th ed., McGraw-Hill, 1945.](#)

Section 3, Definitions: Definitions were added, deleted or updated for clarification as follows:

Accessory — a part capable of performing an independent function and contributing to the operation of the appliance [or gas piping system](#) that it serves.

Air supply (with respect to the installation of an appliance) — combustion air, ~~excess-air~~ flue gas dilution air, and ventilation air.

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~~**Primary air** — that portion of the combustion air that is supplied for the initial stages of the combustion process and is supplied upstream from the point of ignition.~~

~~**Secondary air** — that portion of the combustion air that is supplied for the intermediate and final stages of the combustion process and is supplied downstream from the point of ignition.~~

Appliance — a device to convert gas into energy [or compress gas for the purpose of fuelling](#); the term includes any component, control, wiring, piping, or tubing required to be part of the device.

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[Fuelling appliances](#) — see [Residential fuelling appliances and Vehicle fuelling appliances](#).

~~**Combustible liquid** — a liquid that has a flashpoint at or above 100°F (38 °C) and below 200°F (93 °C).~~

~~**Cylinder system** — an assembly that includes the cylinder base or bracket, cylinder, cylinder valve, manifold valve assembly, regulator, and relief valve, or any combination of these.~~

[Delivery pressure](#) — the outlet gas pressure from the service regulator for natural gas or a second stage propane regulator for propane.

[Design pressure](#) — the maximum inlet pressure a gas piping system or valve train is capable and intended to continuously sustain, contain, or control under normal conditions.



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

Fixed-liquid-level gauge (when referring to the liquid level in containers) — a type of liquid-level gauge that uses a small bleed valve and is designed to indicate when the liquid level in a container being filled reaches the point at which the gauge or its connecting tube communicates with the interior of the container.

Gas connector — a factory-fabricated assembly consisting of gas conduit and related fittings designed to convey gaseous fuel from a gas supply piping to the gas inlet of an appliance. A gas connector is not intended for vibration isolation, nor expansion or contraction control. For the purposes of this Code, solid gas connector includes

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e) gas hose connectors for outdoor portable gas-fired appliances that are certified to ANSI Z21.54/CSA 8.4 and are designed for use in unconcealed outdoor location where the gas pressure does not exceed 1/2 psi (3.45 kPa).

Gas piping system — all components that convey gas or liquids, such as piping, tubing, valves, hoses, and fittings, from the point of delivery to the inlet of the appliance.

~~**Heavy-duty fittings** — those fittings referred to as 300-lb (135 kg) banded fittings.~~

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.

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

~~**Package unit** — an appliance supplied as a complete unit, including burner, controls, and integral wiring.~~

Piping — components of a gas piping system that include fittings, rigid pipe, and flanges.

~~**Primary air** — see Air supply.~~

High pressure regulator — a line pressure regulator except with inlet gas pressures greater than 10 psig (70 kPa) and outlet pressures greater than 2 psig (14 kPa).

Line pressure regulator — a gas pressure regulator intended for installation in a building gas distribution system between the utility building service regulator or LP-gas 2 psi (13.8 kPa) propane service regulator and gas utilization equipment. For purposes of this Standard, a line pressure regulator is rated for an inlet gas pressure of 2, 5, or 10 psi (13.8, 34.5, or 68.9 kPa) and is designed as either Class I or Class II as follows:

Class I — maximum outlet pressure of 1/2 psi (3.5 kPa).

Class II — maximum outlet pressure of 2 psi (13.8 kPa).

Rated pressure — the maximum pressure that the materials, gas piping, devices, fuel train components, operating controls, or safety controls are designed to contain or control.

Residential fuelling appliance (RFA) — an appliance that dispenses natural gas for vehicles directly into the vehicle natural gas fuel storage system.



Safe location (for venting of gas) — a location that allows for the destruction or dispersal of vented gas so that it can reasonably be expected that the following will be prevented:

- a) blocking of the vent termination by snow, ice, water, or any other object or thing;
 - b) gas accumulating in or under a building or enclosure;
 - c) gas accumulating near a source of ignition, hot surface, electrical equipment, or operating control;
 - d) gas accumulating in an area where a person would likely have difficulty in quickly leaving the area;
- or
- e) in an industrial application, gas discharging directly toward a person, walkway, staircase, or ladder.

Note: In industrial applications, due consideration should be given to the pressure and constituents of the gas in order to ensure the vent location does not create a hazard.

~~**Secondary air** — see Air supply.~~

Second stage propane regulator — in a propane application, a pressure regulator at the service entrance intended to reduce first-stage pressure to control the gas pressure inside a building. This regulator is also sometimes known as a “2 psi liquefied propane regulator”.

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

Spray area — any fully enclosed, partly enclosed, or unenclosed area within a building in which spray processes are performed that could result in dangerous quantities of flammable or combustible vapours, mists, residues, dust, or deposits. Spray areas can include any area in the direct path of a spray operation process, a spray booth, a spray room, or a spray workstation.

Supply pressure — the gas pressure at the manual shut-off valve of an appliance or equipment.

Tubing — components of a gas piping system that include fittings, and flexible pipe, tube, CSST, and feedback lines.

Internal relief valve — an overpressure relief device 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 ~~are~~ is such that damage to the parts outside the tank will not prevent effective seating of the valve.

