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CSA B149.1- 2020 – Major Revisions		
Scope – Propane as a refrigerant		
Definitions – Appliance, Delivery Pressure, Design Pressure, Gas Piping System, Regulators, Rated Pressure, Residential Fueling Appliance, Safe Location, Supply Pressure, Vehicle Fueling Appliance.		
Electrical connection and components - Grounding and Bonding		
High Altitude Installations		
Pressure Controls - Delivery Pressure - Pressure Regulators - Venting of pressure control devices - Termination of pressure control devices		
Material		
Piping Practices - Joints and Connections - Purging of gas piping systems after leak testing		
Types of appliances - General Requirements - Direct gas-fired process air heaters (DFPAH)		
Lighting – enclosure ventilation		
Air-supply - Interlocking		
Residential fuelling appliances (RFA) and Vehicle fueling appliances (VFA) used for natural gas without storage.		

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Annex J (Normative) *Acceptance criteria for visual inspection of welds*		
Annex K (informative) *Pressure regulators and overpressure protection devices*		
Annex L (informative) *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.*		
Annex M (Normative) *Requirements for the operation of appliances at shows, exhibitions or other similar events*		
Annex N (Informative) Generators, compressors/pressure boosters, engines, and turbines		
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1 Scope	**1 Scope**	
1.2 This Code does not apply to **(m)** propane used as refrigerant.	**Revised**	(m) Clarification that propane when used as a refrigerant is outside the scope of this Code, to be consistent with CSA B149.2 Scope update.
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. **Fueling appliances** - See **Residential fueling appliances** and **Vehicle fueling appliances**.	**Revised** **Appliance** — a device to convert gas into energy; the term includes any component, control, wiring, piping, or tubing required to be part of the device.	As with proposed changes to the National Fuel Gas Code, the definition is expanded to include compression of gas for use as a fuel gas, in the immediate case to cover refueling appliances.

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Delivery pressure - the outlet gas pressure from the service regulator for natural gas or a second stage propane regulator for propane.	**New**	The new definition provides addition clarity in Clauses 5.1, 5.1.4, 5.2.2, 5.2.2.1, 5.2.2.2, 5.2.3, 5.2.3.1, 5.2.3.2, 5.2.4.2, Annex K Figure K.1, K.4. The term “delivery pressure” is used in relation to line pressure regulators but it was not clear by its use if it means the inlet or the outlet pressure of the line pressure regulator.
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.	**New**	The new definition provides addition clarity in Clause 6.9.4. The “**design pressure**” rating applies to the complete, assembled gas piping system, whereas **rated pressure** applies to separate components, devices, fitting, etc. within a gas piping system. Various components within as gas system have their own **rated pressures** (i.e. the maximum pressure that a component can continuously sustain, contain or control without a catastrophic or unsafe condition. A **rated pressure**, if exceed by a small amount as defined by the manufacturer, catastrophic failure or damage will not occur) as well as maximum exposure pressures under abnormal conditions. As an example, a piece of schedule 40 pipe may be designed, produced, and intended to be for use in systems up to 150 psi, and thus its rated pressure is 150 PSI. If this is the lowest rated part on the gas piping system having all other parts with 200 PSI rated pressures, the design pressure would be 150 PSI. However, if an upstream overpressure protection device having a 200 PSI rated pressure were used and then set to 150 PSI, the design pressure for such a system would be 200 PSI.

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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	**New**	The new definition provides addition clarity for Definitions Accessory, Installer, Line relief valve, and Clauses 4.3.5(c)(ii), 4.3.7, 4.5.5, 4.5.6, 4.8.1, 4.10, 5.1.5, 6, 6.3.2, 6.3.3, 6.3.4, 6.4, 6.5.2, 6.5.3, 6.6.1, 6.6.2, 6.8.7, 6.9.3, 6.10, 6.11.1, 6.11.2, 6.23, 6.23.1,6.23.2,6.23.3,6.23.4, 6.23.5, 6.23.6, 6.23.7,6.23.8, 6.25, 7.31.1 Annex A, A.1, A.3.1, A.3.5 There are different words or phrases used within this Code such as: piping, pipe, tubing, piping system, tubing system, gas piping, gas tubing, corrugated stainless steel tubing (CSST) systems, and gas piping system". Defining the term "**gas piping system**" provides consistency and clarity that any component or device that confines the fuel gas, that the requirements of the B149.1 apply (e.g. fittings, pressure gauges, hoses, etc). To limit the use of different terms that mean the same thing, and apply the terms consistently. A "gas piping system" includes the "tubing" or the "tubing system".

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High pressure regulators - a line pressure regulator except with inlet gas pressures greater than 10 psig (70 kPa), and outlet pressure greater than 2 psig (14 kPa). **Line pressure regulator** — a pressure regulator intended for installation in a building gas distribution system between the building service regulator or LP-gas 2 psi (13.8 kPa) 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 ½ psi (3.5 kPa). Class II - maximum outlet pressure of 2 psi (13.8 kPa).	**New/Revised** **New** **Revised** 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 utilization equipment.	**"High Pressure Regulator"** has been introduced to deal with line pressure regulators that operate at higher inlet/outlet pressures than a CSA 6.22 regulator. This will also aid in later editions after the new "high pressure regulator" standard (currently approved to proceed to development) is published. **"Line Pressure Regulator"** has been revised to reflect the scope of the ANSI Z21.80/CSA 6.22 Standard For Line Pressure Regulators.
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.	**New**	The new definition provides addition clarity in Clauses 5.1.3, 5.2.2.2, 5.2.3, 5.2.3.2, 5.2.3.3, and 5.2.3.5.
Residential fueling appliances (RFA) — an appliance that dispenses natural gas for vehicles directly into the vehicle natural gas fuel storage system.	**New**	As with proposed changes to the National Fuel Gas Code, the definition is expanded to include compression of gas for use as a fuel gas, in the immediate case to cover refueling appliances.

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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 application, 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.*	**New**	The new definition provides addition clarity in Clauses 5.4.1, 5.5.1.1, 5.5.2.1, Annex N (N.2.9). Table 5.2 in B149.1 specifies clearances from relief devices to building openings, appliance vent outlets, moisture exhaust ducts, mechanical air intakes, appliance air intakes, or sources of ignition at between 3 to 10 ft, other considerations such as; vertical versus horizontal separation, prevailing wind direction, snow/ice accumulation, possibility of trapping the gas or blowing it back into the building, or presence of persons (both operators or public) or vehicles near the vent termination. The Code and the industry practice allows the use of fuel gas for instrumentation/actuation, where instrument air is not available the vents from valve actuators or I/ Ps, which vent constantly, may create even bigger hazard than PSV and PRV vents.
Supply pressure - the gas pressure at the manual shut-off valve of an appliance or equipment.	**New**	The new definition provides addition clarity in Clauses 5.5.1.2, 5.7.1.1, Table 6.1, 6.3.4, 6.8.10, Annex K (K.3(b))
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.	**Revised** **VRA** – vehicle refuelling appliance.	The new definition provides addition clarity in Clauses 10, 10.1.5, 10.1.6, 10.1.8, 10.1.9, 10.3.1, 10.4.
4.7 Electrical connection and components	**4.7 Electrical connection and components**	

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4.7.3 All interior metal gas piping 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 absence of such, the *Canadian Electrical Code, Part 1*, 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.	**Revised** All interior metal gas piping that may become energized shall be made electrically continuous and shall be bonded in accordance with the requirements of the local electrical code or, in absence of such, the Canadian Electrical Code, Part 1.	With the emergence of new piping methods such as CSST, bonding is specialized and installers must be trained by the manufacture in order to have a safe and compliant installation. manufactures specific bonding requirements of gas installations, bonding should be left to gas installer for this reason a proposal will also be submitted to the CE code to delete bonding requirements of gas piping for installations covered under the scope of B149.1 Cont.
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 as follows: 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 the CSST itself.	**New**	Cont.

