

ANSI Z21.13-2004
CSA 4.9-2004

American National Standard/
CSA Standard For
**Gas-Fired Low Pressure Steam
And Hot Water Boilers**

AMERICAN NATIONAL STANDARD
ANSI Z21.13-2004

CSA STANDARD
CSA 4.9-2004

GAS-FIRED LOW PRESSURE STEAM AND HOT WATER BOILERS

Second Edition - 2004

This Standard is based on

Z21.13-2000 • CSA 4.9-2000
Z21.13a-2002 • CSA 4.9a-2002
and
Z21.13b-2003 • CSA 4.9b-2003

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ANSI provides that the interests of the public may have appropriate participation and representation in standardization activity, and cooperates with departments and agencies of U.S. Federal, state and local governments in achieving compatibility between government codes and standards and the voluntary standards of industry and commerce.

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***American National Standards Institute, Inc.
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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 pressure steam and hot water boilers. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection and research on gas-fired low pressure steam and hot water boilers 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 pressure steam and hot water boilers, 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. Where they are believed desirable, recommendations or suggestions should be forwarded to the Chairman of Accredited Standards Committee Z21/83, 8501 East Pleasant Valley Road, Cleveland, Ohio 44131, or the Chairman of the CSA Technical Committee on Gas Appliances and Related Accessories, 178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3.

Safe and satisfactory operation of gas-fired low pressure steam and hot water boilers 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. In Canada the Standards Committee and the Interprovincial Gas Advisory Council normally stipulate an effective date for the standard.

History Of The Development Of The Standard For Gas-Fired Low-Pressure Steam And Hot Water Boilers

(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. Joint subcommittees were established to facilitate the standards harmonization process between the United States and Canada.

The first draft of this harmonized standard was based on current coverage from the American National Standard for Gas-Fired Low-Pressure Steam and Hot Water Boilers, Z21.13-1991, Z21.13a-1993, Z21.13b-1994, and the Canadian Gas Association Standards CGA 3.3-1976, Industrial and Commercial Atmospherically Fired Vertical Flue Boilers and Hot Water Supply Heaters and CGA 4.9-1969, Gas-Fired Steam and Hot Water Boilers.

Following reconsideration and modification of the proposed draft standard, in light of comments received, the joint subcommittee at its December 2, 1998 meeting, recommended the proposed draft standard to Accredited Standards Committee Z21/83 and the (Interim) CSA Standards Steering Committee for approval.

The proposed draft of the harmonized standard for gas-fired low-pressure steam and hot water boilers, as modified by the joint subcommittee, was approved by the Z21/83 Committee at its April 15, 1999 meeting, and by the CSA Standards Steering Committee on Gas Appliances and Related Accessories by letter ballot dated April 9, 1999.

The second edition of the American National Standard/CSA Standard for Gas-Fired Low-Pressure Steam and Hot Water Boilers was approved by the Canadian Interprovincial Gas Advisory Council on May 18, 2004, and by the American National Standards Institute, Inc., on June 23, 2004.

The previous edition of the Gas-Fired Low-Pressure Steam and Hot Water Boilers standard, and addenda thereto, approved by the Interprovincial Gas Advisory Council and American National Standards Institute, Inc. are as follows:

ANSI Z21.13-2000 • CSA 4.9-2000
ANSI Z21.13a-2002 • CSA 4.9a-2002
ANSI Z21.13b-2003 • CSA 4.9b-2003

The following identifies the designation and year of the second edition of the standard:

ANSI Z21.13-2004 • CSA 4.9-2004

Note: This 2004 edition of Z21.13 • CSA 4.9 incorporates changes to the 2000 edition and addenda thereto. Changes other than editorial are noted by a vertical line in the margin.

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Contents

	Page
Part I. Construction	
1.1	Scope..... 1
1.2	General Construction..... 2
1.3	Assembly..... 4
1.4	Accessibility..... 4
1.5	Combustion Air and Ventilation Openings..... 5
1.6	Main Burners..... 6
1.7	Primary Air Adjustment Means..... 7
1.8	Orifice Spuds and Orifice Fittings..... 8
1.9	Automatic Gas Ignition Systems..... 8
1.10	Flame Spreaders..... 11
1.11	Manual Gas Valves..... 11
1.12	Gas Supply Lines..... 12
1.13	Bleeds and Vents..... 14
1.14	Automatic Valves and Safety Shutoff Valves..... 15
1.15	Gas Appliance Pressure Regulators and Gas Pressure Interlocks..... 16
1.16	Adjustment for Minimum Input Rating..... 17
1.17	Condensate Disposal..... 17
1.18	Pilot Gas Filters..... 18
1.19	Limiting Devices..... 18
1.20	Safety and Relief Valves..... 18
1.21	Low Water Cutoffs..... 18
1.22	Thickness of Materials..... 19
1.23	Boiler Construction..... 20
1.24	Electrical Equipment and Wiring..... 20
1.25	Motors and Blowers..... 27
1.26	Protection of Service Personnel..... 28
1.27	Flue Collectors..... 29
1.28	Flue Connections and Integral Venting Systems..... 30
1.29	Draft Hoods..... 30
1.30	Automatic Vent Damper Devices..... 31
1.31	Automatic Flue Damper Devices..... 32
1.32	Vent-air Intake Pipes of Direct Vent Systems..... 34
1.33	Water Connections..... 34
1.34	Instructions..... 34
1.35	User's Information Manual..... 41
1.36	Marking..... 43
Part II. Performance	
2.1	General..... 53
2.2	Test Gases..... 56
2.3	Inlet Test Pressures and Burner Adjustments..... 57
2.4	Category Determination..... 57
2.5	Combustion..... 59
2.6	Burner Operating Characteristics..... 60
2.7	Piloted Ignition Systems..... 62
2.8	Direct Ignition Systems..... 67
2.9	Proved Ignition System..... 69
2.10	Flame Roll-out Safety Shutoff Means..... 71
2.11	Efficiency..... 73
2.12	Main Burner and Flame Spreader Temperatures..... 75