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

Valve train — ~~the combination of all gas-confining~~ valves, controls, ~~and~~ piping, fittings, hoses, and tubing of an appliance ~~upstream from the manifold through which gas is supplied to the appliance and by which gas is controlled~~ downstream of the manual shut-off valve to the inlet of the burner.

Vehicle fueling appliance (VFA) — an appliance that compresses natural gas for vehicles and dispenses directly into onboard vehicle storage or delivers to external natural gas storage systems.

~~**VRA** — vehicle refuelling appliance.~~



Section 4.7, Electrical connections and components: Revised requirements for electrical connections and components including adding CSST requirements as follows:

4.7.3

All interior metal gas piping ~~that may become energized~~ connected to a gas-fired appliance with an electrical connection shall be made electrically continuous and shall be bonded to the electrical system by a #6 copper or a #4 aluminum bonding conductor with the connection made accessible after the installation and in accordance with the requirements of the local electrical code or, in the absence of such, the Canadian Electrical Code, Part I, except where any of the following conditions are met:

- a) Gas piping and tubing shall be considered to be bonded to the electrical system when it is connected to an appliance connected to a bonding conductor of the circuit supplying the appliances.
- b) Bonding of piping other than CSST (requiring bonding per Clause 4.7.4) is not required where a gas appliance is not connected to an electrical circuit breaker supplying the appliances.

4.7.4

Unless otherwise certified to protect from the effects of lightning strikes, CSST systems or CSST contained within a piping system shall be bonded in accordance with the manufacturer's installation instructions and:

- a) a bonding conductor shall be
 - i) connected to each end of the CSST tubing; or
 - ii) connected to the inlet end of the CSST tubing with the other end of the bonding conductor connected to the appliance disconnect switch or the electrical distribution panel; and
- b) the bonding connection point at the CSST shall be to the rigid pipe or tubing connected to the CSST and not to the CSST itself.

Section 4.22, High-altitude installations: Revised requirements for high-altitude installations and included the option of manufacturer provided maximum elevation as follows:

4.22.2

When an appliance is installed at elevations above ~~4500 ft (1350 m), the certified high-altitude~~ the maximum elevation option provided by the manufacturer, the input rate shall be reduced following the manufacturer's certified instructions. If no instructions are given for configuring the appliance for higher altitudes, the input rating rate shall be reduced at the rate of 4% for each additional 1000 ft (300 m). The input rate shall be reduced from the rate indicated for the highest altitude option provided.

Section 5, Pressure controls: Revised requirements for delivery pressure and added requirements including pipe routing, and safety design requirements as follows:

5.1 Gas System Delivery pressure

5.1.1

Subject to Clause 5.1.2, the gas pressure in either a gas piping or tubing system, extending from the termination of the utility/distributor's installation inside a building, shall not be higher than that shown in Table 5.1 in normal operation.

5.1.2

Piping to central boiler or mechanical rooms at gas pressures that are greater than allowed for other building locations shall not pass anywhere inside the building other than the central boiler or mechanical room.



5.1.3

A gas piping system shall be designed so that the gas pressure shall not exceed the rated pressure of any accessory, equipment, or appliance, under normal operation and in the event of a failure of an upstream pressure regulator.

5.1.4

The delivery pressure and overpressure protection set-points, as supplied by the gas utility or fuel distributor, shall be considered in the design and installation of a gas piping system, including any modifications to an existing gas piping system.

~~5.1.25.1.5~~

In a residential application using propane, propane vapour pressure in ~~either~~ a gas piping ~~or tubing~~ system between the first-stage pressure regulator and second-stage propane regulator shall not be higher than 10 psig (70 kPa). In other applications using propane, means shall be provided to prevent liquefaction of propane.

~~5.1.35.1.6~~

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~~5.1.45.1.7~~

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Section 5.2, Pressure regulators: Revised requirements for pressure regulators and added requirements including pressure supply range, using overpressure protection devices, and requirements for line pressure regulators as follows:

5.2.1 General

5.2.1.1

Gas shall be supplied to an appliance, equipment, or accessory at a normal operating pressure that is within the pressure range specified on the appliance's, equipment's, or accessory's rating plate, or as indicated by the manufacturer's instructions.

Note: This requirement applies at maximum and minimum load demand on the gas piping system.

5.2.1.2

One or more pressure regulators in conjunction with any required overpressure protection devices shall be installed if required to meet Clause 5.2.1.1.

~~5.2.1.15.2.1.3~~

Every pressure regulator shall be ~~certified and be~~

- a) suitable for the gas;
- b) of sufficient size to provide the required flow of gas;
- c) factory set or field-adjusted to provide, under normal operating conditions, an outlet pressure required for the gas piping system at the extremes of inlet pressures to which the regulator can be exposed; and
- d) capable of supplying the gas pressure as required by Clause 5.2.1.1.

~~Recognized Standards for certifying regulators include~~

~~(a) ANSI Z21.80/CSA 6.22;~~

~~(b) UL 144; and~~

~~(c) CSA 6.18.~~

~~5.2.1.25.2.1.4~~

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.

~~5.2.1.35.2.1.5~~



A ~~line~~ pressure regulator shall not be bypassed.