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4.22.2 When an appliance is installed at elevations above 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 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.	**Revised** When an ***appliance*** is installed at elevations above 4500 ft (1350 m), the ***certified*** high-altitude input rating shall be reduced at the rate of 4% for each additional 1000 ft (300 m).	New technologies in use today include validation testing of the appliance at higher altitudes, and electronic adjustment using dip switches or using feedback mechanisms, ensure manufacturer's requirements are followed.
5 Pressure controls	**5 Pressure controls**	
5.1 Delivery pressure	**Revised Gas system pressure**	
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.	**New/Previous 5.1.2 Relocated to New 5.1.5** 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.	It is **not** the intent that where a higher gas pressure serves a central boiler or mechanical room, that this gas piping at a higher pressure may run through the remainder of a building to the central boiler or mechanical room. Subsequent Code Clauses have been renumbered accordingly
5.1.3 A gas piping system shall be designed so that the gas pressure shall not exceed the rated pressure of any accessary, equipment or appliance, under normal operation and in the event of a failure of an upstream pressure regulator.	**New/Previous 5.1.3 Relocated to New 5.1.6** 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.	Using terms from CSA B149.6. Rated pressure may be the maximum allowable (body) pressure for not exceeding maximum allowable stress, or the rated pressure is that above which exists a condition of un-safe appliance operation.

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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.	**New/Previous 5.1.4 Relocated to New 5.1.7** 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.	Added requirement to evaluate the gas pressure and OPPD as provided at the service connection.
5.2 Pressure regulators	**5.2 Pressure regulators**	
5.2.1 General	**5.2.1 General**	
5.2.1.1 Gas shall be supplied to an appliances, 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.*	**New/Previous 5.2.1.1 Relocated to 5.2.1.3** Every ***regulator*** shall be ***certified*** and be of sufficient size to provide the required flow of gas at the extremes of the 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	Gas pressure delivered to an appliance(s) has to fall within the minimum and maximum allowable pressure range of the appliance nameplate. Note: added to advise that this requirement applies at the maximum and minimum load on the piping distribution 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.	**New/Previous 5.2.1.2 Relocated to 5.2.1.4** 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.	Previous 5.2.1.2 relocated to 5.2.1.4.
5.2.1.3 Every pressure regulator shall 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.	**Relocated/Revised from 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 the 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	Rework Clause 5.2.1.1 to move the need for certified pressure regulators to only where current code clauses use them. The deleted text has been relocated to 5.2.2.2 line pressure regulators. Previous 5.2.1.3 relocated to 5.2.1.5

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5.2.1.7 A pressure regulator shall have a) a manual shut-off valve installed upstream of the pressure regulator; and b) an overpressure protection device in accordance with Clause 5.3. **Note**: *Refer to Annex K regarding certified line pressure regulators and overpressure protection devices*.	**Revised/Relocated from 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.	The requirements are not specific to line pressure regulators. New requirements under Revised Clause 5.3 Overpressure protection devise and New Annex K.
5.2.1.8 Except as permitted by Clause 5.5.4, a pressure regulator vent and any line relief 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.*	**New (replaces part of 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	Created separate clause regarding piping of reliefs, to make it easier for cross-referencing vent-less" installations. Added a Note to clarify what vent means in this context. Previous 5.2.1.6 relocated to 5.2.1.9.
5.2.2 Additional requirements for delivery pressures of 2 psig (14 kPa or less	**Revised** **Additional requirements for pressure regulators for propane applications**	Intended to apply to the majority of the number of installations, i.e.: single and dual-family residences or small commercial spaces. It only applies where the outlet pressure of the service regulator ("delivery pressure" as per new definition) is 2 psig or less.
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.	**New/Relocated to 5.2.4.1** 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.	Deleted reference to CSA 6.18 which is a standard for a service regulator solely for natural gas and is not constructed or tested to the same as in CSA 6.22. Certified regulators apply to appliances with inlet pressure of 2 psig or less. This is within the scope of CSA 6.22, and meets its intended application. See new definition of delivery pressure

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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 only applies to propane.*	**Revised/Relocated to 5.2.4.2** Not less than two-stage regulation shall be utilized on all permanent propane installations. **Text added from previous 5.2.1.1**	Cont. Clause 5.2.2.3 Relocated to 5.2.4.3
5.2.3 Additional requirements for delivery pressures greater than 2 psig (14 kPa)	**New/Relocated to 5.2.4** **Additional requirements for pressure regulators for natural gas applications**	When an appliance has a rated inlet pressure of greater than 2 psig, the pressure regulator cannot be certified within the scope of the ANSI Z21.80/CSA 6.22 Standard.
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).	**New/Relocated to 5.5.4.1** 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 ft^3/h (0.0706 m^3/h) of gas having a specific gravity of 0.6 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.	See new definition of delivery pressure
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 to an operating pressure greater than 2 psi, a high pressure regulator shall be used.	**New/Relocated to 5.5.4.2** For systems with inlet pressures above 2 psig (14 kPa), a pressure regulator shall be exempt from compliance with Clause 5.2.1.5(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 f^3/h (0.0706 m^3/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.	See new code definitions for the following: gas piping system delivery pressure rated pressure high pressure regulator

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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.	**New**	See new code definition of rated pressure Line pressure regulators for natural gas and propane. The final pressure regulator is not to be confused with the appliance regulator.
5.2.3.4 Where a high pressure regulator operates with outlet pressures greater than 2 psig (14 kPa), it shall be a) of suitable construction for the gas being conveyed; b) of suitable capacity to provide the required 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.	**New**	Items (a) through (d) describe the minimum installation and performance requirements for an uncertified regulator. See definition of high pressure regulator
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.	**New**	See definition of rated pressure
5.3 Overpressure protection devices	**5.3 Relief devices**	

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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.*	**Revised/Relocated from 5.3** 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.**	New 5.3.1is intended to provide clarity when overpressure protection is required. The addition of the Note: provides a more detailed explanation. There is an exemption for regulators certified to CSA 6.22 within table 5.2 for regulators with an inlet pressure of 2 psig or less also see new Clause 5.3.2.
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.	**New**	Added Clause 5.3.2 to provide clarity, This is not a new exemption; it already existed in previous editions of the code, this exemption to Clause 5.2.1.5(b) existed under Clause 5.2.2.4 for propane and Clause 5.2.3.1 for natural gas, these types of line pressure regulators are certified to ANSI Z21.80/CSA 6.22.
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.	**New/Partial 5.3**	To recognize that the original 5.3 set-point values and the new Table 5.2 values only apply to relief devices. The 1.5., 2, and 3 times values do not apply to monitoring regulators or shut-off valve OPPD. Clause 5.3.3 only applies to higher pressure appliances. For CSA 6.22 regulators, they come with an OPPD only if the outlet pressure is 14 in wc or less, and then the OPPD set-point is determined by its certification.

<table>
<tr><th>DRAFT - CSA - B149.1 - 2020</th><th>CURRENT- CSA - B149.1 - 2015</th><th>INTERPRETATIONS AND RATIONALE</th></tr>
<tr><td>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.</td><td><u>New</u></td><td>Cont.</td></tr>
<tr><td>Table 5.2
Overpressure protection device setpoint requirements
(See Clauses 5.3.3 and 5.3.4 and Figure 8.2.)