Contents (Continued)

	Page
2.13	Nonload-bearing Flue Gas Baffle Temperatures 76
2.14	Steam Pressure Limiting Devices 77
2.15	Water Temperature Limiting Devices 77
2.16	Manifold and Control Assembly Capacity 78
2.17	Safety Circuit Analysis 78
2.18	Power Interruption..... 79
2.19	Wall, Floor, Ceiling, Electrical Component and Venting System Temperatures..... 79
2.20	Flue Gas Temperature 85
2.21	Flue Collectors 86
2.22	Blocked Vent Shutoff System..... 86
2.23	Draft Hoods 87
2.24	Blocked Vent Test For Boilers Equipped With Forced Or Induced Draft Burners And Without Draft Hoods Or Regulators..... 90
2.25	Automatic Flue Damper Devices 91
2.26	Direct Vent Systems 94
2.27	Boilers for Outdoor Installation 100
2.28	Boilers Vented Horizontally Through an Outside Wall 102
2.29	Condensate Disposal System(s)..... 105
2.30	Venting Systems for Category II, III or IV Boilers..... 106
2.31	Marking Material Adhesion and Legibility 107

Tables

Table I-A.	Maximum Safety Control Timings Natural Draft Atmospheric Burners..... 110
Table I-B.	Maximum Safety Control Timings Other than Natural Draft Atmospheric Burners 110
Table I-C.	Maximum Safety Control Timings Natural Draft Atmospheric Burners..... 111
Table I-D.	Maximum Safety Control Timings Other than Natural Draft Atmospheric Burners 112
Table II.	Minimum Acceptable Wall Thickness for Semi-rigid Tubing 113
Table III.	Maximum Tubing and Fitting Temperatures 113
Table IV.	Minimum Corrosion Protection of Ferrous Materials Used in the Construction of Outside Casings of Heaters for Outdoor Installation..... 114
Table V.	Minimum Thickness of Vent Pipes and Radiation Shields Exposed to Combustion Products on Direct Vent Boilers 115
Table VI. 116
Table VII.	Minimum Average Thickness of Sheet-Metal Junction Boxes..... 116
Table VIII.	Insulation Thickness of Factory Wiring Exposed in Burner or Fan Compartment 117
Table IX.	Minimum Spacings in Inches (mm)..... 118
Table X.	Maximum Allowable Rise above Room Temperature for Various Component Parts 119
Table XI.	Maximum Allowable Motor Winding Temperatures, °F (°C) 120
Table XII.	Characteristics of Test Gases 120
Table XIII.	Inlet Test Pressures..... 120
Table XIV.	Determination of Category 121
Table XV.	Maximum Flame Spreader Temperatures 121
Table XVI.	Maximum Nonload-bearing Flue Gas Baffle Temperatures..... 122
Table XVII.	Maximum Allowable Temperatures Of Typical Non-Metallic Vent Material 123

Contents (Continued)

	Page
Figures	
Figure 1. Accessibility and Protection	126
Figure 2. Arrangement of Vent Pipe for Testing Boilers Having Input Ratings of 400,000 Btu Per Hour (117 228 W) or Less (See 2.1.5.).....	127
Figure 3. Piezo Ring and Details of Typical Construction.....	128
Figure 4. Chart for Determination of Boiler Category.....	129
Figure 5. Suggested Piping Arrangement for Steam Boilers - Feed Water Measurement -	130
Figure 6. Arrangement of Apparatus for Testing Hot Water Boilers.....	131
Figure 7. Enclosure Types and Clearance Nomenclature	132
Figure 8. Method of Sealing Annulus Around Vent Connector During Alcove and Closet Installation Tests.....	133
Figure 9. Venting Arrangements for Alcove and Closet Installation Tests.....	133
Figure 10. Arrangement of Sandbag and Vent-Air Intake Terminal for Impact Test	134
Figure 11. Arrangement of Spray Heads and Associated Piping for Simulated Rainstorm Test.....	135
Figure 12. Spray Head Assembly and Details of Construction	135
EXHIBIT A. Outline of Lighting Instructions for Appliances Equipped with Continuous Pilots	136
EXHIBIT B. Outline of Operating Instructions for Appliances Equipped with Intermittent Pilot or Interrupted Pilot Systems	139
EXHIBIT C. Outline of Operating Instructions for Appliances Equipped with Direct Ignition Systems.....	142
EXHIBIT D. Flue Loss Calculations	145
EXHIBIT E. Items Unique to Canada	149
EXHIBIT F. Provisions For Listed Gas Appliance Conversion Kits.....	167
EXHIBIT G. List of Reference Standards	171
PART III. Manufacturing And Production Tests	175
PART IV. Definitions	177
APPENDIX A. Pertinent References to ANSI Y14.15.....	189
APPENDIX B. Wire Color Designations.....	190
APPENDIX C. Recommended Wire Color Usage.....	191
APPENDIX D. Preferred Graphic Symbols of Commonly Used Items, Extracted from Standard ANSI/IEEE 315, Graphic Symbols for Electrical and Electronics Diagrams, and Abbreviations for These Items.....	192