~~5.2.1.4~~ **5.2.1.6**

~~When a 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 lock-up (positive shut-off) type.

~~5.2.1.5~~ **5.2.1.7**

A ~~line~~ pressure regulator shall have

- a) a manual shut-off valve installed upstream of the pressure regulator; and
- b) ~~either a line relief device or~~ an overpressure protection device in accordance with Clause 5.3.

Note: Refer to Annex 5. regarding certified line pressure regulators and overpressure protection devices.

~~5.2.1.5(b)~~ **5.2.1.8**

~~The~~ Except as permitted by Clause 5.5.4, a pressure regulator vent and any line relief ~~device~~ valve vent shall terminate outdoors.

Note: The word "vent" means either a vent for an internal relief valve or the breather vent on the regulator casing.

~~5.2.1.6~~ **5.2.1.9**

A pressure regulator provided in a gas supply line shall not be installed

- a) where it is inaccessible for repair, replacement, servicing, or inspection;
- b) in a concealed location; or
- c) where it could be reasonably expected to be subject to physical or chemical damage.

5.2.2 Additional requirements for delivery pressures ~~regulators for propane applications~~ of 2 psig (14 kPa) or less

~~5.2.2.1~~ **5.2.2.1**

~~A regulator shall be firmly secured to the container valve, or the regulator bracket on the wall or hood, or shall be secured 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.~~

5.2.2.1

The requirements of Clause 5.2.2 shall apply to natural gas and propane installations where the delivery pressure is 2 psig (14 kPa) or less.

5.2.2.2

A line pressure regulator shall be provided when the delivery pressure is greater than the maximum rated pressure of the appliance or equipment and shall be

- a) installed upstream of the appliance or equipment; and
- b) certified to either
 - i) ANSI Z21.80/CSA 6.22; or
 - ii) UL 144.

Note: ANSI Z21.80/CSA 6.22 applies to both natural gas and propane, while UL 144 applies only to propane.

~~5.2.2.2~~ **5.2.2.3**

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

~~5.2.2.3~~ **5.2.2.4**

A pressure 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 15° from the horizontal; and



b) a single-stage pressure regulator of a capacity not exceeding 150 000 Btu/h (45 kW) may be installed in a horizontal position, provided that it is protected from inclement weather.

5.2.2.45.2.2.5

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) of a gas having a specific gravity of 1.53 shall be exempt from the requirement of Clause 5.2.1.7 b).

A pressure regulator with vent limiting means shall be installed in a ventilated space only.

5.2.3 Additional requirements for delivery pressures greater than 2 psig (14 kPa)

5.2.3.1

The requirements of Clause 5.2.3 shall apply to natural gas and propane installations where the delivery pressure is greater than 2 psig (14 kPa).

5.2.3.2

One or more pressure regulators shall be installed in the gas piping system when the delivery pressure exceeds the maximum rated pressure of the downstream valve train, appliance, or equipment.

When a gas piping system needs its pressure regulator set to an operating pressure greater than 2 psi, a high pressure regulator shall be used.

5.2.3.3

Where the maximum rated pressure of the valve train, appliance or equipment is 2 psig (14 kPa) or less, the final pressure regulator shall be a line pressure regulator certified to ANSI Z21.80/CSA 6.22 or UL 144 as applicable to the type of gas.

5.2.3.4

Where a high pressure regulator operates with outlet pressures greater than 2 psig (14kPa), it shall be a) of suitable construction for the gas being conveyed;

b) of suitable capacity to provide the gas flows and pressures required by the downstream piping system, valve train(s), appliance(s), or equipment;

c) installed in accordance with the manufacturer's instructions and ratings; and

d) be constructed so that the outlet pressure does not exceed 150% of the normal outlet operating pressure under no flow conditions when the downstream appliance or equipment is shut down.

5.2.3.5

Where a pressure regulator(s) is installed downstream of another pressure regulator, the downstream pressure regulator shall be protected by an overpressure protection device complying with Clause 5.3 if failure of the upstream pressure regulator could result in exposing the downstream pressure regulator to inlet pressure greater than its rated pressure.

5.2.3.5.2.4 Additional requirements for pressure regulators for natural gas applications

5.2.3.15.2.4.1

When used on a system operating at an inlet pressure of 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) of a gas having a specific gravity of 0.6 shall be exempt from the requirement of Clause 5.2.1. 7 b).

A line pressure regulator with vent limiting means shall be installed in a ventilated space only.

5.2.3.25.2.4.2

For systems with inlet pressures above 2 psig (14 kPa), a pressure regulator shall be exempt from compliance with Clause 5.2.1. 7 b) of this Code, provided that it is 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), that it has an overpressure protection device set to a pressure either below 2 psig (14 kPa) or 2 times the delivery pressure on the system, and that it is certified to ANSI Z21.80/CSA 6.22.

5.2.4.3

A pressure 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 15" from the horizontal; and

b) a single-stage pressure regulator of a capacity not exceeding 150 000 Btu/h (45 kW) may be installed in a horizontal position, provided that it is protected from inclement weather.

5.2.4.4

A pressure regulator shall be installed on the vehicle in such a manner that its safe operation will not be impeded by weather conditions, and it shall be protected by a substantial metal or plastic hood of the enclosed style.