<table><tr><th>Appliance or equipment maximum rated inlet gas pressure</th><th>Maximum allowable downstream pressure</th></tr><tr><td>14 in w.c. (3.5 kPa) or less</td><td>2 psi (14 kPa)</td></tr><tr><td>Greater than 14 in w.c. (3.5 kPa) up to and including 2 psi (14 kPa)</td><td>5 psi (35 kPa)</td></tr><tr><td>Greater than 2 psi (14 kPa) up to and including 10 psi (70 kPa)</td><td>5 psi (35 kPa) or 2 times maximum rated inlet pressure, whichever is greater.</td></tr><tr><td>Greater than 10 psi (70 kPa)</td><td>10 psi (70 kPa) over maximum rated inlet pressure</td></tr></table>Notes:
1) The requirements of this Table shall apply to Class 2 line pressure regulators certified to ANSI Z21.80/CSA 6.22 (i.e. those with a maximum outlet pressure of 2 psi).
2) The installer might need to consult with pressure regulator manufacturers to determine how best to remain within the maximum allowable downstream pressures.</td><td><u>New/Relocated to Table 5.3</u></td><td>Added Table for clarity</td></tr>
<tr><td>5.5 Venting of pressure control devices</td><td>5.5 Venting of pressure control devices</td><td></td></tr>
<tr><td>5.5.2 Venting of overpressure relief devices</td><td><u>New</u></td><td>Changes within the previous code edition raised concerns regarding manifolding of regulators with internal relief.</td></tr>
</table>

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5.5.2.1 Except as specified in Clause 5.5.2.2, when a pressure regulator with internal relief valve or a 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.	**Revised/Relocated from 5.5.4** Except as specified in Clause 5.5.5, when a ***pressure regulator*** with ***internal relief*** or a gas overpressure 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 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; 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.	The term "gas overpressure relief valve" is interpreted as a "line relief valve" and a defined term. The corrugated stainless steel tubing (CSST) has never been specified for vent line and in the field; it creates a confusion if it's acceptable or not to use this material, increased tubing size by one pipe size of diameter when used as a vent line.
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 highest inlet pressure of any one line relief valve does not exceed 1.1 times the lowest inlet pressure of any other line relief valve, based on manufacturer's product literature; and d) the highest start-to-discharge pressure of one line relief valve does not exceed 1.1 times the lowest start-to-discharge pressure of any of the other line relief valves, based on manufacturer's product literature.	**Revised/Relocated from 5.5.5** 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 5.5.4; (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 inlet pressures of the overpressure relief ***valves*** does not exceed 10%; and (d) the variance between the inlet pressures and the variance between the outlet pressures of the relief ***valves*** does not exceed 10%.	Revised (c) and (d) to fix the "variance" problem and what the value of 10% is based on.
5.5.2.3 Vents from pressure regulator with an internal relief valve shall be piped independently to the outdoors and not be manifolded with any other vents.	**New**	Clauses and Tables have been renumber accordingly.

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5.5.4 Venting exemptions for line pressure regulators	**New**	
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 ft^3/h (0.0283 m^3/h) of a gas having a specific gravity of 1.53; or ii) 2.5 ft^3/h (0.0706 m^3/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.	**New/Relocated/Revised from 5.2.2.4 and 5.2.3.1**	
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 ft^3/h (0.0706 m^3/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.	**New/Relocated/Revised from 5.2.3.2**	Cont.
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.	**New**	Clarification as not to be confused with the code definition of ***"ventilated space"***

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5.6 Termination of vents	**New**	
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.	**New/Relocated from 5.5.6**	
5.6.2 A vent line shall be of sufficient size and configuration to prevent impedance upon a regulator.	**New/Relocated from 5.5.7**	
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.	**New/Relocated from 5.5.8**	
5.6.4 The discharge from overpressure pressure 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 m^3/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 m^3/h).	**New/Relocated from 5.5.9**	These additional requirements have been added to clarify both the intent of the 2005 and 2010 B149.1 previous versions, and to allow service regulators for commercial/industrial installations which cannot be certified to CSA 6.18. The rationale for reducing the separation distance from the outlet of a relief device is if there is some assurance that the gas being released has a restricted flow rate.

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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.	**<u>Revised</u>** A fitting used with steel pipe shall be (a) either malleable iron or steel and shall comply with ANSI/B16.3; or (b) certified to Standard ANSI LC-4/CSA 6.32.	The new wording clarifies that class 300 lb fittings are the minimum when installed on schedule 80 piping systems. The ASME B16.3 standard only applies to malleable iron threaded fittings. Steel threaded fittings and socket weld fittings should conform to ANSI/ASME B16.11. Flanged steel fittings should conform to ANSI/ASME B16.5. Butt-weld steel fittings should conform to ANSI/ASME B16.9. Malleable iron unions should conform to ANSI/ASME B16.39
6.2.3.1 A gas piping system using natural gas or propane vapour phase 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 ½ 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 NPS 2½ to 10. (c) Pipe larger than NPS 10 shall be at least standard weight.	**<u>Revised</u>** 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 for pipe sizes up to and including NPS 10. 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, for pipe sizes up to and including NPS 10; at least Schedule 40 shall be used if joints are either welded or welded and flanged. Pipe larger than NPS 10 may be standard weight. <u>Cont.</u>	New defined term gas piping system Allows the use of schedule-10 black steel pipe for a fuel gas service. Review of schedule-10 piping vs. copper tube (ASTM A53 and ASTM B-88) indicates that wall thickness of schedule-10 piping is greater than the copper tubing wall thickness & has a higher tensile strength of the equivalent size. ASME B36.10 does not allow schedule-10 pipe to utilize threaded fittings. Fitting configuration would be either welded or press-connect both are currently accepted by CSA B149.1 (latest edition). Cont.

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6.2.3.2 A gas piping system using natural gas or propane vapour phase 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 when using welded or flanged joints; or (ii) Piping shall be at least schedule 80 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.	Cont.	Cont.
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.	**New**	The intent is to clarify the different types of copper tubing applications. Under ASTM B88, the types K and L are approved for underground and aboveground use. Subsequent Code Clauses have been renumbered accordingly
6.8 Piping practices	**6.8 Piping practices**	
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.	**New**	Test ports provide access to measure gas pressures at installation and future troubleshooting. The clause also requires that a test point(s) are suitably situated in the gas piping system.
6.9 Joints and connections		
6.9.1 Joints in steel piping shall be threaded, flanged, press-connected, or welded, and shall be specified in Clause 6.15.2. When mating flanges, they shall be of the same face type and rating.	**Revised** Joints in steel piping shall be threaded, flanged, press-connected, or welded, and shall be as permitted in Clause 6.15.2.	New wording provides clear guidance on the intended use of flanges.

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6.9.4 The acceptance criteria for any welds shall (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 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.*	**Revised** The acceptance criteria for any welds shall be as specified in Clause 7.10.2 of CSA Z662 or other approved methods.	Provides detailed references for the acceptable criteria of welds. A new Annex J (mandatory) is included to describe the visual inspection acceptance criteria, based on CSA Z662 requirements.
6.23 Purging of gas piping systems after leak testing	**6.23 Purging of piping and tubing systems and hose after leak testing**	New definition for gas piping systems
6.23.1 A gas piping system shall be purged to the outdoors using approved engineering practices or in accordance with Clauses 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) 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.	**Revised** 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.	To provide clarity to clauses 6.23 and 6.24 as to the requirements. The change is a blend of the existing Clauses in 6.23 and integrated Clauses of 8.3 of NFPA 58. Cont.

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Table 6.4 (See Clause 6.23.1 to 6.23.3.) Nominal piping, tubing or gas hose size in inches / Length of piping, tubing or gas hose in feet (m) ≥ 2 ½ but < 3 / > 50 (15.2) ≥ to 3 but < 4 / > 30 (9) ≥ to 4 but < 6 / > 15 (5) ≥ to 6 but < 8 / > 10 (3) > 8 / Any length **Note:** *Corrugated stainless steel tubing of size 2 in or less are to be sized accordingly to the same as piping.*	**New**	Cont.
6.23.2 When a gas piping system meeting the description of Table 6.4 and containing air is placed in service, it shall be first purged with an inert gas and then purged with fuel gas in accordance with Clause 6.23.4.	**New/Deleted**	Cont.
6.23.3 Where an existing gas piping system is removed from service for the purpose of repair, alteration, or abandonment, the section that is opened shall be isolated from the gas supply and the line purged in accordance with Clause 6.23.4. Where the piping, tubing or gas hose meets the description of Table 6.4, the residual fuel gas in the piping, tubing or gas hose shall be purged with an inert gas.	**New/Deleted**	Cont.

