

American National
Standard/CSA Standard For
**Gas-Fired Low-Intensity
Infrared Heaters**

AMERICAN NATIONAL STANDARD
ANSI Z83.20-2008

CSA STANDARD
CSA 2.34-2008

Second Edition - 2008
This Standard is based on the Standard for
Gas-Fired Low-Intensity Infrared Heaters
ANSI Z83.20-2001 • CSA 2.34-2001
and Addenda Z83.20a-2003 • CSA 2.34a-2003,
Z83.20b-2004 • CSA 2.34b-2004

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Preface

This publication represents a basic standard for safe operation, substantial and durable construction, and acceptable performance of gas-fired low-intensity infrared heaters. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection and research on gas-fired low-intensity infrared heaters designed for utilization of gas. There are risks of injury to persons inherent in appliances that, if completely eliminated, would defeat the utility of the appliance. The provisions in this standard are intended to help reduce such risks while retaining the normal operation of the appliance.

Nothing in this standard is to be considered in any way as indicating a measure of quality beyond compliance with the provisions it contains. It is designed to allow compliance of gas-fired low-intensity infrared heaters, the safety construction and performance of which may exceed the various provisions specified herein. In its preparation, recognition has been given to possibilities of improvement through ingenuity of design. As progress takes place, revisions may become necessary. When they are believed desirable, recommendations or suggestions should be forwarded to the Z21/83 Committee, 8501 East Pleasant Valley Road, Cleveland, Ohio 44131, or the Chairman of the CSA Technical Committee on Gas Appliances and Related Accessories, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.

Safe and satisfactory operation of gas-fired low-intensity infrared heaters depends to a great extent upon its proper installation, use and maintenance. It should be installed, as applicable, in accordance with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54*; the *Natural Gas and Propane Installation Code, CSA B149.1*.

Users of this American National Standard/CSA Standard are advised that the devices, products and activities within its scope may be subject to regulation at the Federal, Territorial, Provincial, state or local level. Users are strongly urged to investigate this possibility through appropriate channels. In the event of a conflict with this standard, the Federal, Territorial, Provincial, state or local regulation should be followed.

THIS STANDARD IS INTENDED TO BE USED BY THE MANUFACTURING SECTOR AND BY THOSE APPLYING THE EQUIPMENT AND BY THOSE RESPONSIBLE FOR ITS PROPER INSTALLATION. IT IS THE RESPONSIBILITY OF THESE USERS TO DETERMINE THAT IN EACH CASE THIS STANDARD IS SUITABLE FOR AND APPLICABLE TO THE SPECIFIC USE THEY INTEND.

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EFFECTIVE DATE: An organization using this standard for product evaluation as a part of its certification program will normally establish the date by which all products certified by that organization should comply with this standard.

History Of The Development Of The Standard For Gas-Fired Low-Intensity Infrared Heaters

(This History is informative and is not part of the standard.)

With the onset of the Free Trade Agreement between the United States and Canada on January 2, 1988, significant attention was given to the harmonization of the United States and Canadian safety standards addressing gas-fired equipment for residential, commercial and industrial applications. It was believed that the elimination of the differences between the standards would remove potential trade barriers and provide an atmosphere in which North American manufacturers could market more freely in the United States and Canada. The harmonization of these standards was also seen as a step toward harmonization with international standards.

The draft harmonized standard was based on current coverage from the American National Standard for Gas-Fired Infrared Heaters, Z83.6-1990, and the Canadian Standard for Gas-Fired Infra-Red Heaters, CAN1-2.16-M81.

At the November 18, 1998 meeting of the Z21/(Interim) CSA Joint Subcommittee for Gas-Fired Infrared Heaters, the subcommittee approved the draft harmonized standard on Gas-Fired Low-Intensity Infrared Heaters, Z83.20/CSA 2.34 for distribution for Public Review and Comment. The proposed draft harmonized standard was distributed for industry review on January 15, 1999.

At its October 1999 meeting, following reconsideration and modifications of the proposed draft standard for Gas-Fired Low-Intensity Infrared Heaters, the subcommittee recommended the the proposed draft standard to the Accredited Standards Committee Z21/83 and the CSA Technical Committee on Gas Appliances and Related Accessories for approval.

The proposed draft harmonized standard for Gas-Fired Low-Intensity Infrared Heaters was approved by the Z21/83 Committee on January 19, 2001, and by the CSA Technical Committee by letter ballot dated February 25, 2000.

The first edition of the American National Standard/CSA Standard for Gas-Fired Low-Intensity Infrared Heaters was approved by the Canadian Interprovincial Gas Advisory Council (IGAC) on January 4, 2001 and by the American National Standards Institute, Inc. (ANSI), on March 14, 2001.

This, the second edition of the American National Standard/CSA Standard for Gas-Fired Low-Intensity Infrared Heaters, was approved by the Canadian Interprovincial Gas Advisory Council (IGAC) on September 14, 2007 and by the American National Standards Institute, Inc. (ANSI) on February 15, 2008.

The previous editions of the Gas-Fired Low-Intensity Infrared Heaters, and addenda thereto, approved by the IGAC and ANSI Institute, Inc. are as follows:

ANSI Z83.20-2001 • CSA 2.34-2001
ANSI Z83.20a-2003 • CSA 2.34a-2003
ANSI Z83.20b-2004 • CSA 2.34b-2004

The following identifies the designation and year of the harmonized standard:

ANSI Z83.20-2008 • CSA 2.34-2008

Note: This edition of Z83.20 • CSA 2.34 incorporates changes to the 2001 edition and addenda thereto. Changes are denoted by a vertical line in the margin.

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American National Standard/CSA Standard For Gas-Fired Low-Intensity Infrared Heaters

Part I: Construction

1.1 Scope

1.1.1

This standard applies to newly produced, gas-fired low-intensity infrared heaters and infrared radiant tube heaters (see Part IV, Definitions), hereinafter referred to as heaters or appliances, constructed entirely of new, unused parts and materials with inputs up to and including 400 000 Btu/hr (117.23 kW) per burner:

- a. For use with natural gas;
- b. For use with manufactured gas;
- c. For use with mixed gas;
- d. For use with liquefied petroleum (propane) gases;
- e. For use with LP gas-air mixtures; and
- f. Convertible for use with natural gas and liquefied petroleum (propane) gases, when provision is made for the simple conversion from one gas to the other.

1.1.2

The heaters covered by this standard are intended for installation in and heating of outdoor spaces or nonresidential indoor spaces and are intended for location where flammable gases or vapors are not generally present.

Although heaters covered by this standard may, in certain instances, be suitable for application in industrial processes, this standard does not cover industrial process burners.

1.1.3

Low-intensity infrared heaters and infrared radiant tube heaters may be suspended overhead, angle mounted overhead, wall mounted or floor mounted. Floor-mounted heaters may be free-standing and, when for outdoor installation, also may be portable to the extent defined in Part IV, Definitions.

