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**ANSI Z83.25-2017 • CSA 3.19-2017**

# **Direct gas-fired process air heaters**

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**ANSI Z83.25-2017 • CSA 3.19-2017, Direct gas-fired process air heaters**

<b>Revision from previous edition</b>	<b>Revision symbol (in margin)</b>
Annex <a href="#">B</a>	Δ

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**Direct gas-fired process air heaters**



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**IGAC**

*Interprovincial Gas Advisory Council*



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<b>J. Novkovic</b>	CSA Group, Cleveland, Ohio, USA	<i>Program Manager</i>
<b>S.M. Corcoran</b>	CSA Group, Cleveland, Ohio, USA	<i>Project Manager</i>

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<b>J. Novkovic</b>	CSA Group, Cleveland, Ohio, USA	<i>Program Manager</i>
<b>C.L. Rake</b>	CSA Group, Cleveland, Ohio, USA	<i>Project Manager</i>

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<b>T. Kwon</b>	Air-Conditioning, Heating, and Refrigeration Institute, Arlington, Virginia, USA	
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<b>M. Thomas</b>	Natural Resources Canada CanmetENERGY, Ottawa, Ontario, Canada	
<b>S. Wang</b>	Lenuan Heating Appliances Co., Ltd., Foshan, Guangdong, China	<i>Non-voting</i>

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<b>A. Yilmaz</b>	Air-Conditioning, Heating, and Refrigeration Institute, Arlington, Virginia, USA	<i>Alternate</i>
<b>J. Novkovic</b>	CSA Group, Cleveland, Ohio, USA	<i>Program Manager</i>
<b>S.M. Corcoran</b>	CSA Group, Cleveland, Ohio, USA	<i>Project Manager</i>

# Preface

This is the third edition of ANSI Z83.25 • CSA 3.19, Standard for *Direct gas-fired process air heaters*. It supersedes the previous edition published in 2015.

This Standard was prepared by the Z83/CSA Joint Technical Sub-Committee on Standards for Gas-Fired Heavy Duty Forced Air Heaters under the jurisdiction of the Technical Committee on Gas Appliances and Related Accessories, the Z21/83 Technical Committee on Performance and Installation of Gas Burning Appliances and Related Accessories, and the Strategic Steering Committee on Standards for Fuel Burning Appliances, and had been formally approved by the Technical Committee(s), American National Standards Institute, and the Interprovincial Gas Advisory Council.

This publication represents a basic standard for safe operation, substantial and durable construction, and acceptable performance of Recirculating direct gas-fired industrial air heaters. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection, and research on appliances designed for the 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 function 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 direct gas-fired process 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 technical advances take place, revisions may become necessary. When they are believed desirable, recommendations or suggestions should be forwarded to the CSA Group, 8501 East Pleasant Valley Road, Cleveland, Ohio 44131. A proposal form is provided in the back of this document.

Safe and satisfactory operation of a direct gas-fired process heater depends to a great extent upon its proper installation, use, and maintenance. It should be installed in accordance with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54*, manufacturers' installation instructions, and local municipal codes.

Users of this American National Standard are advised that the devices, products, and activities within its scope may be subject to regulation at the Federal, 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, state, or local regulations 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.**

**CAUTION NOTICE:** This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute, Inc., require that action be taken to reaffirm, revise, or withdraw this Standard no later than five (5) years from the date of approval. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, Inc., 25 West 43rd Street, Fourth Floor, New York, N.Y. 10036, (212) 642-4900.

**Interpretations:** The Strategic Steering Committee on Standards for Fuel Burning Appliances has provided the following direction for the interpretation of standards under its jurisdiction: "The literal

text shall be used in judging compliance of products with the safety requirements of this Standard. When the literal text cannot be applied to the product, such as for new materials or construction, and when a relevant committee interpretation has not already been published, CSA Group's procedures for interpretation shall be followed to determine the intended safety principle."

**Notes:**

- 1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
- 2) *This Standard contains SI (Metric) units corresponding to the yard/pound quantities, the purpose being to allow the standard to be used in SI (Metric) units. (IEEE/ASTM SI 10, American National Standard for Metric Practice, or ISO 80000-1:2009, Quantities and units – Part 1: General, is used as a guide in making metric conversion from yard/pound quantities.) If a value for a measurement and a corresponding value in other units are stated, the first stated value is to be regarded as the requirement. The given corresponding value may be approximate. If a value for a measurement and a corresponding value in other units are both specified as a quoted marking requirement, the first stated unit, or both, are to be provided.*
- 3) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- 4) *This publication was developed by consensus, which is defined by CSA Policy governing standardization – Code of good practice for standardization as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity." It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this publication.*
- 5) *This Standard is subject to review at least every five years, suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include "Proposal for change" in the subject line:*
  - a) *Standard designation (number);*
  - b) *relevant clause, table, and/or figure number;*
  - c) *wording of the proposed change; and*
  - d) *rationale for the change.*
- 6) *To submit a request for interpretation of this Standard, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include "Request for interpretation" in the subject line:*
  - a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
  - b) *provide an explanation of circumstances surrounding the actual field condition; and*
  - c) *where possible, phrase the request in such a way that a specific "yes" or "no" answer will address the issue.*

*Committee interpretations are processed in accordance with the CSA Directives and guidelines governing Standardization and are available on the Current Standards Activities page at [standardsactivities.csa.ca](http://standardsactivities.csa.ca)*

## History of development of the Standard for Direct gas-fired process air heaters

**Note:** *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 equipment.

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.