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6.23.4 The open end of a gas piping system being purged shall be discharged directly to an outdoor location. Purging operations shall comply with all of the following requirements: a) During purging operations, the open point of discharge shall be continuously attended by a qualified person. b) The point of discharge shall be directly controlled during the purging operation by means of a quarter-turn shut-off valve having an attached operating handle within 5 ft (1.5 m) of the open end. No other valve shall be used to control or terminate the purge. The person doing the purging shall be in direct control of the purging gas supply by means of this valve. The purge line shall not be smaller than NPS ½ . c) The point of discharge shall be located: i) at least 10 ft (3 m) from a source of ignition, and maximum precautions shall be taken to either remove or shut off any source of ignition prior to commencing the purge; ii) at least 10 ft (3 m) from a building or a building opening; and iii) at least 25 ft (7.5 m) from a mechanical air intake opening. d) Purging operations introducing fuel gas shall be maintained by a continuously burning flame at the burner port(s) until a stable gas flame is established. e) The device used to ignite the pressure vented or purged gas shall be as follows: i) a burner, not located in a combustion chamber, with a continuous or intermittent pilot; ii) two independent burners, not located in a combustion chamber, which reliably ignite one from the other; or iii) an approved burner for such purpose. f) Persons not involved in the purging operations and smoking shall be prohibited from all areas within 10 ft (3 m) of the point of discharge.	**New/Deleted**	Cont.

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6.23.6 A gas piping system not meeting the conditions specified in Clause 6.23.1 may be purged either a) to the outdoors, in accordance with Clause 6.23.4, or b) to the indoors, in accordance with Clause 6.23.7, or c) in accordance with good engineering practice.	**New/Deleted**	Cont.
6.23.7 When the conditions in Clause 6.23.6 allow it, a gas piping system shall be purged in an indoor space only in accordance with one of the following: a) The gas in the piping system shall be ignited at an appliance having an input rating up to and including 400 000 Btu/h (120 kW) with a readily accessible burner not located in a combustion chamber. Such burner shall be provided with a continuous source of ignition and a continuously burning flame shall be maintained at the burner port(s) until a stable gas flame is established; or b) For an appliance not equipped with a continuous pilot, in accordance with the procedure described in Annex H. When there is an open point of discharge during the purge, it shall be continuously attended by a qualified person.	**New/Deleted**	Cont.
6.23.8 When all gas piping systems have been purged and placed in service, the appliance or equipment piping shall be purged prior to being placed in service and the pilot lighted.	**Revised/Relocated to New 6.23.5** When flaring is used to ***purge*** a piping or tubing system, an ***approved purge burner*** shall be used.	Cont.
7 Installation of specific types of appliances	**7 Installation of specific types of appliances**	
7.2.3 Emergency generators	**7.2.3 Emergency use generators**	

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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.*	**New**	Overpressure conditions, an overpressure shut-off device in the piping to a generator used for life safety purposes will completely shut off the flow of gas to the generator. In the event that there is a need for the generator to activate at this time, it will not be able to do so. Therefore, over pressure protection should instead be controlled by either a monitoring regulator or an overpressure relief device (either internal or external to the regulator), as both of these methods will maintain gas flow to the generator.
7.22 Direct gas-fired process air heaters (DFPAH)	**7.22 Direct gas-fired process air heaters (DFPAH)**	
7.22.6.1 Where the installation is dependent upon exfiltration through the building envelope or through relief openings, the structure's designed exfiltration rate and the size of relief openings shall be determined by a professional engineer.	**Revised from 7.22.6** Where the installation is dependent upon exfiltration through the ***building*** envelope or through relief openings, the ***structure's*** designed exfiltration rate and the size of relief openings shall be determined by a professional engineer.	Cont. Second paragraph from Clause 7.22.6
7.22.6.2 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 burners do not operate until the air dampers are fully open.	**Revised from 7.22.6** 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 ***burners*** do not operate until the air ***dampers*** are fully open.	Cont. Third paragraph from Clause 7.22.6
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.	**New/Relocated to 7.22.9** In a spray booth application, an interlock shall be provided to lock out the spraying equipment unless the ***DFPAH*** is operated in the ventilation mode	Cont.

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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 burners 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.	**New/Relocated** Previous Clause 7.22.6 the 3rd paragraph is relocated to this new Clause 7.22.6.1	Cont.
7.22.7.2 Where the installation is dependent solely on an interlocked powered exhaust system, the airflow 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.	**New**	Cont.
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.	**Revised 7.22.7** The total air replacement of an installation in a spray booth shall not exceed the total exhaust capacity of the booth.	The revised provisions 7.22.6, 7.22.7 (New), and 7.22.8 address the exhaust fan interlock requirements for the ventilation and process modes along with the requirements to provide exhaust systems for spray area installations. Changed spray booth wording to spray area to similar requirements in NFPA 33 definitions.

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7.22.13 For a space served by a DFPAH operating in process mode, an interlock for access points, such as a door or partition, shall be provided 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".	**Revised** In a process application, an interlock for access points, such as a door or partition, shall be provided to ensure the DFPAH is operated in the ventilation mode for an minimum of 3 min or a minimum of four air changes of the process space served, whichever is greater	The changes and structural revisions reflect the intent of provision 4.21.12 of ANSI Z83.25 /CSA 3.19 Direct gas-fired process air heaters. The combustion products are not defined in the process mode of operation in this standard. The post purge cycle is defined in 7.22.14. The source document for these clauses in ANSI Z83.25/CSA3.19 was NFPA 33. The changes above are more consistent with NFPA 33. While Clause 4.21.12 of ANSI Z83.25/CSA3.19 is not specific about what applications require interlock, NFPA 33 is specific.
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 and 7.22.9 and 7.22.11; (b) Clause 7.22.12; or (c) Clause 7.22.13.	**Revised** 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.	Clarifies the intent of this clause.
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.	**New**	This provision incorporates the requirements of 4.21.21 and 4.21.23 from ANSI Z83.25/CSA 3.19 Direct gas-fired process air heaters. To differentiate between the process mode of the appliance and off gassing from drying or curing.

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7.22.18 In spray applications or other applications with flammable airborne particulate matter, the duct system of a DFPAH that recirculates process area air shall be provided with doors, panels or other means to facilitate inspection, maintenance, cleaning and access to fire protection devices. Filters that are suitable for their intended service shall be installed in the return air duct system.	**New**	This provision incorporates the requirements of 4.21.14, 4.21.15 and 4.21.16 from ANSI Z83.25/CSA 3.19 Direct gas-fired process air heaters. Filtration may not be necessary in all applications with airborne particulate matter, for example aggregate and salt dryers.
7.31 Lighting	**7.31 Lighting**	
7.31.4 Ventilation shall be provided when a lighting appliance is installed or used in an enclosure. The ventilation openings shall be at the top of the enclosure or as high as possible at the top of it and at the bottom of the enclosure, not less than 12 in (300 mm) above the outside grade level. The openings shall be of a minimum of 4 in^2 for each lighting appliance installed or used.	**New**	Illuminating devices (lamps/lights) in a very cramped and airtight enclosure require ventilation.
7.35 Operation of appliances at shows, exhibitions or other similar events The operation of appliances at shows, exhibitions or other similar events shall comply with Annex M and meet any additional requirements of the authority having jurisdiction.	**New**	The intent of the new Annex is to assist code users, as gas-fired equipment is increasingly popular at indoor/outdoor events.
8.5 Air-supply dampers, louvers, and grilles	**8.5 Air-supply dampers, louvers, and grilles**	
8.5.4 Except as permitted by Clause 8.5.6, 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.	**Revised** 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.	An alternative to interlocking combustion air damper prescribed in Clause 8.5.6.

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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 annunciate 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.*	**New**	The intent is to minimize or eliminate the necessity for an installer to refer to CSA C282 (predominantly an electrical installation code) when natural gas or propane is used as a fuel for emergency generators.
10 Residential fuelling appliances (RFAs) and vehicle fueling appliances (VFAs) used for natural gas without storage	**10 Vehicle refuelling appliances (VRA) without storage (for natural gas only)**	RFAs and VFAs are certified to separate standards. "VRA" is changed to "VFA" for consistency of terminology.
10.1.1 A VRA refuelling system shall be certified in compliance with the requirements of CSA/ANSI NGV 5.2	**Revised** A VRA refuelling system shall be ***certified*** in compliance with the requirements of CSA 12.6	
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.	**New/Revised/Relocated to 10.1.4** A ***VRA*** shall be installed on a firm support to prevent undue stress on piping and conduit.	Cont.