1.1.4

Overhead heaters complying with this standard are suitable for use in (1) aircraft hangars when installed in accordance with the Standard for *Aircraft Hangars*, ANSI/NFPA 409, and (2) garages when installed in accordance with the Standard for *Parking Structures*, ANSI/NFPA 88A, or the Standard for *Repair Garages*, ANSI/NFPA 88B, or the Canadian *Natural Gas and Propane Installation Code*, CSA B149.1, and are so marked.

1.1.5

The heaters covered by this standard may be:

- a. Designed for connection to a vent; or
- b. Not designed for connection to a vent.

1.1.6

The construction and performance of heaters covered by this standard are specified in Parts I and II, respectively. The definitions for certain terms used are in Part IV, Definitions.

1.1.7

If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated value is to be regarded as the specification.

1.1.8

All references to “psi” are to be considered gage pressures unless otherwise specified.

1.1.9

Exhibit A, Items Unique to the United States, contains provisions that are unique to the United States.

1.1.10

Exhibit B, Items Unique to Canada, contains provisions that are unique to Canada.

1.1.11

Exhibit D, List of Reference Standards, contains a list of standards specifically referenced in this standard, and sources from which these reference standards may be obtained.

1.2 General Construction

1.2.1

The construction of the heater shall be such that it will not show signs of becoming warped, bent, broken or otherwise damaged during the initial test installation or during any of the tests specified, so as to prevent its compliance with this standard, and, whether specifically covered in this standard or not, shall be in accordance with reasonable concepts of safety, substantiality and durability.

All specifications as to construction set forth herein may be satisfied by the construction actually prescribed or such other construction as will provide at least equivalent performance and durability.

1.2.2

Asbestos shall not be used.

1.2.3

Every part of the heater shall be secure against displacement and shall be constructed so as to maintain a fixed relationship between essential parts under normal and reasonable conditions of handling and usage. Parts not permanently secured shall be designed so they cannot be incorrectly assembled and cannot be improperly located or misaligned in removing or replacing during cleaning or other servicing.

1.2.4

A panel shall be designed so as to prevent its being attached in an improper position or being interchanged with other panels on the same heater in a manner that may interfere with proper operation of the heater.

1.2.5

Radiant tube type heaters shall be provided with reflectors or other means to deliver radiation in the desired direction with the exception of elbows, continuous radii u-bends and connecting fittings.

1.2.6

If designed for connection to a vent, the construction of a heater shall be such that during normal operation no flue gases will be discharged into the room air.

1.2.7

A floor-mounted heater shall be constructed so it cannot be tipped by any reasonable pressure or pull. This provision shall not apply to appliances which are provided with means (including necessary screws, bolts, or both) and instructions for attaching them to the floor or wall.

Method of Test

Appliances weighing up to 100 lb (45.4 kg) shall be tipped in any direction at an angle of 15 degrees (0.26 rad) from the vertical and shall not tip over when released.

Appliances weighing over 100 lb (45.4 kg), shall not tip over when a horizontal force equal to $\frac{1}{10}$ of the appliance weight is applied in any direction at the center of the top of the appliance.

1.2.8

A heater for outdoor installation shall have all controls and electrical wiring adequately protected from climatic conditions.

1.2.9

Special construction provisions applicable to heaters for outdoor installation are outlined under [1.1.2](#), [1.2.8](#), [1.6.4](#), [1.8.10](#), [1.27.9](#), [1.5](#), [1.40](#) and [B.3.1](#).

1.2.10

A heater for indoor installation designed to vent the flue gases horizontally outdoors through a wall by means other than a conventional venting system shall be provided with the means for venting the flue gases to the outdoors unless the necessary parts to accomplish this are of specific types tested by a nationally recognized testing agency and the appliance manufacturer's instructions identify and specify the use of such specific parts (see [1.27.12](#) and [2.1.9](#)).

1.3 Assembly

1.3.1

The construction and assembly of the heater shall be of a neat and workmanlike character with parts well fitted and bolts or other fasteners drawn up to give rigidity. Any exposed edges of the appliance which might be brought in contact with the hand during normal usage or adjustment shall be smooth.

1.3.2

In submitting the heater for test, the manufacturer may furnish a list of manufacturing tolerances applicable thereto and have the appliance tested for compliance with this standard at both extremes of tolerance specified.

1.3.3

Bolts, nuts, screws, except sheet-metal screws, and other threaded fasteners used in the general assembly of the heater shall have threads conforming to the *Standard for Unified Inch Screw Threads (UN and UNR Thread Form)*, *ANSI/ASME B1.1*, or the *Standard for Unified American Screw Threads, CSA B1.1*.

1.3.4

When tap screws are used for attaching pipe supports they shall not be less than $\frac{3}{16}$ in (4.8 mm) (No. 10) size.

1.4 Accessibility

1.4.1

All controls shall be accessible for normal servicing and functional adjustment in position and shall be replaceable during normal servicing. Manifold assemblies which permit removal of control(s) intact shall be considered as complying with this provision for servicing. Removal of an access panel or door to provide access to a control compartment shall be considered acceptable.

1.4.2

It shall be possible to oil the motor, blower or fan bearings, which require that lubricant be added, without dismantling or removing any portion of the draft hood or venting system.

1.4.3

It is permissible to disconnect the draft hood or venting system for removal of the blower assembly.

1.5 Combustion Air

In the event the blower motor providing the draft becomes inoperative on an appliance provided with an induced draft or power burner, the appliance design shall be such as to prevent gas flow to the main burner(s).

A properly applied centrifugal or sail switch, or equivalent device, meets the intent of this provision. If a centrifugal switch is used, the blower shall be secured to the shaft on which the centrifugal switch is located by means of: keying, two set screws with at least one on a flatted shaft, a locking type set screw on a flatted shaft, or the equivalent.

1.6 Materials

1.6.1

The minimum thickness of sheet-metal reflectors shall be as follows:

Sheet Steel	0.0152 in (0.386 mm)
Sheet Aluminum	0.024 in (0.610 mm)
Coated Steels	0.0152 in (0.386 mm)

1.6.2

When sheet metal is used in the construction of heating surfaces, the thickness shall be such as to provide strength, rigidity, durability, resistance to corrosion, and other physical properties equivalent to 0.0304 in (0.772 mm)* thick AISI C1010 hot-rolled sheet steel. (For minimum thickness of certain other materials, see Table I, Maximum Heating Element and Load-Bearing Flue Gas Baffle Temperatures.)

1.6.3

When brick, ceramic, wire screen, or other materials are used in the construction of heating surfaces, the thickness shall be such as to provide strength, rigidity, durability and resistance to corrosion.

* This corresponds to No. 20 U.S. Standard gage sheet steel with all applicable minus tolerances included.

1.6.4

Outside casings of heaters for outdoor installation shall be protected against corrosion by one of the coatings outlined in Table II, Minimum Corrosion Protection of Ferrous Materials Used in the Construction of Outside Casings of Heaters for Outdoor Installation, and the notes applicable thereto, or by other metallic or nonmetallic coatings or materials which have been shown to give equivalent protection.