APPENDIX E.	Sample Failure Modes and Effects Analysis for Component Wiswiring	194
APPENDIX F.	Table of Conversion Factors.....	195

Note

This standard contains SI (Metric) equivalents to the yard/pound quantities, the purpose being to allow the standard to be used in SI (Metric) units. (*IEEE/ASTM-SI-10* or *CAN/CSA Z234.1* are used as a guide in making metric conversion from yard/pound quantities.) If a value for a measurement and an equivalent value in other units, the first stated is to be regarded as the requirement. The given equivalent value may be approximate. If a value for a measurement and an equivalent value in other units, are both specified as a quoted marking requirement, the first stated unit, or both shall be provided.

American National Standard/CSA Standard For Gas-Fired Low Pressure Steam And Hot Water Boilers

Part I: Construction

1.1 Scope

1.1.1 This standard applies to newly produced gas-fired low-pressure steam and hot water boilers with gas inlet pressure ratings not exceeding $\frac{1}{2}$ psi (3.5 kPa) and having input ratings of less than 12,500,000 Btu per hour (3 663 389 W) (see Part IV, Definitions), hereinafter referred to as boilers*, constructed entirely of new unused parts and materials, for operation at or below the following pressures and temperatures:

Steam heating boilers
15 psi (103.42 kPa) steam pressure

Hot water heating boilers
160 psi (1.10 MPa) water pressure
250°F (121°C) water temperature

Hot water supply boilers
160 psi (1.10 MPa) water pressure
250°F (121°C) water temperature

- a. For use with natural gas;
- b. For use with manufactured gas;
- c. For use with mixed gas;
- d. For use with liquefied petroleum gases; and
- e. For use with LP gas-air mixtures.

The construction of boilers for use with the above-mentioned gases is covered under Part I.

The performance of boilers for use with the above-mentioned gases is covered under Part II.

1.1.2 This standard applies to indoor type boilers, of other than the direct vent which are categorized according to vent pressure and temperature as either Category I, Category II, Category III or Category IV (see Part IV, Definitions), and to outdoor type boilers.

* See Exhibit E (E2.1) for boilers covered in Canada which exceed the above limits in gas inlet pressure and/or input ratings.

- 1.1.3** This standard also applies to direct vent boilers (see Part IV, Definitions). A direct vent boiler anticipated by this standard is essentially a balanced flue appliance with the air intake and vent outlet in proximity. Other designs shall be subjected to such additional tests as believed necessary at the discretion of the testing agency.
- 1.1.4** This Standard covers the method of test to determine combustion efficiency for indoor boilers with input rates of 300,000 Btu/h (87 921 W) or greater and the thermal efficiency for both indoor and outdoor boilers. (See Exhibit E, Items Unique to Canada, for minimum efficiencies of indoor boilers with input rates under 300,000 (87 921 W) for sale in Canada).
- 1.1.5** 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.
- 1.1.6** All references to pressure throughout this standard are to be considered gauge pressure, unless otherwise specified.
- 1.1.7** Exhibit E, Items Unique to Canada, contains provisions unique to, and required by, Canada.

1.2 General Construction

- 1.2.1** The construction of a boiler, whether specifically covered in this standard or not, shall be in accordance with reasonable concepts of safety, substantiality and durability. Component parts shall be well fitted and 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 compliance with this standard.
- 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.
- 1.2.2** Asbestos shall not be used in the construction of a boiler.
- 1.2.3** Every part of the boiler 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.
- 1.2.4** On a boiler having an input rating 400,000 Btu per hour (117 228 W) or less, the leads or terminals of an individual control, in the gas control circuit, that are provided for making electrical connections and which are intended to be disconnected in order to replace or service the control shall be identified by a number (s), letter(s), symbol(s) or combination thereof, in a color which contrasts with the background. This provision does not apply when:
- a. The control incorporates means which will physically prevent miswiring; or
 - b. The control incorporates only two terminals or leads, the interchange of which does not change the operation of the control.