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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/Revised/Relocated to 10.1.5** A ***VRA*** shall be installed outdoors unless ***certified*** and labelled for indoor installation.	Cont.
Annex J (Normative) ***Acceptance criteria for visual inspection of welds*** **Note:** *This Annex is a mandatory part of this Code* **J.1General** **J.1.1** This Annex applies where referenced by the Code.	**New**	As part of the revision to Clause 6.9.4 Information within this annex copied from CSA Z662, This Annex applies to design pressures < 100 psig, and the inspection is on a self-inspections basis, as written it is left to the installation contactor to determine these things, unless provincial/territorial regulatory requirements imposed on a licensed gas/pipe/steam fitter, pressure piping contractor.
J.1.2 The completed welds on the outside surface of the piping shall be visually inspected for 100% of the weld length for any imperfections in accordance with the requirements of Clause J.2 The inspection shall be performed in accordance with documented procedures approved by the installation contractor. Such procedures shall include requirements for extent and frequency of visual examination, personnel qualifications and visual acuity, maximum viewing distance and angle, lighting conditions, evaluation tools, and reporting. ***Note:*** *The requirements for qualification of welding inspectors and procedures can be subject to other provincial or territorial regulations.*	**New**	Cont.

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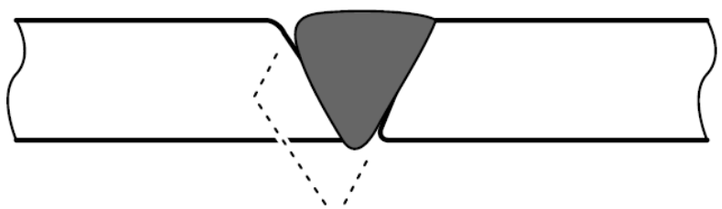
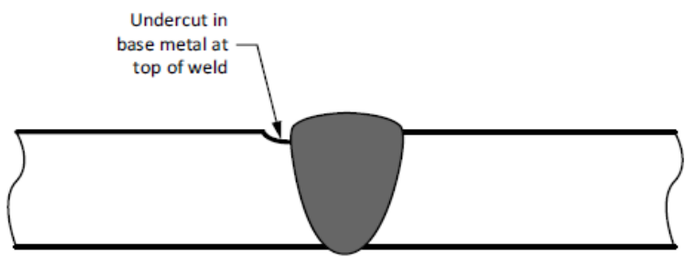
J.1.3 Results of the visual inspection of completed welds shall be reported in a format approved by the installation contractor. Reports of defective welds shall include (a) Weld identification; (b) description, position and length of defects; (c) date; and (d) signature of qualified inspector.	**New**	Cont.
J.2 Acceptance Criteria	**New**	Cont.
J.2.1 Weld Crown At no point shall the outside surface of welds be below the surface of the adjacent base metal or above it by more than the amount shown in Table J.1, except that an additional (1.0 mm) shall be allowed for localized deviation. **Table J.1** **Outside crown height** (See Clause J.2.1) **Nominal wall thickness, in (mm)** / **Outside crown height, maximum, mm** 3/8 (10.0) or less / 1/10 (2.5) Greater than 3/8 (10.0) / 1/8 (3.5)	**New**	Cont.

DRAFT - CSA - B149.1 - 2020	CURRENT- CSA - B149.1 - 2015	INTERPRETATIONS AND RATIONALE
J.2.2 Incomplete fusion Individual indications of incomplete fusion conditions at the crown of the weld, and at the root of the weld where accessible, shall not exceed ½ in (12 mm) in length. The cumulative length of such indications in any 12 in (300 mm) length of weld shall not exceed 1 in (25 mm), except that for welds less than 12 in (300 mm) long, the cumulative length of such indications shall not exceed 8% of the weld length (refer to Figure J.1) **Figure J.1** **Incomplete fusion** (See Clause J.2.2.)  Lack of bond at the root and top of joint where accessible	**New**	Cont.

DRAFT - CSA - B149.1 - 2020	CURRENT- CSA - B149.1 - 2015	INTERPRETATIONS AND RATIONALE
J.2.3 Undercut The following shall apply for acceptance of undercut in the top of the weld: (a) Except as permitted in Clause J.2.3 c), individual lengths of indications of undercut shall not exceed 2 in (50 mm) nor exceed a depth of 1/32 in (1.0 mm). (b) Except as permitted in Clause J.2.3 c), the cumulative length of such indications in any 12 in (300 mm) length of weld shall not exceed 2 in (50 mm), except that for welds less than 12 in (300 mm) long, the cumulative length of such indications shall not exceed 16% of the weld length. (c) Undercut depths less than 1/64 in (0.5 mm) or 6% of the nominal wall thickness, whichever is the lesser, shall be acceptable regardless of length, provided that a mechanical method of assessing the depth is used (see Figure J.2). **Figure J.2** **Undercut** (See Clause J.2.3.)  	**New**	Cont.

DRAFT - CSA - B149.1 - 2020	CURRENT- CSA - B149.1 - 2015	INTERPRETATIONS AND RATIONALE
J.2.4 Cracks and arc burns Indications of cracks shall be unacceptable regardless of location (weld metal or HAZ). Indications of arc burns shall be unacceptable regardless of location.	**New**	Cont.
J.2.5 Unequal leg length – Fillet welds Except where required by design, there shall be not more than 1/8 in (3 mm) difference between the leg lengths of each fillet weld.	**New**	Cont. Clause 7.11. 17 of CSA Z662 Includes additional limitations on accumulation of certain imperfections - incomplete penetration of root, incomplete fusion, hollow beading and burn-through at the root. Except for incomplete fusion at the top of the weld, the other imperfections are not detectable by (VI) visual inspection; therefore this Clause has not been included.
Annex K (informative) ***Pressure regulators and overpressure protection devices*** **Note**: *This Annex is not a mandatory part of this Code.*	**New**	This annex provides the code user with background information regarding the use of line pressure regulators. Cont.
K.1 Pressure control and regulation Figure K.1 illustrates the requirements of Clause 5 for pressure control, regulation, and overpressure protection	**New**	Cont.

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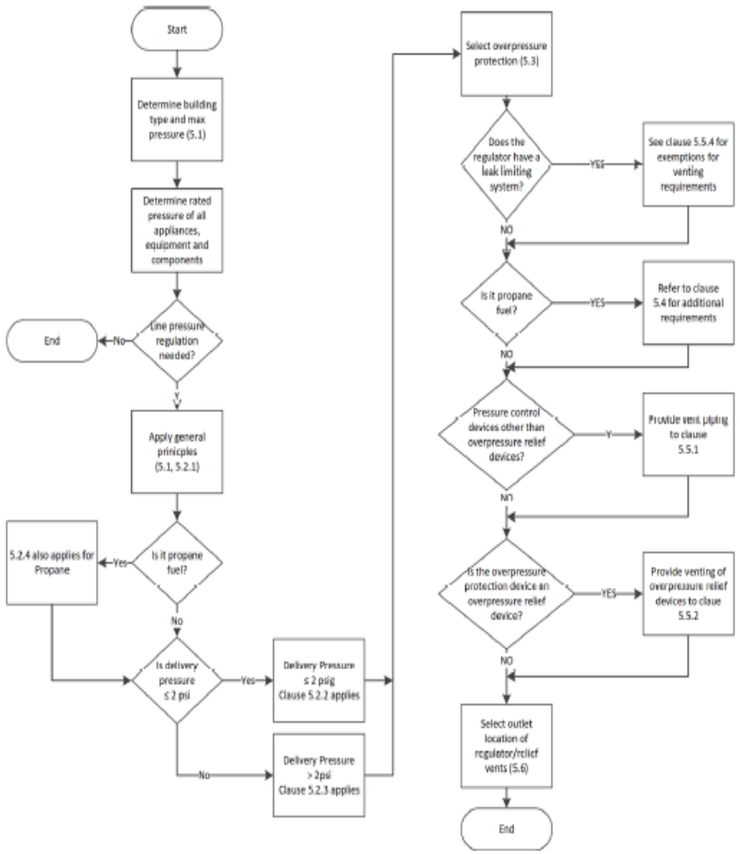
Figure K.1 **Pressure control regulation and overpressure protection** (See Clause K.1)  	**New**	Cont.