1.6.5

When outside casings are constructed of sheet steel, they shall not be less than 0.0195 in (0.495 mm)* thick unless reinforcing or a double construction is employed, in which case strength equivalent to that afforded above shall be considered acceptable. The thickness of other metallic and nonmetallic casings shall be judged on the basis of equivalent strength and rigidity.

1.7 Joints In Heating Elements

1.7.1

Joints of metallic heating surfaces shall be either welded, brazed, threaded, lock seamed, machined and bolted, formed slip joints or of flanged construction tightly bolted together and enclosing gaskets.

1.7.2

Welded joints should be substantially a continuous weld.

1.7.3

A slip joint shall neither be constructed entirely of sheet metal nor depend upon friction of the joint itself for strength.

1.7.4

When the heating surface is other than metal and adhesives are used in its construction, they shall be suitable to withstand the temperatures required for satisfactory operation.

1.8 Main Burners

1.8.1

Bodies of burners (including mixer head, mixer tubes, and burner head) shall be of substantial and durable construction. They shall be constructed of either (1) materials having melting points above 1450°F (788°C), or (2) materials having melting points of from 1000 to 1450°F (538 to 788°C), in which case the design and materials used in the construction of the burner shall be such that no part of the burner having a melting point below 1450°F (788°C) will attain a temperature above 875°F (468°C) and the burner will not sag, distort, melt, exhibit appreciable corrosion or damage to any protective coating sufficient to expose the base metal or show leakage of gas during any of the tests specified herein, or when the burner is operated with flame burning within the mixer tube or burner head.

Method of Test

The following test need only be conducted when parts of the burner have a melting point of 1000 to 1450°F (538 to 788°C).

The test shall be conducted at the increased inlet test pressure.

Thermocouples shall be suitably attached to all probable high temperature points of material having a melting point of 1000 to 1450°F (538 to 788°C).

* This corresponds to No. 24 U.S. Standard gage sheet steel with all applicable minus tolerances included.

The gas to the burner shall be ignited in such a manner that it will burn within the mixer tube or burner head and shall continue to burn there for 30 minutes. If the flame cannot be maintained within the mixer tube or burner head, the gas rate to the burner shall be reduced to a point where it can be so maintained.

During this test and during conduct of 2.13, Wall, Floor and Ceiling Temperatures, the temperatures indicated by the thermocouples shall be recorded.

At the end of this test, as well as at the conclusion of all performance tests specified herein, the burner shall be carefully examined for evidence of sagging, distortion, melting, appreciable corrosion, damage to protective coating sufficient to expose the base metal, or leakage of gas.

1.8.2

Joints, when used in the pressure zone or in the burner head of a burner assembly, shall be gastight.

1.8.3

Bolt holes shall not intersect gasways unless adequate provision is made for permanent gastightness.

1.8.4

A removable burner head shall fit on its mixer tube in the correct position only, and be connected (without set screws in the heat zone) so it will remain in the proper position

1.8.5

Ports shall be machined or otherwise accurately made.

1.8.6

Ribbon burners shall be constructed so that the ribbon assembly can be easily removed, cleaned and replaced in the field without the use of special tools.

1.8.7

Burners shall be readily removable and essentially self-locating, and shall be secured so that they will not twist, slide, or drop out of position in normal use.

1.8.8

Provision shall be made to permit ready observation of a major portion of each burner flame under operating conditions.

1.8.9

Burners of heaters convertible for use with natural gas and liquefied petroleum (propane) gases shall operate satisfactorily with both Test Gases A and E.

1.8.10

Main bodies of burners (including mixer head, mixer tube, and burner head) of heaters for outdoor installation shall be of corrosion-resistant material or have a corrosion-resistant finish.

1.9 Primary Air Control

1.9.1

Primary air control means shall be designed so the flow of primary air will be adequate for proper combustion characteristics. This may be done with or without adjustment means.

1.9.2

When air shutters are used, the surfaces between the air shutter and mixer face shall be reasonably smooth. Primary air adjustment means on main burners shall be designed so as to give a yellow-tipped flame when adjusted for minimum primary air.

1.9.3

Provision shall be made for fixing adjustable pilot and main burner primary air control means accurately in position. The main burner primary air control means shall be accessible with the burner in operation.

1.9.4

Primary air control means shall be attached so they will not change their position by the action of gravity when the means of securing the attachment is released.

1.9.5

Air shutters shall be constructed of corrosion-resistant material or have a corrosion-resistant finish, except when the type of material or construction employed will prevent sticking or corroding in position. Cast-iron air shutters are considered acceptable.

1.9.6

Sheet-metal air shutters for main burners shall be not less than 0.0254 in (0.645 mm)* thick. If sheet-metal air shutters are less than 0.0508 in (1.290 mm)** thick, they shall have the outer edges turned at right angles or be otherwise properly reinforced.

1.9.7

When screws or bolts are used to attach air shutters, they shall be of corrosion-resistant material or, if of steel, shall have a corrosion-resistant finish.

1.10 Condensate Disposal For Radiant Tube Type Heater

1.10.1

For condensing type infrared heaters, means shall be provided for the collection and disposal of condensate.

1.10.2

A condensate trap(s), if necessary for compliance with 2.17, Condensate Disposal System(s), shall be provided as part of the tube heater or supplied with the tube heater with instructions for proper installation (see 1.26.4).

1.10.3

The condensate lines shall not be adversely affected by the composition of the condensate.

1.10.4

Where a condensate neutralizer is provided, an overflow shall be provided such that condensate will be directed to the drain in the event the neutralizer becomes plugged.

1.11 Orifices And Orifice Fittings

1.11.1

A threaded hexagon head or equivalent fixed orifice spud shall be provided for each main burner and shall be readily accessible.

1.11.2

Main burner orifice spuds and orifice spud holders shall be constructed of materials having a melting point of not less than 1450°F (788 °C).

* This corresponds to No. 22 U.S. Standard gage sheet steel with all applicable minus tolerances included.

** This corresponds to No. 16 U.S. Standard gage sheet steel with all applicable minus tolerances included.

1.11.3

Main burner gas orifice spuds shall be threaded to their holders with at least 3¹/₂ full threads.

1.11.4

Readily removable fixed orifice spuds shall be provided, independent of the operation of the pilot gas valve, for limiting the amount of gas consumed by the pilot. The maximum normal rate for continuous pilots shall not exceed 2000 Btu/hr (586 W) per pilot at the applicable normal inlet test pressure when using the appropriate pilot equipment for each test gas.

When a separate gas appliance pressure regulator is installed in the pilot line, the outlet pressure specified by the manufacturer shall be employed in determining the maximum rating of the pilot.

1.11.5

A heater convertible for use with natural gas or liquefied petroleum (propane) gases shall be supplied with properly identified orifices for both natural and LP (propane) gases. One set of orifices shall be in place in the pilot and main burners when an appliance is shipped from the factory.