5.2.4.5

When provision is made for mounting a cylinder on the A-frame of a vehicle, a rigidly mounted support bracket for mounting the pressure regulator shall be provided. The pressure regulator shall be protected in accordance with Clause 5.2.4.4.

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.~~

Section 5.3, Overpressure protection devices: Revised requirements for overpressure protection devices as follows:

5.3, Overpressure protection devices:

5.3.1

Except as permitted in Clause 5.3.2, a line pressure regulator or a high pressure regulator shall be provided with an overpressure protection device.

Note: Class I line pressure regulators certified to ANSI Z21.80/CSA 6.22, and rated for inlet pressures of either 5 psig (35 kPa) or 10 psig (70 kPa), are supplied with factory-installed overpressure protection devices to limit the downstream pressure to 2 psig (13.8 kPa) in the event of failure of the regulating mechanism, which is acceptable for certified appliances with a maximum inlet gas pressure of 14 in w.c. See Annex K.

5.3.2

Where a line pressure regulator is certified to ANSI Z21.80/CSA 6.22 and if the inlet pressure to the line pressure regulator is 2 psig (14 kPa) or less, an overpressure protection device shall not be required.

5.3.3

Where the outlet pressure of a pressure regulator is greater than 14 in w.c. (3.5 kPa), the setting of the overpressure protection device shall be set in accordance with Table 5.2.

5.3.4



An overpressure protection device shall be set to operate at the pressures specified in Table 5.2. Additionally, if an internal relief valve or line relief valve is used as the overpressure protection device, it shall be sized to fully relieve the rated capacity of the line pressure regulator.

Section 5.5, Venting of pressure control devices: Revised requirements for venting of pressure control devices and added requirements for venting exemptions for line pressure regulators as follows:

5.5.45.5.2 Venting of overpressure relief devices

5.5.2.1

Except as specified in Clause 5.5.2.2, when a pressure regulator with internal relief valve or a ~~gas~~ **overpressure line** relief valve is installed, it shall be vented separately to a safe location outdoors by a vent line

- a) of steel pipe, or of seamless steel tubing or copper tubing or corrugated stainless steel tubing (CSST) that complies with Clause 6.2; and
- b) of a size
 - i) at least equal to the nominal pipe size of the vent outlet of the valve or regulator increased as specified by the manufacturer's instructions and for CSST increased by one pipe size diameter; or
 - ii) in the absence of manufacturer's instructions, 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 5.5.2.2

When two or more gas overpressure relief valves are installed, they may be connected into a single vent line, provided that

- a) there is compliance with Clause 5.5.2.1;
- b) the single vent line has an area equal to the largest relief valve opening plus 50% of the total area of the other relief valve openings;
- c) ~~the variance between~~ the highest inlet pressures of any one line relief valves does not exceed ~~10%~~ 1.1 times the lowest inlet pressure of any other line relief valve, based on manufacturer's product literature; and
- d) ~~the variance between~~ the inlet highest start-to-discharge pressures of one line relief valve does not exceed ~~10%~~ 1.1 times the lowest start-to-discharge pressure of any of the other line relief valves, based on manufacturer's product literature.

5.5.2.3

Vents from a pressure regulator with an internal relief valve shall be piped independently to the outdoors and not be manifolded with any other vents.

5.5.4 Venting exemptions for line pressure regulators

5.5.4.1

A line pressure regulator shall be exempt from the requirements of Clause 5.2.1.8 provided that

- a) the inlet pressure the pressure regulator is 2 psig (14 kPa) or less;
- b) the pressure regulator is equipped with a leak limiting system orificed to limit the escape of gas from the vent openings, even in the event of a main diaphragm failure, to less than
 - i) 1 ft³/h (0.0283 m³/h) of a gas having a specific gravity of 1.53; or
 - ii) 2.5 ft³/h (0.0706 m³/h) of a gas having a specific gravity of 0.6;
- c) the pressure regulator is certified to ANSI Z21.80/CSA 6.22; and
- d) the pressure regulator is installed in a ventilated space.



5.5.4.2

For line pressure regulators with inlet pressure of 5 or 10 psig (35 or 70 kPa), a line pressure regulator shall be exempt from compliance with Clause 5.2.1.8 provided that

- a) the pressure regulator is equipped with a leak limiting system orifice 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) of a gas having a specific gravity of 0.6;*
 - b) the pressure regulator is equipped with an overpressure protection device consisting of either a monitoring regulator or an overpressure shut-off device, which is
 - i) set to limit the downstream pressure to 2 psig (14 kPa) or less; and*
 - ii) supplied as a complete unit with the line pressure regulator;**
 - c) the pressure regulator and its overpressure protection device are certified to ANSI Z21.80/CSA 6.22;*
- and*
- d) the pressure regulator is installed in a ventilated space.*

5.5.4.3

For the purpose of Clause 5.5.4, a space shall be considered to be a ventilated space where the accumulation of gas in the space does not exceed 25% of the lower explosion limit of the gas.

5.6 Termination of vents

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.~~

Section 5.6, Termination of vents: Added new Section 5.6 for termination of vents as follows:

5.6.1

The outdoor vent termination of a pressure regulator or a line relief device shall be equipped with a means to prevent the entry of water, insects, or foreign material.