<table>
<tr><th>DRAFT - CSA - B149.1 - 2020</th><th>CURRENT- CSA - B149.1 - 2015</th><th>INTERPRETATIONS AND RATIONALE</th></tr>
<tr><td>K.2 ANSI Z21.80/CSA 6.22 Line pressure Regulators</td><td><u>New</u></td><td>Cont.</td></tr>
<tr><td>K.2.1

ANSI Z21.80 / CSA 6.22 applies to line pressure regulators for use with either natural gas or propane. These regulators are used where it is necessary to reduce the delivered pressure after the utility service regulator, to the required inlet pressure to the appliance.

ANSI Z21.80 / CSA 6.22 applies to regulators with an inlet pressure of either 2, 5 or 10 psig (13.8, 34.5 or 68.9 kPa), and for outlet pressures of either 2 psig (13.8 kPa), or 0.5 psig (3.5 kPa) or less, and are organized into Class I or Class II regulators as shown in Table K.1.

Table K.1
Line Pressure Regulator Class Rating
(See Clause K.2.1.)

<table>
<tr><td rowspan="2" colspan="2">Rated inlet pressure</td><td colspan="4">Maximum outlet pressure</td></tr>
<tr><td colspan="2">Class I*</td><td colspan="2">Class II</td></tr>
<tr><td>2 psi</td><td>(13.8 kPa)</td><td>½ psi</td><td>(3.5 kPa)</td><td colspan="2">---</td></tr>
<tr><td>5 psi</td><td>(34.5 kPa)</td><td>½ psi</td><td>(3.5 kPa)</td><td>2 psi</td><td>(13.8 kPa)</td></tr>
<tr><td>10 psi</td><td>(68.9 kPa)</td><td>½ psi</td><td>(3.5 kPa)</td><td>2 psi</td><td>(13.8 kPa)</td></tr>
</table>

*Class I regulators may be adjustable to ½ psi (3.5 kPa) or less.</td><td><u>New</u></td><td>Cont.</td></tr>
<tr><td>K.2.2.1
The ANSI/CSA standard includes requirements for overpressure protection devices of the following types:
(a) overpressure shut-off device;
(b) overpressure relief device (either a regulator with internal relief, or by use of an external relief device); and
(c) monitoring regulator.</td><td><u>New</u></td><td>Cont.</td></tr>
</table>

DRAFT - CSA - B149.1 - 2020	CURRENT- CSA - B149.1 - 2015	INTERPRETATIONS AND RATIONALE
K.2.2.2 The standard only requires a line pressure regulator to be provided with an overpressure protection device under the following conditions: (a) The rated inlet pressure to the regulator is greater than 2 psi (13.8 kPa) (i.e. rated to either 5 psi or 10 psi (34.5 or 68.9 kPa); (b) The outlet pressure is capable of being adjusted to deliver a pressure of 0.5 psi (3.5 kPa) or less; and (c) The overpressure protection device is set to limit the downstream pressure to a maximum of 2 psi (13.8 kPa) in the event of a failure of the regulator. If a separate overpressure protection device is used, ANSI Z21.80/CSA 6.22 requires that the overpressure device be factory pre-assembled and supplied to the field as a unit. This would apply to overpressure shut-off devices, monitoring regulators (where a separate regulator is used), and a line relief valve. The testing of the overpressure protection device only determines that, once the protection device has activated, the downstream pressure does not exceed 2 psig (13.8 kPa). This means that for an appliance with an inlet pressure of 14 in.wc. or less, in event of a failure of the upstream line pressure regulator, the appliance may be subject to pressures of up to 2 psi (13.8 kPa).	**New**	Cont.
K.2.3 When the operating pressure is required to be greater than 2 psi (13.8 kPa), then a high pressure regulator (uncertified) will need to be used, since there is presently no certified regulator available that can regulate the outlet pressure to more than 2 psi.	**New**	Cont.
K.3 Types of overpressure protection devices	**New**	

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K.3.1 Monitoring regulators Monitoring regulators consist of a working regulator and a second regulator which “monitors” the downstream pressure of the working regulator. In the event of a failure of the working regulator, the monitoring regulator will then operate to control the downstream pressure., and should be set to deliver a safe operating pressure (i.e. in accordance with overpressure setpoint requirements). If a working regulator fails, it is usually because of a failure of the diaphragm, in which case gas will leak into the upper diaphragm chamber and be vented through the bleed vent; the odour should then attract attention to the failed regulator. The monitoring regulator may be constructed either as: (a) a physically separate regulator, mounted either downstream of the working regulator, or mounted upstream of the working regulator and provided with a regulation sensing line piped downstream of the working regulator; or (b) an integrated regulator mounted directly to the working regulator. In either case, the operating principle is the same. In event of a failure of the working regulator, this arrangement will continue to supply pressure to the downstream system, at the pressure to which the monitoring regulator is set.	**New**	Cont.
K.3.2 Overpressure shut-off device (or cut-off device) An overpressure shut-off device is a special diaphragm valve mounted upstream of the working regulator and provided with an external registration line piped to the downstream side of the working regulator. In the event of a failure of the working regulator, when the downstream pressure rises above setpoint, the shut-off device will close the supply of gas to the system. The pressure setpoint, therefore, must be in accordance with overpressure setpoint requirements.	**New**	Cont.

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K.3.3 Regulator with internal relief A line pressure regulator with internal relief has a pressure relief valve built into the diaphragm of the working regulator that senses downstream pressure. On a pressure rise above its setpoint, the internal relief valve opens, causing downstream gas to pass into the upper diaphragm chamber, to be vented to the outdoors through the regulator vent port. The pressure setpoint, therefore, must be in accordance with overpressure setpoint requirements. The regulator will continue to supply gas to the downstream system. **Note**: *some regulators are offered with partial internal relief, meaning it has limited relieving capacity and might not control the downstream pressure. This Code requires internal relief valves to fully relieve the capacity of the regulator.*	**New**	Cont.
K.3.4 Line relief valve Similar in function to the regulator with internal relief, the line relief valve is mounted on piping network immediately downstream of the pressure regulator. **Note**: *Where a line pressure regulator is certified to ANSI Z21.80 / CSA 6.22 and a line relief valve is used, the relief valve must be provided with the regulator as a complete set.*	**New**	Cont.
K.3.5 Overpressure protection Setpoints Clause 5.3 specifies the requirements for use of overpressure protection devices and for setting of their control setpoints. Figure K.2 illustrates the logic for determining these requirements.	**New**	Cont.