Proper identification as to which orifices are in place on the appliance as shipped shall be provided on the outside front of the appliance, including reference to the location of the conversion instructions. This marking may be a tear-off type label worded as follows:

THIS HEATER IS EQUIPPED FOR NATURAL [OR LP (PROPANE)] GAS

This heater is equipped with orifices sized for operation with natural [or LP (propane)] gas.

For conversion to LP (propane) (or natural) gas see instruction plate on the heater.

Orifices necessary for LP (propane) (or natural) conversion are provided ____.*

(*Location to be determined by manufacturer.)

When a change of orifice spuds is not required to convert from one gas to another, the above marking need not be provided.

1.12 Automatic Gas Ignition Systems

1.12.1

Every heater shall be equipped with an automatic gas ignition system (see Part IV, Definitions). This system shall be designed to function in either of the following manners:

- a. Provide for ignition of main burner gas by means of a proved igniter or pilot.

If the presence of neither the ignition source nor the main burner flame is proved, provide for automatic shutoff of main burner gas and, on appliances for use with fuel gases having a specific gravity greater than 1.0, also provide for automatic shutoff of any pilot burner gas.

On appliances having a power burner or forced- or induced-draft blower, equipped with an interrupted or intermittent pilot, and not of the open-flame type, the system need not provide for automatic shutoff of pilot burner gas. (See [1.5, Combustion Air](#).)

On appliances for use with any fuel gas and having a power burner or a forced- or induced-draft blower, equipped with a continuous pilot and not of the open-flame type, the gas supply to such pilot shall be shut off if the pilot is extinguished.

- b. Provide for ignition of main burner gas by means of a direct ignition device.

If the presence of the main burner flame is not proved, provide for automatic shutoff of main burner gas.

In the event of main burner flame outage during an operating cycle, provide for automatic shutoff of main burner gas without reenergizing the direct ignition device or provide for prompt and safe reignition of main burner gas by reenergizing the direct ignition device.

1.12.2

In addition to the automatic gas ignition system functions specified in 1.12.1-a, a system having an interrupted ignition source shall provide for supervision of the main burner flame only following the main burner flame-establishing period. If the presence of the main burner flame is not proved within the flame-establishing period, the system shall provide for the automatic shutoff of main burner gas.

1.12.3

Automatic gas ignition systems shall comply with the applicable construction provisions of the Standard for *Automatic Gas Ignition Systems and Components*, ANSI Z21.20, CAN1-6.4 or CSA C22.2, No. 199, *Combustion Safety Controls and Solid-State Igniters for Gas- and Oil- Building Equipment*, or the Standard for *Combination Gas Controls for Gas Appliances*, ANSI Z21.78 • CSA 6.20.

1.12.4

If a piezo-electric spark device is used for pilot burner ignition, it shall comply with the applicable construction provisions of the Standard for *Manually-Operated Piezo-Electric Spark Gas Ignition Systems and Components*, ANSI Z21.77 • CGA 6.23, or the Standard for *Combination Gas Controls for Gas Appliances*, ANSI Z21.78 • CSA 6.20.

1.12.5

An automatic ignition device shall be placed so as to be easily seen. Pilot burners shall be placed so that they can be easily seen and safely lighted.

1.12.6

Automatic ignition devices shall be positively positioned with respect to the main burner port(s).

1.12.7

Means shall be provided to prevent incorrect assembly or reversible mounting of any automatic ignition device in relation to the main burner(s) being served.

1.12.8

Automatic gas ignition system components shall be installed so their operation and main burner ignition will not be affected by falling scale and dirt during normal operation.

1.12.9

Automatic gas ignition system components, and bleed assemblies when used, shall be made secure against accidental displacement.

1.12.10

Pilot burner primary air openings and orifices shall be easily accessible for servicing.

1.12.11

Automatic gas ignition system components, except safety shutoff valves, shall be constructed and installed so, without the use of special tools and with reasonable care, they may be removed without removing main burners, controls or accessories, or breaking or disturbing any gas connections other than those of

the pilot burner gas supply, bleed supply, or manifold unions. Automatic gas ignition system components which are easily removed with main burners and controls as a unit are considered as complying with this provision. Also see 1.4.1.

1.12.12

Ample clearance shall be provided for removal and replacement of the pilot burner without kinking the pilot gas tubing.

1.12.13

When the pilot burner supply line is taken from a horizontal line, the connection shall be made either on the side or top. In other cases the pilot line shall be connected to the supply line in a manner so that there will be no likelihood of stoppage of the pilot line at the point of connection due to the collection of dust, dirt or condensate.

1.12.14

Tips of aerated pilot burners shall be made from AISI 416 steel or material having at least equivalent heat and corrosion-resistant characteristics. Alloys of greater than 1.0 percent nickel, because of catalytic cracking effect, are not acceptable.

1.12.15

When automatic gas ignition system wiring extends into a combustion chamber, it shall be protected against abrasion. When it is necessary to disconnect leads to remove an automatic gas ignition system component, the leads shall be of sufficient length to reach a convenient disconnect point.

1.12.16

Electric make-and-break contacts shall not be placed within a combustion chamber unless adequately shielded against deterioration by heat and flue gases.

1.13 Automatic Pilot Igniters

1.13.1

Pilot burners equipped with means for ignition of the pilot burner gas, such as a standing pilot, electric resistance coil, or other means, shall be designed so as to prevent the flow of gas to the main burner until the ignition flame has been established and the thermal sensing element has functioned to admit gas to the main burner.

1.13.2

When an automatic relight pilot system is used, it shall be of the type that will act to reestablish the ignition means in 0.8 second or less, or a mechanical or electrical interlocking means shall be provided to prevent the flow of gas to the main burner(s) when the automatic relight pilot system is energized.

1.13.3

If the position of the automatic pilot igniter is adjustable with respect to the pilot burner, locking means shall be provided for maintaining such adjustment.

1.13.4

Automatic pilot igniters shall not interfere with the adjustment of the pilot.

1.14 Pilot Gas Filters

1.14.1

Pilot gas filters complying with the Standard for *Pilot Gas Filters on Appliances*, ANSI Z21.35 • CGA 6.8, shall be provided for continuous or cycling gas pilots on appliances:

- a. For use with manufactured gas; and
- b. Having a pilot burner input rate of 1000 Btu/hr (293 W) or less.

1.14.2

Manufacturer's specified capacities of pilot gas filters shall not be less than the rated capacities of the burners with which they are used.

1.14.3

Pilot gas filters shall be installed at the point of pilot gas take-off from the main gas supply line.

1.15 Low Gas Pressure Shutoff System

1.15.1

A heater equipped with a low gas pressure shutoff system designed to prevent gas flow to the main burner in the event of inadequate gas supply pressure shall comply with [2.4, Low Gas Pressure Shutoff System](#).