5.6.2

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

5.6.3

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.

5.6.4

The discharge from overpressure protection devices, relief devices, and internal relief valves, and the termination of any other vent not eligible to be vented into a ventilated space shall terminate outdoors with the clearances specified in Table 5.3.

The clearances in Table 5.3 may be reduced for natural gas in accordance with the second column of the Table where a pressure regulator meets the following requirements:

- a) the service regulator is certified to CSA 6.18 and equipped with an overpressure shut-off device;*



- b) the pressure regulator is certified to ANSI Z21.80/CSA 6.22 and equipped with a vent limiting device that vents gas at a rate not exceeding 2.5 scf/h (0.0706 m³/h) or less; or
- c) the pressure regulator is equipped with an overpressure shut-off device that vents gas at a rate not exceeding (2.5 scf/h 0.076 m³/h).

Section 6.2, Material: Revised material requirements as follows:

6.2 Material

6.2.2

A fitting used with steel pipe shall be

- a) either malleable iron or steel and shall comply with the material selection requirements of CSA Z662 or the applicable ASME B16 series of standards; or
- b) certified to ANSI LC-4/CSA 6.32.

When Schedule 80 pipe is required, the minimum Class of fitting used with the pipe shall be Class 300.

6.2.3

6.2.3.1

A gas piping system using natural gas piping or propane vapour phase piping with operating pressures up to and including 125 psig (860 kPa) shall comply with the following as applicable:

- a) Piping shall be at least Schedule 10 for NPS 1/2 to 2. When using Schedule 10 to less than Schedule 40, piping shall be located indoors, and joints shall use fittings certified to ANSI LC-4/CSA 6.32.
- b) Piping shall be at least Schedule 40 for ~~pipe sizes up to and including~~ NPS 2-1/2 to 10.
- c) Pipe larger than NPS 10 ~~may~~ shall be at least standard weight.

6.2.3.2

A gas piping system using natural gas piping or propane vapour phase piping with operating pressures exceeding 125 psig (860 kPa) and all liquid piping systems shall comply with either of the following:

- a) For pipe sizes up to and including NPS 10
 - i) piping shall be at least Schedule 40 ~~shall be used if joints are either~~ when using welded or ~~welded and~~ flanged joints; or
 - ii) piping shall be at least Schedule 80 ~~if joints are either~~ when using threaded joints. Threaded joints shall be threaded or threaded and back welded.
- b) Pipe larger than NPS 10 shall be at least standard weight.

6.2.5

Copper tubing Types K and L specified in Clause 6.2.4 b) may be used for liquid propane or propane in the vapour phase.

Section 6.3, Size: Revised sizing requirements and added CSST sizing as follows:

6.3.2

A gas 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 piping, tubing, and fittings shall be determined in accordance with good engineering practice, such as

.....

- c) for CSST, by the use of sizing methods and tables supplied by the manufacturer.



Section 6.8, Piping Practices: Added requirements for piping practices for including a test port as follows:

6.8.10

A test port shall be installed immediately downstream of a line pressure regulator or a high pressure regulator except where the pressure regulator can be adjusted while measuring and observing the supply pressure at any appliance being served by the pressure regulator. Where opening the test port could create an uncontrolled release of gas, the test port shall be equipped with a manual shut-off valve that is either capped or plugged.

Section 6.9, Joint Connections: Revised requirements for joints and connections as follows:

6.9.1

Joints in steel piping shall be threaded, flanged, press-connected, or welded, and shall be as specified in Clause 6.15.2. When mating flanges, they shall be of the same face type and rating.

6.9.4

The acceptance criteria for any welds shall be ~~as specified~~

a) for design pressures greater than 250 psi (1720 kPa), comply with the visual and radiographic inspection requirements of Clause 7 of CSA Z662 or other approved methods;
b) for design pressures between 100 psi (700 kPa) and up to 250 psi (1720 kPa), be in accordance with the visual and radiographic inspection requirements of Chapter IV of ANSI/ASME B31.3; or
c) for design pressures of 100 psi (700 kPa) and less, be by visual inspection of the external weld surface, as well as the internal weld surface where accessible without the use of special tools. Acceptance criteria of the weld shall be in accordance with the requirements of Annex J.

Notes:

- 1) For clarification, the use of the word "inspection" in CSA B149.1 means the same as "examination" in ANSI/ASME B31.3.
- 2) Hand mirrors and flashlights are not considered to be special tools.

Section 6.18, Manual shut-off valves: Revised requirements for manual shut-off valves to be in accordance with CSA 3.11, CSA 3.16, or ANSI Z21.15/CSA 9.1 or approved for use with gas as follows:

6.18.1

A manual shut-off valve shall be ~~of the plug, ball, or eccentric type, and~~ certified ~~for its intended purpose, to CSA 3.11, CSA 3.16, or ANSI Z21.15/CSA 9.1, or approved for use with gas,~~ and it shall not be subjected to either a temperature or a pressure outside of its certified rating range.

6.21 Gas Connectors: Revised requirements for gas connectors as follows:

6.21.8

A gas connector certified to ANSI Z21.75/CSA 6.27 may be used to connect

a) an appliance for outdoor use that is frequently moved after installation; or

b) ~~where~~ a mobile home ~~that~~ is not installed on a permanent foundation ~~, the mobile home may be connected by a gas connector certified to ANSI Z21.75/CSA 6.27.~~

These connectors are not intended for use with wheeled, caster mounted, or portable appliances.