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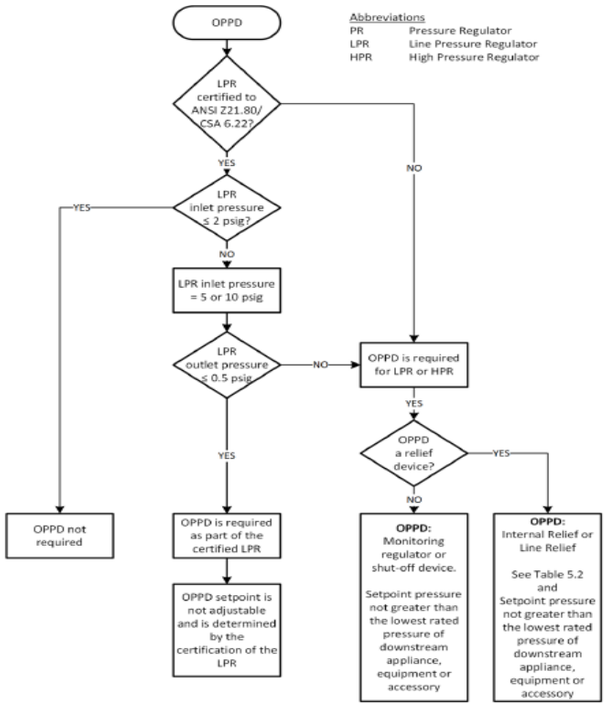
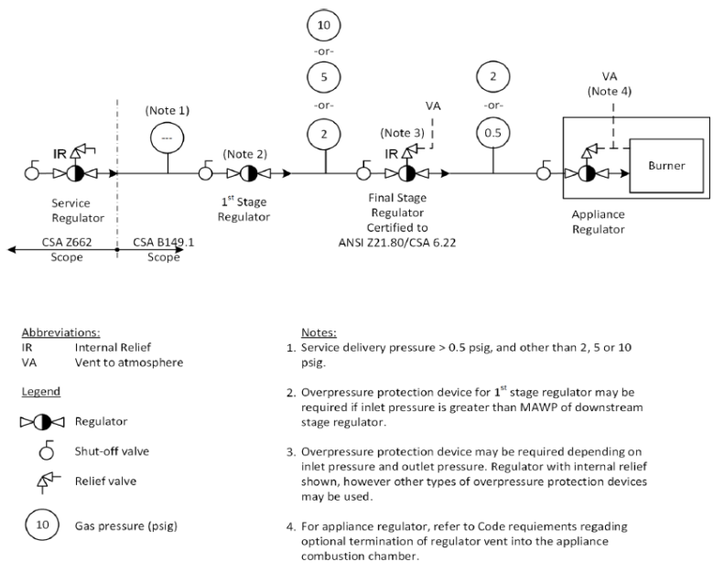
Figure K.2 **Requirements for overpressure protection devices (OPPD)** (See Clause K.3.5.)  **Note**: *This Figure is provided for illustration purposes only. The requirements of Clause 5.3 govern.*	**New**	Cont.

DRAFT - CSA - B149.1 - 2020	CURRENT- CSA - B149.1 - 2015	INTERPRETATIONS AND RATIONALE
K.4 Multi-stage regulation for natural gas Where the delivery pressure after the service regulator is other than 2, 5 or 10 psi (13.8, 34.5, or 68.9 kPa), and the appliance inlet pressure is 2 psi (13.8 kPa) or less, then two (or more) stages of line pressure regulators will be required. The first-stage regulator will reduce the service delivery pressure to a pressure of 2, 5 or 10 psi (13.8, 34.5, or 68.39 kPa), and then the second-pressure regulator (i.e., uncertified regulator since there is presently no certified regulator available that can regulate the outlet pressure to greater than 2 psi (13.8 kPa). See Figure K.3.	**New**	Cont.
Figure K.3 **Multi-stage line pressure regulation for natural gas** (See Clause K.4.)  	**New**	Cont.

DRAFT - CSA - B149.1 - 2020	CURRENT- CSA - B149.1 - 2015	INTERPRETATIONS AND RATIONALE
K.5 Leak limiters and ventilated spaces Line pressure regulators certified to ANSI Z21.80 / CSA 6.22 can be provided with a vent limiter (also known informally as a leak-limiting device) which, if there is a small leak in the diaphragm, will limit the leakage rate through the regulator vent connection to a prescribed amount. The Code permits such regulators to be installed inside the building and not require the regulator to be piped to the outdoors provided the regulator is located in a ventilated space. While high pressure regulators and other uncertified regulators may also be equipped with a vent limiter, this Code does not allow this exemption for such pressure regulators. While the Code provides a definition for a ventilated space, it does not state any performance criteria to demonstrate if the space is suitably ventilated to prevent a hazardous accumulation of gas in the space. However, if such demonstration is required by an authority having jurisdiction, CSA C22.1, rule 18-006, Appendix B references API RP 505, which states the concentration of a flammable gas should not exceed 25% of the lower explosion limit (LEL) of a flammable gas for a room to be a “ventilated room”. This 25% LEL is commonly used in other standards as an upper control limit. Natural gas LEL is 5% by room volume. For a pressure regulator emitting 2.5 CFH natural gas, and for it not to exceed 1.25% by room volume, then the space must have an air change rate of only 200 CFH, or 3.33 CFM. This is a very low ventilation rate (it cannot be measured accurately by commercial measuring equipment). For propane, the LEL is 2.1% by room volume. At a release rate of 1 CFH, this has the same ventilation rate for natural gas (i.e. a ventilation rate of 200 CFH or 3.333 CFM).	**New**	For an unventilated space of 30 x 30 x 12 ft (a typical commercial building structural bay), it will take almost 65 hours to reach a concentration of 1.25% by room volume. For a space of 20 x 20 x 8 ft (2 car garage), it will take approximately 20 hrs. Similarly, for propane, it will take 55 hours to reach a concentration of 0.5% by room volume for a room of 30 x 30 x 12 ft, and 16 hours for a room of 20 x 20 x 8 ft (2 car garage) dimensions. Typical room air change rates for general purpose ventilation is 2 CFM/SF of floor area. For a space which is 100 ft^2, this equates to 20 CFM or 1200 CFH (six times the 200 CFH minimum air change rate described above). For larger rooms, the result is even more conservative.

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Cont. One possible means of meeting this requirement is to provide a mechanical ventilation system that will exhaust 500 ft^3 in 1 h (on a continuous or non-continuous basis); this will provide a factor of safety of 2.5:1 to allow for incomplete mixing of the gas in the space. For a continuous ventilation system, 500 CFH is only 8.3 CFM. If the fan only operates 5 min per h, then the required ventilation exhaust rate is 100 CFM. For comparison, a typical residential washroom exhaust fan is 80-100 CFM.	**New**	Cont.
Annex L (informative) ***Recommended requirements for automatic safety shutoff 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.*** **Note:** *This Annex is not a mandatory part of this Code.* **L.1** When using automatic valves handling inlet gas pressures over 150 psi (1034.3 kPa) and capacities greater than 12.5 MMBtu/h (3.66 MW), the valves should be approved for a given application. When approving a valve for this kind of application, the following performance requirements should be taken into consideration: a) The automatic valve should not incorporate a bypass or an external means which prevents it from closing. b) The pressure rating, temperature rating, and corrosion resistance should be taken into account. c) There should be UV protection if installed outside. d) The automatic valve should not utilize fuel gas pressure/flow through the valve or an external power source for closure. Cont.	**New**	Annex L was added in support of Clauses 7.2.4.2 and 7.2.4.3

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Cont. e) The automatic valve should not have a closing time so slow that it would adversely affects the safety of downstream equipment; f) The automatic valve should use elastomers resistant to the effects of the gas. g) The automatic valve should comply with the following clauses in ANSI Z21.21/CSA 6.5: i) Clause 4.1, General requirements; ii) Clause 4.2, Equipment and data to be furnished by the manufacturer; iii) Clause 4.3, Assembly; iv) Clause 4.8, Materials; v) Clause 4.9, Instructions; and vi) Clause 5.4, Leakage (number of cycles, as declared by the automatic valve manufacturer, with which the automatic valve can comply; the recommended capability is 20 000 cycles). h) Closing times should be not more than 5 s.	**New**	Cont.
Annex M (normative) ***Requirements for the operation of appliances at shows, exhibitions or other similar events*** **Note:** *This Annex is a mandatory part of this Code.*	**New**	The intent of the new Annex is to assist code users, as gas-fired equipment is increasingly popular at indoor/outdoor events.
M.1 This Annex applies to appliances that (a) are on display at shows, exhibitions, or other similar events; and (b) are designed to be used outdoors or vented to the outdoors.	**New**	Cont.
M.2 An appliance may be operated and vented indoors if it meets the requirements of this Annex.	**New**	Cont.