1.15.2

The low gas pressure shutoff system shall comply with a nationally recognized standard.

1.15.3

The low gas pressure shutoff system shall not incorporate field adjustment means for the set point of the device.

1.16 Gas Supply Lines

The following construction provisions apply to the gas supply lines used within an appliance.

1.16.1

Steel pipe employed as gas conduit on heaters shall comply dimensionally with the Standard for *Welded and Seamless Wrought Steel Pipe, ANSI/ASME B36.10M*, or *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless, ASTM A53/A53M-99b*.

1.16.2

Tapped holes for gas valves, pilots or other branch supply lines shall carry not less than 3¹/₂ taper pipe threads in accordance with the Standard for *Pipe Threads, General Purpose (Inch), ANSI/ASME B1.20.1*.

1.16.3

Bent supply piping shall have the bends smoothly made without any appreciable reduction in the cross-sectional area, shall reveal no imperfections occasioned by the bending process, and shall be annealed if necessary to remove internal stresses.

1.16.4

Piping and tubing shall be carefully reamed to remove obstructions or burrs. Gas-carrying passageways shall be carefully cleaned internally to remove loose particles.

1.16.5

When semi-rigid tubing is employed as gas conduit it shall not be less than nominal ¹/₈ in size.

1.16.6

Aluminum semi-rigid tubing shall not be acceptable for use where the tubing passes through insulating material of other than neutral reaction unless the tubing is adequately protected from the insulation. Such tubing shall not be exposed to condensate.

1.16.7

Copper tubing or tubing with internal copper surfaces when used for conveying gas, shall be internally tinned or equivalently treated to resist sulfur corrosion.

1.16.8

Nonferrous semi-rigid tubing employed as gas conduit shall have a wall thickness in accordance with Table III, Minimum Acceptable Wall Thickness for Nonferrous Semi-Rigid Tubing.

1.16.9

Tubing and fittings used as gas conduit shall be capable of withstanding a temperature of 1000°F (538°C) without melting.

Tubing and fittings used as gas conduit shall not be exposed to temperatures in excess of those specified in Table IV, Maximum Tubing and Fitting Temperatures, when the appliance is operated as specified in 2.13, Wall, Floor and Ceiling Temperatures,.

1.16.10

Gas supply piping, tubing and fittings shall be firmly supported.

1.16.11

Compounds used on threaded joints of gas piping shall be resistant to the action of the LP (propane) gas.

1.16.12

Unions in gas lines shall be of the ground- joint type or flanged-joint type including a gasket resistant to the action of liquefied petroleum (propane) gases and suitable for the temperature to which it is exposed.

1.16.13

A test gage connection shall be furnished downstream of the gas appliance pressure regulator for measuring gas pressure. The connection shall be $\frac{1}{8}$ in NPT plug or cap with cleanly cut taper threads in accordance with the Standard for *Pipe Threads, General Purpose (Inch)*, ANSI/ASME B1.20.1. If the plug is of the slotted type it shall also incorporate square or hex flats, or;

When the pressure tap connection is provided as part of the control this pressure gage connection shall be:

- a. A tapping sealed by a $\frac{1}{8}$ in NPT plug or cap as specified above; or
- b. A hose fitting which incorporates a captured sealing means.
- c. The fitting shall have a minimum length of 0.355 in (9.02 mm) and a 0.355 in (9.02 mm) maximum/0.335 in (8.05 mm) minimum outside diameter.

1.17 Manual Gas Valves

1.17.1

Manual gas valves shall comply with the applicable provisions of the Standard for *Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves*, ANSI Z21.15 • CGA 9.1, or the Standard for *Combination Gas Controls for Gas Appliances*, ANSI Z21.78 • CSA 6.20.

1.17.2

An appliance main gas valve shall be provided for turning on and shutting off the gas supply to the main burner and pilot burner.

1.17.3

A burner valve shall be provided for turning on and shutting off the gas supply to the pilot burner on heaters which do not utilize automatic pilot igniters.

This valve and the valve specified in 1.17.2 shall be arranged and positioned so that the main burner gas will be shut off during manual lighting of the pilot.

1.18 Gas Appliance Pressure Regulators

1.18.1

A gas appliance pressure regulator which will satisfactorily limit the main burner gas supply pressure shall be supplied with each appliance.

On an appliance for operation at the alternative gas supply pressures specified in [Table V, Alternative Inlet Test Pressures](#), the pilot burner gas supply shall also be under the control of a gas appliance pressure regulator.

1.18.2

Gas appliance pressure regulators, including vent limiters when so equipped, shall comply with the applicable provisions of the Standard for *Gas Appliance Pressure Regulators*, ANSI Z21.18 • CSA 6.3, or the Standard for *Combination Gas Controls for Gas Appliances* ANSI Z21.78 • CSA 6.20.

1.18.3 A heater convertible for use with natural gas or liquefied petroleum (propane) gases shall be provided with a convertible gas appliance pressure regulator (see Part IV, Definitions).

A gas appliance pressure regulator provided on a heater not convertible for use with natural gas or liquefied petroleum (propane) gases shall be of either the adjustable or nonadjustable type (see Part IV, Definitions).

1.18.4

The gas appliance pressure regulator shall be installed in a location so it will not attain a temperature in excess of that specified by the regulator manufacturer when the heater is subjected to the tests specified under 2.13, Wall, Floor and Ceiling Temperature.

1.18.5

When a single regulator is used to control the pressure of both the pilot and main burner gas, it shall be of the type suitable for pilot and main burner load application as designated by the following symbol adjacent to the regulator model number:

- a. $\textcircled{P}$ for an appliance having a pilot gas flow rate less than 0.50 but not less than 0.15 ft³/hr (less than 3.93 but not less than 1.18 cm³/s); or
- b. $\textcircled{P}$ or $\textcircled{\nabla}$ for an appliance having a pilot gas flow rate of 0.50 ft³/hr (3.93 cm³/s) or greater.

1.19 Automatic Valves

1.19.1

Automatic valves shall comply with the applicable provisions of the Standard for *Automatic Valves for Gas Appliances*, ANSI Z21.21 • CSA 6.5, or the Standard for *Combination Gas Controls for Gas Appliances* ANSI Z21.78 • CSA 6.20.

1.19.2

Electrically-operated main gas control valves shall be of a type that will close upon loss of voltage.

1.20 Bleeds And Vents

1.20.1

Bleed lines from diaphragm control valves shall be furnished. A gas appliance pressure regulator shall be equipped with either a vent line or a vent limiter.

1.20.2

When there is a continuous pilot, the bleed line from the diaphragm control valve and the vent line (when furnished) from the gas appliance pressure regulator shall vent into the combustion chamber or space. A common bleed line and vent line shall not be used.

Bleed lines from diaphragm control valves and vent lines from gas appliance pressure regulators shall terminate in separate suitable burner tips constructed of a metal having a melting point not less than 1450°F (788°C). They shall be located so the escaping gas will be readily ignited by the pilot and the heat liberated thereby will not adversely affect the normal operation of the safety shutoff system. Bleed line burners shall be securely held so that the ports are in a fixed position relative to the pilot.