A Z83/CGA joint Subcommittee on Standards for Heavy Duty Heaters was then established, based on memberships of the Z83 subcommittee for Gas-Fired Heavy Duty Forced Air Heaters, and the CGA committees for Unit Heaters/Duct Furnaces, Make-up Air Heaters, and Door Heaters.

Membership on the joint heavy duty heaters subcommittee encompasses representatives from the U.S. and Canadian manufacturing industry, gas suppliers (natural and LP), regulatory authorities, and general interest.

To facilitate the reporting structure of joint subcommittees, a CGA Standards Steering Committee on Gas Burning Appliances and Related Accessories was established to parallel Accredited Standards Committees Z21 and Z83.

The first meeting of the Z83/CGA joint heavy duty heaters subcommittee was held on July 14-16, 1992 in Toronto.

The Joint Technical Sub-Committee (TSC) on Standards for Gas-Fired Heavy Duty Forced Air Heaters adopted the proposed draft standard for Direct Gas-Fired Process Air Heaters for distribution for review and comment at its May 10, 2006 meeting.

The draft of the proposed harmonized standard was issued for public review in September 2006. All comments relating to the draft were duly considered by the joint heavy duty heaters TAG at its meeting on May 17, 2007. The resulting draft of the proposed harmonized standard was submitted for approval by the Z21/83 Committee and the CGA Technical Committee.

The first edition of the harmonized Z83/CSA Standard for Direct gas-fired process air heaters was approved by the Canadian Interprovincial Gas Advisory Council on November 26, 2007, and by the American National Standards Institute, Inc. on January 14, 2008.

The second edition of the harmonized Z83/CSA Standard for Direct gas-fired process air heaters was approved by the Canadian Interprovincial Gas Advisory Council on February 5, 2015, and by the American National Standards Institute, Inc. on January 8, 2015.

This, the third edition of the harmonized Z83/CSA Standard for Direct gas-fired process air heaters was approved by the Canadian Interprovincial Gas Advisory Council on June 26, 2016, and by the American National Standards Institute, Inc. on June 14, 2016.

The previous edition of the harmonized Direct gas-fired process air heaters, and addenda thereto, approved by the Interprovincial Gas Advisory Council and the American National Standards Institute are as follows:

Z83.25-2008 • CSA 3.19-2008

Z83.25a-2013 • CSA 3.19a-2013

Z83.25-2015 • CSA 3.19-2015

The following identifies the designation and year of the third edition of the Standard:

ANSI Z83.25-2017 • CSA 3.19-2017

**Note:** *This, the 2017 edition of Z83.25 • CSA 3.19, incorporates changes to the 2015 edition. Changes, other than editorial, are denoted by a delta in the margin.*

# ANSI Z83.25-2017 • CSA 3.19-2017

## ***Direct gas-fired process air heaters***

### **1 Scope**

#### **1.1**

This Standard applies to newly produced, direct gas-fired process air heaters of the recirculating or non-recirculating type (see Clause 3, Definitions), hereinafter referred to as heaters, whose primary purpose is to provide process heating to non-occupied spaces within commercial and industrial buildings and may also include operation as a non-recirculating ventilation air heater (see Clause 3), if the heater is operated during periods when the space is occupied.

Heaters covered under this Standard are limited to a maximum discharge temperature of 250 °F (121 °C).

Heaters covered by this Standard are not intended for use in any area containing sleeping quarters. The installation conforms with local codes, or in the absence of local codes, in accordance with the *National Fuel Gas Code, ANSI Z223.1*, or the *Natural Gas and Propane Installation Codes, CAN/CSA B149.1*.

This Standard is intended to cover only complete packaged heaters with integral air moving components, i.e., those which are designed by, cataloged by, and built on a repetitive basis by the manufacturer.

#### **1.2**

When the heater operates with people present within the space being served by this heater, it is configured so that the performance window of the heater operation will be in compliance with the applicable provisions associated with the ventilation air heater mode contained in this Standard.

#### **1.3**

When the heater is operated in the bake cycle mode, the combustion by-products generated by the heater have not been defined since it is intended to operate in this mode in the non-occupied condition only.

#### **1.4**

When the heater is utilized as a paint booth heater, it must be operated as a non-recirculating ventilation air heater during the spraying operation and may be operated as a recirculating heater in the bake or drying mode provided all of the conditions identified in Clauses 4.1.11, 4.1.12, 4.15.3, 4.15.12, 4.15.13, 4.15.14, 4.21.12, 4.21.13, 4.21.14, 4.21.15, 4.21.16, 4.21.17, 4.21.18, 4.21.19, and 4.21.20, if applicable, are met.

#### **1.5**

Process air heaters that operate in the bake cycle mode only (does not operate in the occupied mode) are not required to comply with the following construction provisions: Clauses 4.15.5-b) and 4.21.1-m)-iii).

**1.6**

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.

**1.7**

Items unique to the U.S.A. are shown in Clause 6.

**1.8**

Items unique to Canada are shown in Clause 7.

**1.9**

Clause 2, Reference publications, contains a list of standards specifically referenced in this Standard, and sources from which these referenced standards may be obtained.

**1.10**

All references to “psi” through this Standard are to be considered gage pressure unless otherwise specified.

**1.11**

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; “may” is used to express an option or that which is permissible within the limits of the standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

## 2 Reference publications

This Standard refers to the following publications, and where such reference is made, it is to the edition listed below.

**CSA Group**

CSA C22.1-15

*Canadian Electrical Code, Part 1*

CSA C22.2 No. 3-M1988 (R2014)

*Electrical Features of Fuel-Burning Equipment*

CSA C22.2 No. 77-14

*Motor with Inherent Overheating Protection*