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M.3 An appliance shall only be used for the purpose of demonstrating its operation but shall not be used for heating space, water, or any other thing or for any other purpose.	**New**	Cont.
M.4 An appliance certified or approved for outdoor use being operated indoors for the purpose of demonstration shall be clearly marked with a warning that this appliance is for outdoor use only and the sign shall read: WARNING THE USE OF THIS TYPE OF APPLIANCE IS PROHIBITED FOR INDOOR USE. FOR YOUR SAFETY THE UNIT IN THIS DISPLAY IS CONSTANTLY MONITORED FOR THE PRESENCE OF CARBON MONOXIDE. TO PROTECT YOU AND YOUR FAMILY NEVER USE A (name of the appliance i.e. BBQ, Patio Heater, Fire Pit, etc.) INDOORS, INCLUDING A GARAGE. ATTENTION L'UTILISATION DE CE TYPE D'APPAREIL EST INTERDITE POUR L'UTILISATION À L'INTÉRIEUR. POUR VOTRE SÉCURITÉ L'APPAREIL DANS CETte EXPOSITION EST SURVEILLÉ CONSTANTMENT POUR LA PRÉSENCE DE MONOXYDE DE CARBONE. POUR PROTÉGER VOUS ET VOTRE FAMILLE, N'UTILISER JAMAIS (name of the appliance i.e. BBQ, Patio Heater, Fire Pit, etc.) À L'INTÉRIEUR, Y COMPRIS UN GARAGE. The sign shall be located immediately adjacent to the appliance and in clear view of the public, and the letters shall be a minimum 1 in (25 mm) high.	**New**	Cont.

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M.5 An appliance shall be installed and activated initially by a person holding an appropriate valid certificate under the authority having jurisdiction.	**New**	Cont.
M.6 A person who has knowledge of the manufacturer's operating instructions for the appliance shall be in constant and immediate control of the operation of the appliance. A copy of the manufacturer's instructions shall be left with the appliance.	**New**	Cont.
M.7 An appliance shall be certified or approved.	**New**	Cont.
M.8 The level of carbon monoxide in the vicinity of an appliance shall a) be measured at intervals not exceeding 3 h, b) be measured 4 ft (1.2 m) above the floor and 4 ft (1.2 m) horizontally from the appliance, and c) be recorded with the date and time the measurements were made. The record of levels of carbon monoxide made shall be kept where the appliance is displayed and for the entire period of its display.	**New**	Cont.
M.9 An appliance shall be shut down if the carbon monoxide level determined under Clause M.8 exceeds 25 ppm.	**New**	Cont.
M.10 A means shall be provided to physically protect any person from contact with hot surfaces, hot gases or flames resulting from operation of an appliance.	**New**	Cont.

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M.11 A certified portable fire extinguisher classified in accordance with ULC Standard CAN/ULC-S508-02 (R2013) “Standard for the Rating and Fire Testing of Fire Extinguishers” of not less than 10-B:C rating shall be located at each booth or stall displaying appliances.	**New**	Cont.
Annex N (Informative) **Generators, compressors/pressure boosters, engines, and turbines** **Note:** *This informative (non-mandatory) Annex is written in normative (mandatory) language to facilitate adoption where users of the Code or regulatory authorities wish to adopt it formally as additional requirements to this Code.*		Clauses reproduced in this informative Annex, have been moved into Code B149.3-20 as mandatory requirements. A substantial segment of the industry makes use of sub-section 7.2 of the CSA B149.1-15 Code, If the clauses are removed entirely from the B149.1-20 edition, industry would be forced to acquire and carry another document for a small portion of its content.
N.1 Compressors/pressure boosters	**New**	Cont.
N.1.1 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.	**New**	Cont.
N.1.2 A compressor shall be isolated from vibration at the inlet or outlet by a gas hose certified to the requirements of CAN/CSA-8.1, CAN/CSA-8.3, ULC/ORD C536, or CGA CR96.	**New**	Cont.
N.1.3 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 safety device installed in the booster outlet piping set to prevent the system pressure from exceeding the normal operating pressure by 20%.	**New**	Cont.

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N.1.4 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 17 of CSA B149.3 and shall not have a capacity greater than 500 scf/h (14.15 m^3/h).		Cont.
N.2 Engines and turbines	**New**	Cont.
N.2.1 If the generator is used as emergency electrical supply system as defined by CSA C282, the gas train safety interlocks, if installed, shall be permitted to be wired and operated in accordance with Table 1 of CSA C282.	**New**	Cont.
N.2.2 A turbine not falling under Clause 17.3.5 of CSA B149.3 or engine shall be equipped with a) a safety shut-off valve or valves as required in Clause 17.3.3 of CSA B149.3 that are certified in accordance with the requirements of ANSI Z21.21/CSA 6.5. 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 or gas control valve; and e) a gas hose certified to the CAN/CGA-8.1, CAN/CGA-8.3, ULC C536 or CGA CR96, not exceeding 6 ft (2 m) in length, where the gas is installed downstream of the safety shut-off valve or valves required under Item a). The valve train upstream of the gas hose shall be mounted, anchored, and supported in such a manner as to minimize damage to the valve train from the engine or turbine vibration	**New**	Cont.

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N.2.3 A turbine not falling under Clause 17.3.5 of CSA B149. 3 or an engine shall comply with the following. Where the input to an engine or turbine is a) up to and including 2.5 MMBtu/h (732 kW), one safety shut-off valve marked C/I or two safety shut-off valves I. However, if propane-fueled, a minimum of two safety shut-off valves shall be provided; b) over 2.5 MMBtu/h (732kW), and up to and including 5 MMBtu/h (1464 kW), at least two safety shut-off valves shall be provided, each marked C/I, and shall be piped in series and wired in parallel; c) over 5 MMBtu/h (1464 kW), and up to and including 12.5 MMBtu/h (3660 kW), two safety shut-off valves shall be in series, each marked C/I. At least one safety shut-off valve shall be equipped with a proof of closure switch that is integrated with the start-up circuit; and d) over 12.5 MMBtu/h (3660 kW), at least two safety shut-off valves in series, each marked C/I. Each safety shut-off valve shall be equipped with a proof of closure switch that is integrated with the start-up circuit. The two safety shut-off valves shall be supervised by an approved valve proving system (VPS), which is integrated into the start-up circuit and prevent safety shut-off valves from opening when a leak is detected, or be equipped with an automatic vent valve installed in a vent line that is connected into the valve train immediately downstream of the first automatic safety shut-off valve.	**New**	Cont.
N.2.4 Where the input to an engine or turbine is in excess of 2.5 MMBtu/h (732 kW), a high gas pressure safety device and a low gas pressure safety device shall be installed and set to detect incorrect outlet pressure ranges of the pressure regulator.	**New**	Cont.

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N.2.5 A turbine having capacities greater than 12.5 MMBtu/h (3.66 MW) and inlet pressures greater than 150 psi shall be equipped with a) two safety shut-off valves in series, each with proof of closure, and automatic vent valve installed downstream of the first safety shut-off valves. Each safety shutoff valve and the automatic vent valve shall be approved for use in the application; **Note:** *See Annex K for recommended requirements automatic valves to be approved for use.* b) a control valve and a turbine controller to maintain proper turbine speed; and c) a gas hose, having a length recommended by the hose manufacturer for the application, shall be installed between the turbine and the control valve or between the turbine and the externally installed safety shutoff valve.	**New**	Cont.
N.2.6 Where an engine or turbine is of an automatic-start type, it shall be equipped with overcrank protection in addition to the requirements of Clauses 17.3.2 to 17.3.4 of CSA B149.3.	**New**	Cont.
N.2.7 Where the inlet 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.	**New**	Cont.
N.2.8 The valve train shall meet the over-pressure protection requirements of Clause 10.4.	**New**	Cont.
N.2.9 A regulator or relief valve shall be vented to a safe location outdoors and shall meet the requirements for venting or pressure control devices per Clause 7.2.4.3 of CSA B149.1.	**New**	Cont.

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N.3 Additional requirements for engines and turbines in buildings	**New**	Cont.
N.3.1 An engine or turbine installation in a building shall be in compliance with Clause 7.2.5 of CSA B149.1.	**New**	Cont.
N.3.2 The equipment for indoor installation or in an enclosure shall be equipped 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 equipment.	**New**	Cont.
END		