6.21.9

A gas connector certified to ANSI Z21.54/CSA 8.4 may be used to connect a portable outdoor appliance in an uncealed space.



Section 6.23, Purging of gas piping systems after leak testing: Revised requirements for purging of gas piping systems after leak testing as follows:

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

6.23.1

A gas piping system, ~~tubing system, or hose connecting either air or inert gas~~ shall be purged in a safe manner to the outdoors using approved engineering practices or in accordance with Clauses ~~6.23.7 6.23.2 through 6.23.4~~ where it meets either of the following:

- a) the gas pressure in the gas piping system is greater than 2 psig (14 kPa); or
- b) to an approved purge burner, except as permitted in Clause 6.23.4, the gas piping system being purged contains one or more sections of pipe, tubing, or gas hose meeting the size and length described in Table 6.4.

Section 7.2.2, Compressors/pressure boosters: Revised requirements for compressors/pressure boosters as follows:

7.2.2 Compressors/pressure boosters

7.2.2.1

A compressor/pressure booster shall comply with Clause 17.2 of CSA B149.3 and shall be approved by the authority having jurisdiction.

~~**7.2.2.3**~~

~~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.~~

~~**7.2.2.4**~~**7.2.2.3**

The following requirements shall apply to all gas piping, tubing, hose, compressor/pressure boosters, and components operating at an outlet pressure higher than those permitted by Table 5.1:

.....

~~**7.2.2.6**~~

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

Section 7.2.3, Emergency generators: Revised requirements for emergency generators as follows:

7.2.3 Emergency use generators

7.2.3.1

Piping or tubing serving a generator that provides power for safety purposes shall be independent of any other gas supply to the building or any other generator that provides power for safety purposes, and shall be provided with a manual valve identified with a permanent sign in accordance with CSA C282 as applicable. This valve shall be at the point of entry of the piping system to the building.

7.2.3.2

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 in accordance with CSA C282 as applicable. The valve used for this purpose shall be at the point of entry of the piping system to the building.

~~**Note:** For safety purposes means for powered emergency elevators or emergency lights are to be provided where such emergency applications are required by the National Building Code of Canada or local code.~~



7.2.3.3

An overpressure protection device used in conjunction with a pressure regulator on piping serving a generator that provides emergency electrical power supply to a building shall be either a monitoring regulator or an overpressure relief device only. Overpressure shut-off devices are not permitted in this application.

Note: Refer to CSA C282 for additional piping requirements for fuel systems serving emergency power supplies.

Section 7.2.4, Non-motive gas engines and turbines: Revised requirements for non-motive engines and turbines as follows:

7.2.4 Stationary Non-motive gas engines and turbines

7.2.4.1

An engine or turbine shall be certified or comply with Clause 17.3 of CSA B149.3.

7.2.4.2

~~A stationary engine or turbine shall be equipped with~~

~~(a) a certified automatic safety shut-off valve installed immediately upstream of the gas hose connector. The safety shut-off valve shall be certified in accordance with the requirements of ANSI Z21.21 /CSA 6.5 for valves marked C/I. It shall be controlled by a vacuum switch, oil pressure switch, or an equivalent device to prevent the flow of gas to the fuel system on the engine or turbine when it is not running;~~

~~(b) an automatic speed governor;~~

~~(c) a vacuum switch or low oil pressure switch;~~

~~(d) a zero governor type regulator; and~~

~~(e) a gas hose, not exceeding 3 ft (1 m) in length, which shall be of a Type I hose connector approved in compliance with CSA CAN/CGA-8.1, where the connector is installed downstream of the automatic safety shut-off valve required under Item (a) and on the upstream side of the zero governor type regulator.~~

7.2.4.4 7.2.4.3

~~Stationary e~~Engine or turbine exhaust gases shall be piped so they can neither be trapped nor be drawn into a building through a window, door, or other opening.

7.2.4.5

~~Where a stationary engine or turbine 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.~~

7.2.4.6

~~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.~~

7.2.4.7

~~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 7.2.4.8 and shall be set to prevent pressure build-up exceeding that of the lowest-rated downstream component.~~

7.2.4.9

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

7.2.4.10

~~Each stationary engine or turbine shall be provided with a clearly legible, permanent rating plate indicating~~

~~(a) the manufacturer's or vendor's name;~~



- ~~(b) the fuel supplied;~~
- ~~(c) the electrical rating;~~
- ~~(d) the maximum input rating; and~~
- ~~(e) the inlet pressure at the point of connection to the supply piping.~~

Section 7.2.5, Additional requirements for gas engines and turbines in buildings: Revised requirements for additional requirements for gas engines and turbines in buildings as follows:

7.2.5 Stationary Additional requirements for gas engines and turbines in buildings

~~7.2.5.1~~

~~The requirements of Clause 7.2.4 shall also apply to stationary gas engines and turbines in buildings.~~

~~7.2.5.2~~ 7.2.5.1

A room containing ~~a~~ an engine or turbine shall be ventilated

- a) at the floor level ~~for propane fuel~~; or
- b) as close as practicable to the ceiling for natural gas.