1.20.3

When there is no continuous pilot, the vent line (when furnished) from a gas appliance pressure regulator shall be vented according to the manufacturer's instructions but not into a combustion chamber or space.

When there is no continuous pilot, the bleed line from a diaphragm valve shall be vented in such a manner as to provide for burning of the bleed gas during normal operation. In the event of diaphragm rupture, the bleed shall not permit the escape of more than 1.0 ft³/hr (7.86 cm³/s) of 0.6 specific gravity gas at 7.0 in wc (1.74 kPa) pressure for natural, manufactured or mixed gases for LP gas-air mixtures, and 0.5 ft³/hr (3.93 cm³/s) of 1.53 specific gravity gas at 11.0 in wc (2.74 kPa) pressure for liquefied petroleum (propane) gases.

1.20.4

When a vent line is provided for a gas appliance pressure regulator, a No. 40 mesh brass, aluminum or stainless steel wire screen, sufficient in size to provide free area equal to the area of the escapement orifice, shall be installed in and made a part of the connecting fitting for installation at the regulator vent tapping. The fitting, when tightened against the screen, shall provide no opening larger than the mesh of the screen specified. This provision is only applicable to gas appliance pressure regulators having escapement orifices larger than 0.0165 in (0.419 mm) in diameter.

1.20.5

Also see [1.12.11](#) and [1.12.12](#).

1.21 Adjustment Of Minimum Input Rating

A control designed for two or more rates shall be equipped with either:

- a. A readily accessible leakproof adjustment means for regulating all rates other than the full open rate (the adjustment for the lowest flow condition shall not be capable of adjustment in the field to a rate lower than the manufacturer's specified minimum input rating); or
- b. A means for setting the lowest flow condition that is not adjustable in the field. Nonadjustable types shall be set by the manufacturer so that the low-flow condition is not lower than the manufacturer's specified minimum input rating.

In the case of a power burner, the control shall be constructed so no adjustment of the rate of gas flow is permitted, unless the burner system is such that adjustment of the valve will not adversely affect the proportion of gas and air supplied to the burner.

1.22 Electrical Equipment And Wiring

See Exhibit A, Items Unique to the United States, and Exhibit B, Items Unique to Canada.

1.23 Protection Of Service Personnel

1.23.1

An uninsulated live part in a high-voltage or high-tension ignition circuit (see Part IV, Definitions) within the heater cabinet shall be located, guarded or enclosed so as to minimize accidental contact by service personnel performing service functions which may have to be performed with the equipment energized.

1.23.2

An electrical control component which may require examination, adjustment, servicing or maintenance while energized shall be located and mounted with respect to other components and with respect to grounded metal parts so that it is accessible for electrical service functions without subjecting the serviceman to the likelihood of shock hazard from adjacent uninsulated live parts.

1.24 Motors And Blowers

1.24.1

See Exhibit A, Items Unique to the United States, and Exhibit B, Items Unique to Canada.

1.24.2

Motor, blower or fan bearings shall be either (a) permanently lubricated or (b) provided with accessible means for lubrication. (Also see [1.4.2](#) and [1.27.13.](#))

1.24.3

Bearings of motors, blowers or fans shall be of a type suitable for the temperatures to which subjected in normal operation.

1.25 Draft Hoods

1.25.1

Asuitablely designed draft hood shall be furnished on units designed for connection to a vent, except when heaters are supplied with a power burner or a forced- or induced-draft blower and are not intended for use with a draft hood, in which case the provisions of 2.16, Draft Test for Appliances Not Equipped with Draft Hoods, shall be met.

1.25.2

All parts of a draft hood shall be of corrosion-resistant material or have a corrosion-resistant finish.

1.25.3

All parts of a draft hood shall be constructed of a material not less than 0.0152 in (0.386 mm)* thick.

* This corresponds to No. 26 U.S. Standard gage sheet steel with all applicable minus tolerances included.

1.25.4

Detachable draft hoods shall be designed so removal and replacement in normal usage will not permanently deform any part nor alter the relative position of any part with respect to another.

1.25.5

Joints used in the construction of draft hoods shall not depend primarily on solder for strength or tightness.

1.25.6

Draft hoods shall be constructed of such material that there will be no melting, softening or distortion of any part as a result of the tests specified herein.

1.25.7

Draft hood outlets shall be of such size that they will accommodate vent pipe of integral inch diameter.

1.25.8

If a built-in draft hood is provided, provision shall be made to provide a firm support of the vent piping to the draft hood or to the flue outlet. Horizontal outlets shall have a minimum 1¹/₄ in (31.8 mm) lip for attachment of the vent pipe.

1.25.9

A draft hood shall be sufficiently rigid in construction and supported on the heater so that it will comply with [2.15.6](#).

1.25.10

Flue dampers shall not be used.

1.26 Instructions

1.26.1

Clearly defined and complete instructions for lighting and shutting down the heater shall be provided for the user on Class IIIA marking material. These instructions shall be located on or adjacent to the controlling device or in an equally conspicuous position where they can be easily read. Lighting instructions shall specify a 5 minute complete shutoff period before the appliance is relighted.

1.26.2

On heaters convertible for use with natural gas or liquefied petroleum (propane) gases, the instruction plate shall also include instructions for converting the heater from the use of one gas to another.

1.26.3

Each heater shall be accompanied by printed instructions and diagrams adequate for proper field assembly, installation and safe operation, including all controls and accessories.

The cover or, in the absence of a cover, the first page of the instruction manual shall bear the following statements. They shall be boxed as shown:



WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

These instructions shall indicate the following:

- a. The manufacturer's, distributor's, jobber's or dealer's name, as it appears on the rating plate, and address and appliance model or series number.
- b. Adequate clearance around air openings into the combustion chamber, clearances from combustible material, provisions for accessibility and for combustion and ventilating air supply.
- c. Adequate clearances in public garages and airplane hangers for overhead heaters (see 1.1.4).
- d. The stated clearance to combustibles represents a surface temperature of 90°F (32°C) above room temperature. Building material with a low heat tolerance may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent material are not subject to degradation.
- e. A warning statement that an overhead heater should be installed so that the minimum clearances marked on the heater will be maintained from vehicles parked below the heater.
- f. statement indicating that in locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles, and that such signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats in a conspicuous location.
- g. The installation must conform with local building codes or, in the absence of local codes, with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* or the *Natural Gas and Propane Installation Code, CSA B149.1*.
- h. For horizontally vented heaters, information on where the vent terminal, air-intake terminal or vent-air terminal should and should not terminate, including:
 1. Distances from adjacent public walkways, adjacent buildings, openable windows and building openings, consistent with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* or the *Natural Gas and Propane Installation Code, CSA B149.1*;
 2. Information on preventing blockage by snow; and
 3. Information on protecting building materials from degradation by flue gases.
- i. If applicable, the manufacturer's specified maximum and minimum length of heat exchanger surfaces (see Part IV, Definitions) for tube type radiant heaters.
- j. Directions to provide a 1/8 in (3.2 mm) NPT plugged tapping, accessible for test gage connection, immediately upstream of the gas supply connection to the heater.
- k. If an external electrical source is utilized, the heater, when installed, must be electrically grounded in accordance with the *National Electrical Code, ANSI/NFPA 70* or current *Canadian Electrical Code, CSA C22.1*.
- l. The maximum and minimum inlet gas supply pressure to the heater.
- m. If applicable, a statement that the appliance is equipped with a safety control system designed to shut the burner off in the event of inadequate gas pressures. This statement shall also include the information specified in 1.27.3.

