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American National Standard/
CSA Standard For
**Connectors For Gas
Appliances**

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AMERICAN NATIONAL STANDARD
ANSI Z21.24-2006

CSA STANDARD
CSA 6.10-2006

Third Edition - 2006
This Standard is based on the Standard for

Connectors For Gas Appliances

ANSI Z21.24-2001 • CSA 6.10-2001
and Addenda Z21.24a-2002 • CSA 6.10a-2002,
Z21.24b-2003 • CSA 6.10b-2003

APPROVED



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Preface

This publication represents a basic standard for safe operation, substantial and durable construction, and acceptable performance of a connector for gas appliances. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection and research on connectors for gas appliances 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 connectors for gas appliances, 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 Chairman of Accredited Standards Committee Z21/83, 8501 East Pleasant Valley Road, Cleveland, Ohio 44131, or the Chairman of CSA Technical Committee on Gas Appliances and Related Accessories, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.

Safe and satisfactory operation of a connector for gas appliances 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; and 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 Connectors For Gas Appliances

(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.

A draft harmonized standard for connectors for moveable gas appliances was prepared for review by the Z21/CGA Joint Connector Subcommittee. The draft harmonized standard for connectors for gas appliances is based on the American National Standard for Connectors for Gas Appliances (Z21.24-1993 and Z21.24a-1993), the standard American National Standard for Flexible Connectors of Other than All-Metal Construction for Gas Appliances (Z21.45-1992, Z21.45a-1993 and Z21.45b-1993), and the National Standard of Canada for Connectors for Gas-Appliances (CAN/CGA-6.10-M88). At its September 20, 1994 meeting, the Z21/CGA joint Connector Subcommittee considered and modified the proposed harmonized draft standard and agreed to distribute it for industry review during April 1995.

With the formation of joint subcommittees, a Canadian Gas Association Standards Steering Committee on Gas Burning Appliances and Related Accessories was established to parallel Accredited Standards Committees Z21 and Z83, and to support the formation of joint subcommittees. Operating procedures, in accordance with American National Standards

Institute procedures, for joint subcommittees were developed and subsequently approved by ANSI on April 1, 1993.

Following reconsideration and modification of the proposed draft standard for connectors for gas appliances, in light of comments received, the joint connector subcommittee, at its November 16, 1995 meeting, recommended the proposed draft to the Z21 Committee and the CGA Standards Steering Committee for approval.

The first edition of the harmonized standard for connectors for gas appliances, as modified by the joint subcommittee, was approved by the Z21 Committee at its April 11, 1996 meeting, by the CGA Standards Steering Committee on May 8, 1996, by the Interprovincial Gas Advisory Council (IGAC) in June 1996, by the CGA Standards Advisory Committee on September 6, 1996, and by the American National Standards Institute, Inc. (ANSI), on June 6, 1997.

The second edition of the harmonized standard for connectors for gas appliances was approved by the Z21/83 Committee on January 31, 2001, by the CSA Technical Committee on January 25, 2001, by the IGAC on June 12, 2001, and by ANSI on May 18, 2001.

This, the third edition of the harmonized standards for Connectors for Gas Appliances was approved by the Z21/83 Committee on July 7, 2005, by the CSA Technical Committee April 21, 2005, by the IGAC December 1, 2006 and by ANSI on August 25, 2005.

The previous editions of the connectors for gas appliances standard, and addenda thereto, approved by ANSI and the IGAC, are as follows:

Z21.24-1997 • CGA 6.10-M97
Z21.24a-2000 • CGA 6.10a-2000
Z21.24b-2001 • CGA 6.10b-2001

Z21.24-2001 • CSA 6.10-2001
Z21.24a-2002 • CSA 6.10a-2002
Z21.24b-2003 • CSA 6.10b-2003

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

Z21.24-2006 • CSA 6.22-2006

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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. (Standard for use of the International System of Units (SI): The Modern Metric System, IEEE/ASTM SI IO, is 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.

Harmonized Standard For Connectors For Indoor Gas Appliances

Part I: Construction

1.1 Scope

1.1.1

This standard applies to newly produced gas appliance connectors, constructed entirely of new unused parts and materials, having nominal internal diameters of $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$ and 1 in, and having fittings at both ends provided with taper pipe threads for connection to a gas appliance and to house piping. This standard covers assembled appliance connectors not exceeding a nominal length of 6 ft (1.83 m). Connectors listed under this standard are intended for use with gas appliances that are not frequently moved after installation.

For the purpose of this standard, an unused connector, including end fittings, is considered to be a connector which has not been installed.

1.1.2

Appliance connectors complying with this standard are considered suitable for use with natural, manufactured, mixed and liquefied petroleum gases and LP gas-air mixtures.

1.1.3

Appliance connectors complying with this standard are for use with piping systems having fuel gas pressures not in excess of $\frac{1}{2}$ lb/in² (3.5 kPa).

1.1.4

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.

1.1.5

All references to psi throughout this standard are to be considered gauge pressure unless otherwise specified.

1.1.6

Exhibit A contains provisions that are unique to Canada.

1.1.7

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

1.2 Test Samples

1.2.1

Connectors submitted for examination under this standard shall be representative production samples.

1.2.2

The manufacturer shall supply the number of samples of each nominal size, type and material specified by the testing agency. For test purposes, the testing agency may specify samples fabricated in lengths not to exceed 6 ft (1.83 m).