7.2.5.3

~~A stationary~~ An engine or turbine 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 on all sides, including the top and bottom, to prevent natural gas or propane from entering other sections of the building.

~~7.2.5.8~~

~~Propane-fuelled stationary engines or turbines shall be equipped with two solenoid valves, installed in series and wired in parallel, installed immediately upstream of the gas hose required in Clause 7.2.4.9. They shall be controlled by a vacuum switch, oil pressure switch, or an equivalent device to prevent the flow of gas to the fuel system of the stationary engine or turbine when it is not running.~~

Section 7.22, Direct gas-fired process air heaters (DFPAH): Revised requirements for direct gas-fired process air heaters (DFPAH) as follows:

7.22.7

The design of the installation shall include adequate provisions to permit non-recirculating airflow of a DFPAH in the process mode to operate at its rated capacity by providing properly designed ducted relief openings determined by a professional engineer, or an interlocked powered exhaust system, or a combination of these methods. Relief opening(s), powered exhaust system(s), or a combination of both shall terminate outdoors.

7.22.7.1

Relief openings shall be louvres or counterbalanced gravity dampers. Motorized dampers or closable louvres may be used, provided that they are interlocked so that the main burner do not operate until the air dampers are fully open. The opening area of the exhaust fan used in the ventilation mode may also be considered for open relief area for the process mode.

7.22.7.2

Where the installation is dependent solely on an interlocked powered exhaust system, the air flow capacity of the interlocked exhaust system shall in no case be less than 95% or more than 105% of the outside air supply to the DFPAH in the process mode. This exhaust fan may be a different exhaust fan than that provided in 7.22.6 depending on the ability to turn down the airflow accurately.

7.22.8



For a spray area installation, an interlocked exhaust system shall be utilized to exhaust the ventilation air supply to the DFPAH in the ventilation mode and an interlocked exhaust system shall be utilized to exhaust the outside air supply to the DFPAH in the process mode.

7.22.11

In a DFPAH spray booth application that ~~also~~ has a ~~bake or drying cycle~~ process mode, an interlock shall be provided to lockout the ~~booth lighting~~ spray area lighting and the spraying equipment while in process mode.

7.22.12

In a DFPAH process application, an interlock shall be provided to ensure the DFPAH is operated in the ventilation mode for a minimum of 3 min or a minimum of four air changes of the ~~spray booth enclosure~~ volume including any inlet ducting, whichever is greater, at the start of the ~~process~~ bake or drying cycle with the spraying equipment locked out.

7.22.13

~~In a process application,~~ For the space served by a DFPAH operating in the process mode, an interlock for access points, such as a door or partition, shall be provided ~~for an minimum of 3 min or a minimum of four air changes of the process space served, whichever is greater.~~ to immediately shut down the process mode if entry is made. The following warning marking shall be posted at each access opening: "Do not enter this space until the post purge cycle is complete." and "N'entrer pas dans l'espace avant que le cycle de minuterie de purge soit fini".

7.22.14

In process applications that are intended to be entered by personnel following ~~a bake or drying cycle,~~ the process mode operation, the controls shall include a post-purge timer to purge contaminants from the space and cool the products to avoid a burn hazard. The length of the post-purge period shall be field adjustable to accommodate the specifics of that particular application.

7.22.16

The outdoor air intake of a DFPAH shall be located not less than 20 ft (6 m) horizontally from a vertical plane in which combustible gas, vapour, or dust is present except for a DFPAH serving a spray area that it is interlocked with in accordance with

a) Clauses 7.22.8, 7.22.9, and 7.22.11;

b) Clause 7.22.12; or

c) Clause 7.22.13.

7.22.17

In the process mode, a DFPAH that recirculates process area air must provide the minimum ventilation airflow to support complete combustion (200 cfm per 1000 cfh of natural gas based on the maximum capacity of the heater) plus an allowance to sufficiently dilute the VOCs from the drying or curing to maintain the lower explosive level (LEL) below a 25% threshold value, if applicable. The duct systems shall be designed to prevent recirculation of insufficiently diluted products of combustion.

Section 8.4, Air-supply requirements for appliances having a total input exceeding 400 000 Btu/h (120 kW) (see Clause 8.1.4): Revised requirements for air-supply requirements for appliances having a total input exceeding 400,000 Btu/h (120 kW) as follows:

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 an appliance and a venting system with a draft control device is installed in the same space or enclosure, there shall be a permanent air-supply opening having



a cross-sectional area of not less than $1 \text{ in}^2/7000 \text{ Btu/h}$ ($310 \text{ mm}^2/\text{kW}$) up to and including $1\,000\,000 \text{ Btu/h}$ (300 kW), plus $1 \text{ in}^2/14\,000 \text{ Btu/h}$ ($155 \text{ mm}^2/\text{kW}$) in excess of $1\,000\,000 \text{ Btu/h}$ (300 kW). 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 ~~for a power burner, in addition to the opening for ventilation air required in Clause 8.4.1~~ outdoors for an appliance and a venting system without a draft-control device is installed in the same space or enclosure, there shall be a permanent air-supply opening having a total cross-sectional area of not less than 1 in^2 for each $30\,000 \text{ Btu/h}$ (70 mm^2 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. The 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.