- n. The manifold pressure in inches water column.
- o. If a transformer is not supplied with the heater, transformer specifications which are compatible with the electrical ratings marked on the appliance shall be provided.
- p. A statement that the user shall not attempt to ignite the pilot by hand on heaters equipped with automatic pilot igniters. (See [1.17.3.](#))
- q. Information regarding the connection of a heater to the gas supply line, in particular taking into account the thermal expansion and contraction of an appliance/heater.

1.26.4

For horizontally vented heaters with the venting system not supplied by the manufacturer, information on the following shall be provided:

- a. Type of vent material(s) to be used to interconnect the heater with the vent terminal, air-intake terminal or vent-air terminal;
- b. Size and length of the vent material(s);
- c. The type and number of mechanical fasteners to be used; and
- d. The type of sealing method to be used on the joints of the venting system.

1.26.5

In addition to the information specified in [1.2.10](#), a heater for indoor installation designed to vent the flue gases horizontally outdoors through a wall by means other than a conventional venting system shall also be accompanied by instructions covering the installation of properly identified parts to provide for the venting of the flue gases to the outdoors, including instructions which specify that the draft hood, when applicable, shall be installed so as to be in the same atmospheric pressure zone as the combustion air inlet of the appliance. When the parts for venting the flue gases are not provided by the appliance manufacturer and they are specific types tested by a nationally recognized testing agency, these instructions shall clearly identify and specify the use of the specific parts (see [1.2.10](#), [1.27.12](#) and [2.1.9](#)).

1.26.6

In addition to the information specified in [1.26.3](#), the instructions accompanying a radiant tube type heater designed to operate in a condensing mode shall indicate:

- a. The heater shall be installed to prevent accumulation of condensate;
- b. The heater be provided with means for drainage of the condensate; and
- c. Service instructions (including recommended frequency guidelines) suggesting:
 - 1. When means are provided to neutralize condensate a maintenance schedule, if required; and
 - 2. Periodic cleaning of the condensate collection and disposal system(s), if applicable.

1.26.7

Electrical diagrams (see Part IV, Definitions) on Class IV marking material applicable to the controls normally supplied by the manufacturer shall be supplied in each of the following forms:

- a. A connection diagram to aid in locating components for field service; and

- b. A schematic diagram of the ladder form, in addition to the connection diagram, and when necessary for clarification, a cycle chart or printed sequence of switching action shall accompany the schematic diagram.

1.26.8

Electrical diagrams shall conform to the Standard for *Electrical and Electronics Diagrams*, ANSI Y14.15. See [Appendix A, Pertinent References to ANSI Y14.15](#), for reference to pertinent provisions of ANSI Y14.15. The wire color designations specified under 15-3.11 of ANSI Y14.15 are shown in [Appendix B, Wire Color Designations](#).

1.26.9

It is recommended that the usage of wire colors be as shown in [Appendix C, Recommended Wire Color Usage](#).

1.26.10

Unidentified graphic symbols used for electrical diagrams shall conform with the Standard for *Graphic Symbols for Electrical and Electronics Diagrams (Including Reference Designation Class Designation Letters)*, ANSI/IEEE 315. See Appendix D, Preferred Graphic symbols of Commonly Used Items, Extracted from ANSI/IEEE 315, *Graphic Symbols for Electrical and Electronics Diagrams*, and Abbreviations for These Items, for preferred symbols of commonly used items, as extracted from Standard ANSI/IEEE 315. Abbreviations for identified items shall be as shown in Appendix D.

1.26.11

The electrical diagrams specified in [1.26.7](#) shall be placed in a suitable pocket or affixed to a panel on the heater. When the controls are packaged separately, or when there is no suitable panel, the electrical diagrams shall be included with directions that they be affixed on or adjacent to the heater.

1.26.12

If a transformer is not supplied with the heater, the wiring diagram(s) or the rating plate shall include the electrical rating of the heater.

1.26.13

If wire other than that conforming with a temperature limitation of 63°F (35°C) rise has been specified for use on the heater, the following statement shall appear on all electrical diagrams. "If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least ____."

If wire other than that conforming to the temperature limitation of 63°F (35°C) rise has been specified for field-wired connections, then the following statement shall appear on all electrical diagrams: "Field wiring having a minimum temperature rating of at least ____ °C shall be used and supply circuit wiring shall have a minimum size of ____ AWG."

Also see [1.20.3](#), [1.27.6](#), and A.1 (prefatory note).

1.26.14

The instructions shall identify the length and ID of the flexible appliance connector appropriate for the heater. The instructions shall also include correct and incorrect installation geometry as shown in Figure 1, Installation Position Instruction. Additionally the warning statement shown in Figure 2, Connector Installation Label, shall appear. (See Items Unique to the United States (A.4, Gas Supply to Radiant Tube Heater,) and Items Unique to Canada (B.4, Gas Supply to Radiant Tube Heater).

1.27 Marking

1.27.1

Marking material shall be identified by class number and shall meet the following specifications. All metal marking materials shall be rustproof. All markings shall be suitable for application to surfaces upon which applied and shall demonstrate suitable legibility as specified under 2.21, Marking Material Adhesion and Legibility. The designation of any class of marking shall not preclude the use of marking of a lower number class.

Class I. Integral Marking

Marking that is embossed, cast, stamped, or otherwise formed in the part. This includes markings baked into an enameled surface.

Class IIA-1. Permanent Plate

Shall be made of metal having a minimum thickness of 0.012 in (0.30 mm) and shall be securely attached by mechanical means.

Class IIA-2. Permanent Plate

Shall be made of metal having a thickness of 0.006 to 0.012 in (0.15 to 0.30 mm) and shall have mechanical attachment means at all corners with a maximum spacing of 6 in (152 mm) between mechanical fasteners.

Class IIA-3. Permanent Plate

Shall be made of metal having a thickness less than 0.006 in (0.15 mm). Such plates shall be attached by means of nonwater-soluble adhesive which will comply with 2.21, Marking Material Adhesion and Legibility. These materials shall not be located on surfaces having temperatures exceeding 300°F (149°C) as determined during the conduct of 2.13, Wall, Floor and Ceiling Temperatures.