1.3 Materials

1.3.1

Materials used in the construction of appliance connectors and fittings shall comply with Table I, Material for Appliance Connectors and Fittings, within commercial tolerances, and satisfactory evidence of this fact shall be furnished to the testing agency.

1.3.2

Materials used in the exterior construction of the connector shall be resistant to deterioration from moisture, common household chemicals, and cooking oils or shall be provided with a coating suitable to prevent such deterioration.

1.3.3

Materials used in the interior construction of the connector shall be resistant to deterioration from fuel gases.

1.3.4

Fittings shall be of good quality with respect to material, workmanship and design.

1.4 Tubing Structure

Metal Tubing shall be of uniform thickness (commercial tolerances allowed) but no section of such tubing shall be less than 0.010 in (0.254 mm) thick. Tubing shall be free from dents, flaws or other defects. Austenitic stainless steel with a minimum thickness of 0.008 in (0.203 mm) is acceptable.

1.5 Connector Dimensions

1.5.1

The nominal length of a connector shall refer to the over-all length, including fittings. The actual length of any sample shall be within minus $\frac{1}{2}$ in (12.7 mm) to plus 2 in (50.8 mm) of its nominal length.

1.5.2

Nominal connector size shall refer to the finished internal diameter of the connector tubing. The actual internal diameter of the tubing shall not be more than 0.025 in (0.635 mm) less than its nominal size, as determined by inserting a cylindrical rod, of the proper diameter, 1 in (25.4 mm) into the end of the connector tubing.

1.6 Connector Nuts And Adapters — Design And Dimensions

1.6.1

Connector nuts and adapters shall be faced or otherwise finished externally to provide an adequate hexagonal or octagonal wrench grip. The dimensions across the flats and the length of the flats for connector nuts and adapters shall not be less than those specified in [Table II, Minimum Wrench Grip Dimensions For Flare Connector Nuts](#), and [Table III, Minimum Wrench Grip Dimensions For Adapters Having Pipe Threads](#), respectively.

1.6.2

Surfaces of connector nuts and adapters which normally may come in contact with the tubing shall have a smooth finish.

1.6.3

Threads on pipe-end connections of adapters shall be taper pipe threads conforming to the Standard for *Pipe Threads, General Purpose (Inch)*, ANSI/ASME B1.20.1, or the Standard for *Dryseal Pipe Threads (Inch)*, ANSI/ASME B1.20.3 NPTF.

1.6.4

Adapters conforming with the standard for *Refrigeration Tube Fittings -General Specifications*, ANSI/SAE J513, shall also be acceptable.

1.6.5

Each end of a connector shall be equipped with a flare or other union fitting.

1.6.6

An appliance connector shall not incorporate a connector nut employing threads which are capable of being assembled to standard pipe threads. The flare fitting dimensions shall comply with [Table IV, Flare Fitting Dimensions](#), as identified in [Figure 2, Flare Figure Dimensions](#).

1.6.7

Quick-disconnect devices shall not be used as end fittings on connectors covered by this standard.

1.6.8

Valves used as end fittings shall comply with the applicable provisions for an appliance connector valve as specified in the Standard for *Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves*, ANSI Z21.15 • CSA 9.1.

1.6.9

Union seats shall not depend upon gaskets for gastightness.

1.7 General

1.7.1

The construction of tubing and fittings not specifically covered by this standard 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.

1.7.2

Neither soldering nor brazing shall be used in the construction of a connector.

1.7.3

Porosity in welds shall be held to a minimum consistent with good manufacturing practice.

1.7.4

Connectors shall be free from scale, loose oxides and acid residue.

1.7.5

If chemicals are used in the processing of a connector, there shall be no evidence of corrosive attack.

1.7.6

When a connector is provided with a protective coating the connector shall comply with this standard without the coating, unless otherwise specified.

1.7.7

Connectors shall not be packaged by the manufacturer's with any bends smaller than $1\frac{1}{2}$ in (38.1mm) mandrel size. If connectors are shipped for repackaging, instructions shall be provided specifying that the connector shall not be packaged with any bends smaller than $1\frac{1}{2}$ in (38.1mm) in mandrel size.

1.7.8

A protective coating on a connector shall:

- a. Cover all portions of the connector which are capable of being bent or flexed;
- b. Adhere to or otherwise be tightly bonded to the surface of the tubing;
- c. Not react with the tubing to the detriment of the tubing or the coating; and
- d. Have no adverse effect upon the performance of the connector.

1.7.9

Nonmetallic exteriors or coatings shall not continue to burn after an ignition source has been removed.

Method of Test

This test shall be conducted in a draft-free location.

One 2 ft (610 mm) connector shall be used for test purposes and the connector shall not be exposed to a relative humidity greater than 70 percent during the 24 hour period prior to the test.

The connector under test shall be supported at one end and hung with its axis vertical.

A Bunsen burner having a nominal $\frac{3}{8}$ in (9.5 mm) diameter tube and with means of controlling the primary air and gas input shall be used as an ignition source. The gas at the burner shall be ignited and adjusted to produce a flame 2 to 3 in (50.8 to 76.2 mm) in length.

The flame shall be applied to the nonmetallic exterior approximately 3 in (76.2 mm) above the start of the exterior coating at the bottom end of the connector for 1 minute (by orienting the burner at an angle as needed to ignite the nonmetallic exterior or coating) and then withdrawn. If no burning, flaming or glowing combustion is observed, additional attempts to ignite the nonmetallic exterior covering of the connector shall be made with the flame varied from blue to yellow. If flaming or glowing combustion of