8.4.4

When air is provided by natural airflow from outdoors into a ~~location~~ space or enclosure containing both types of ~~equipment appliances or venting systems~~ described in Clauses 8.4.2 and 8.4.3, the cross-sectional area of the opening shall not be less than the ~~total~~ sum of the required cross-sectional areas for ~~both all~~ all types of ~~equipment appliances or venting systems~~ when calculated in accordance with ~~either~~ Clauses 8.4.2 and 8.4.3, as applicable. 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. 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.

Section 8.5, Air-supply dampers, louvers, and grills: Revised requirements for air-supply dampers, louvres, and grilles as follows:

8.5.4

Except as permitted by Clause 8.5.6, an automatically operated damper or automatically adjustable louver shall be interlocked so that the main burner cannot operate unless either the damper or louver is in the fully open position.

8.5.6

For emergency generators, stand-by generators, or firewater pumps, the combustion air damper interlock is not required, provided

- a) the intake combustion air dampers and the ventilation air dampers, if provided separately, are sized for a maximum face velocity of 500 fpm (2.5 m/s);
- b) the combustion air dampers and ventilation air dampers
 - i) fail open on loss of power;
 - ii) open on a generator run command from the generator control panel; and
 - iii) fail open fully in under 30 s;
- c) the combustion air damper remains open at all times while the generator is operating;
- d) the ventilation air damper remains open for at least the first 30 s after start of all dampers moving to the open position;* and
- e) the combustion air damper is equipped with a position switch that is set at least at 85% open to announce an alarm to a supervised location if the damper is not proved open after 30 s.

* The intent is for the ventilation air damper to go to its fully open position and not come under temperature control (if provided) until the combustion air damper is also fully open.



Section 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, circulating fan, or fireplace 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.

Note: Refer to CSA F300-13 for assessment and possible solutions to mitigate the depressurization issue.

Section 9.4, Cylinder Storage: Revised requirements for cylinder storage as follows:

9.4.3

The storage cabinet shall

- ~~(a) be at least 6 ft (2 m) high, measured from grade, unless it is supplied with a top cover;~~
- ~~(b) have wall or top cover material that is either metal wire of not less than No. 9 SWG (3.7 mm) with openings not greater than 2 x 2 in (50 x 50 mm) or sheet metal;~~
- ~~(c) be ventilated to the outside air on a minimum of two sides at the top and bottom of the cabinet walls; and~~
- ~~(d) be securely anchored in an upright position.~~
- a) be at least 6 ft (2 m) high, measured from grade, unless it is supplied with a top cover;
- b) be made of noncombustible material and be structurally sound, with no openings greater than 4 in² (25.8 cm²);
- c) have at least 2 sides constructed to provide equal ventilation through openings at the top and bottom of the side, providing, as a minimum, the equivalent total opening of 15% open area on each side panel;
- d) not restrict the dispersion of any fuel gas leak to ensure it is well ventilated;
- e) have its base on a firm level footing in an upright position; and
- f) not be located against other objects, or have objects attached, that restrict ventilation.

9.4.4

~~Portable containers~~ Cylinders stored outdoors shall be located

- a) 5 ft (1.5 m) from a property line if the aggregate capacity of expanded gas* ~~does not exceed~~ is up to and including 6000 ft³ (170 000 L);
 - b) 25 ft (7.5 m) from a property line if the aggregate of expanded gas* is more than 6000 ft³ (170 000 L) ~~but under~~ and up to and including 18 000 ft³ (500 000 L); and
 - c) 50 ft (15 m) from a property line if the aggregate of expanded gas* exceeds 18 000 ft³ (500 000 L).
- * This is evaluated at standard pressure of 14.7 psi absolute (101.3 kPa) and temperature of 59°F (15 °C).



Section 10, Residential fuelling appliances (RFAs) and vehicle fueling appliances (VFAs) used for natural gas without storage: Title changed and appliance abbreviations have been revised to reflect the new and revised abbreviations as follows:

10 Residential fuelling appliances (RFAs) and vehicle fueling appliances ~~(VFA)~~ (VFAs) used for ~~(natural gas only)~~ without storage

10.1.2

RFAs shall be certified to ANSI/CSA NGV 5.1 and shall be installed in accordance with the manufacturer's installation instructions and local requirements, including fire regulations, building codes, and zoning requirements.

10.1.3

VFAs shall be certified to ANSI/CSA NGV 5.2 and shall be installed in accordance with the manufacturer's installation instructions and local requirements, including fire regulations, building codes, and zoning requirements.

Note: For VFAs connected to storage vessels, see CSA B108.

New Table 5.2 "Overpressure protection device setpoint requirements"

Annex J, Acceptance criteria for visual inspection of welds: Added new Annex J

Annex K, Pressure regulators and overpressure protection devices Added new Annex K:

Annex L, Recommended requirements for automatic safety shut-off valves and automatic vent valves installed on gas turbines having capacities greater than 12.5 MMBtu/h (3.66 MW) and inlet pressures greater than 150 PSI: Added new Annex L,

Annex M, Requirements for the operation of appliances at shows, exhibitions, or other similar events: Added new Annex M

Annex N, Generators, compressors/pressure boosters, engines, and turbines: Added new Annex N