Class IIA-4. Permanent Plate

Shall be made of pressure-sensitive metal foil requiring no solvent or activator, provided such plates comply with 2.21, Marking Material Adhesion and Legibility. These materials shall not be located on surfaces having temperatures exceeding 300°F (149°C) as determined during the conduct of 2.13, Wall, Floor and Ceiling Temperatures.

Class IIIA-1. Permanent Label

Shall be made of material not adversely affected by water, shall be attached by means of nonwater-soluble adhesive and shall comply with 2.21, Marking Material Adhesion and Legibility. These materials shall not be located on surfaces having temperatures exceeding 300°F (149°C) as determined during the conduct of 2.13, Wall, Floor and Ceiling Temperatures.

Class IIIA-2. Permanent Label

Shall be made of material not adversely affected by water, shall be attached by means of nonwater-soluble adhesive and shall comply with 2.21, Marking Material Adhesion and Legibility. These materials shall not be located on surfaces having temperatures exceeding 175°F (79.5°C) as determined during the conduct of 2.13, Wall, Floor and Ceiling Temperatures.

Class IIIB. Waterproof Marking

Shall be printed directly on the part with waterproof marking not adversely affected by a temperature of 175°F (79.5°C). This marking shall not be used on surfaces having temperatures exceeding 175°F (79.5°C) as determined during the conduct of 2.13, Wall, Floor and Ceiling Temperatures.

Class IV. Semi-Permanent Label

Shall be made of material which may be soluble in water, and may use water-soluble adhesive for attachment means.

Class V. Printed Marking

Marking shall be clear and prominent and may be applied directly by any printing means.

Class VI. Attached Tags

1.27.2

RATING PLATE. Each heater shall bear a rating plate of Class IIIA marking material, located where it can be easily read when the heater is in a normally installed position, on which shall appear the following:

- a. The manufacturer's or distributor's name.
- b. The manufacturer's or distributor's number of the heater.
- c. The manufacturer's normal hourly Btu input rating.
- d. The manufacturer's normal manifold pressure in inches water column.
- e. Minimum permissible gas supply pressure for purpose of input adjustment.
- f. The manufacturer's minimum hourly Btu input rating for a heater for automatic operation at ratings less than full input rating.
- g. The type of gas for which equipped: Nat., Mfd., Mix., LP (propane). Btu LP gas-air mixture(s). (For LP gas-air mixtures, the heating value shall be indicated.) This information may appear as a separate Class IIIA marking adjacent to the rating plate.
- h. A heater convertible for use with natural gas and liquefied petroleum (propane) gases shall be marked as follows and the marking specified under “-g” omitted:

“For Natural Gas when equipped with No. ____ drill size orifice.”

“For LP (propane) Gas when equipped with No. ____ drill size orifice.”

(Each orifice shall be clearly identified with regard to the gas for which it will be used, and the orifice size shall be indicated on the spud or hood. Also see [1.11.5](#).)

- i. As applicable, the words, “Low-Intensity Infrared Heater” or “Infrared Radiant Tube Heater,” permanently displayed in a readily observed location.
- j. Identification of this standard by indicating either this edition of the standard, or the most recent effective addenda thereto, with one of the following markings:

"ANS Z83.20 • CSA 2.34-(year) Low-Intensity Infrared Htr.;"
"ANS Z83.20a • CSA 2.34a-(year) Low-Intensity Infrared Htr.;" or
"ANS Z83.20b • CSA 2.34b-(year) Low-Intensity Infrared Htr."

- k. Angle-mounted heaters shall have the maximum angle of mounting specified.
- l. The symbol of the organization making the tests for compliance with this standard.

1.27.3

A heater equipped with a low gas pressure shutoff system shall bear a marking specifying the minimum permissible inlet gas supply pressure. This marking may be on the rating plate or on a separate Class IIIB marking adjacent to the rating plate

1.27.4

If applicable, infrared radiant type tube heaters shall bear a marking specifying the appliance can be installed in variable configurations as specified in the manufacturer's installation instructions (see 1.26.3-g). This marking may be on the rating plate or a separate Class IIIB marking adjacent to the rating plate.

1.27.5

NAME PLATE. The heater shall bear the trade name designated by the manufacturer and recorded with the organization making the test for compliance with this standard on Class IIIA marking material.

1.27.6

The rating plate of an overhead heater shall include instructions for installation of the unit in (1) airplane hangars in accordance with the Standard for *Aircraft Hangars, ANSI/NFPA 409*, and (2) public garages in accordance with the Standard for *Parking Structures, NFPA 88A*, except when such instructions appear as a separate Class IIIA marking adjacent to the rating plate, or the *Natural Gas and Propane Installation Code, CSA B149.1*.

1.27.7

Heaters shall bear a Class IIIA marking indicating all minimum clearances from combustible construction as established by performance tests (see 2.13, Wall, Floor and Ceiling Temperatures).

1.27.8

On an appliance which requires clearances from any type of construction for serviceability or proper operation, a marking indicating the minimum distance required from each surface involved.

1.27.9

Each heater shall bear one of the following markings on Class IIIA marking material, as applicable:

- a. "For indoor installation only."
- b. "For outdoor installation only."
- c. "For either indoor or outdoor installation."
- d. "For outdoor portable use only."

1.27.10

Heaters for installation only on or over noncombustible floors shall be marked "For Installation on (or over) Noncombustible Floors Only" on Class IIIA marking material.

1.27.11

A marking of Class III marking material shall, when practical, be affixed to the heater in a conspicuous location by the manufacturer. When not practical, this label shall be supplied by the manufacturer with explicit instructions to affix the label in a conspicuous location adjacent to the heater. This label shall include the following information:

 **WARNING:** Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

1.27.12

A heater for indoor installation designed to vent the flue gases horizontally outdoors through a wall by means other than a conventional venting system shall also bear markings specifying the following information:

- a. The appliance manufacturer's part number(s) of the means to provide for venting of the flue gases to the outdoors. When venting system components are listed by a nationally recognized testing agency, the listing identification by manufacturer and specific part number may be used in lieu of the appliance manufacturer's part number. When parts of special design and listings are involved, the vent manufacturer is also to be identified.
- b. On parts supplied by the appliance manufacturer (see [1.2.10](#)) for venting flue gases from the heater to the outdoors, identification in accordance with "-a" above.
- c. A Class V marking in a location conspicuous prior to installation clearly indicating the minimum and maximum vent length from the appliance.

1.27.13

Instructions on a Class V marking for lubrication of motor, blower or fan bearings shall be provided on the fan or blower housing or on surfaces adjacent to the means of access. Instructions shall designate the

1.27.14

Radiant tube heaters shall bear a Class IIIA marking as shown in Figure 2, Connector Installation Label. The marking shall be in close proximity to the gas inlet.

Note: If the location and orientation of the gas connection to the radiant tube heater is other than shown, the label shall reflect the burner geometry and any additional piping needed to accomplish the intended connector geometry.

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