

American National
Standard For
**Household Cooking
Gas Appliances**

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American National Standard
ANSI Z21.1-2010

Twenty-Ninth Edition - 2010
This Standard is based on the standard
for Household Cooking Gas Appliances

ANSI Z21.1-2005
ANSI Z21.1a-2007
ANSI Z21.1b-2008



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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 household cooking gas appliances. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection and research on household cooking gas appliances designed for the utilization of gas. There are risks of injury to persons inherent in some appliances that, if completely eliminated, would defeat the utility of the appliance. The provisions in this Standard are intended to 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 household cooking 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 technical advances take 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. A proposal form is provided in the back of this document.

Safe and satisfactory operation of household cooking 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; the (U.S.) Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280, or when such standard is not applicable, the Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities, ANSI/NFPA 501A, manufacturers' installation instructions, and local municipal building codes.

Users of this American National Standard are advised that the devices/products/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 regulation should be followed.

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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 Household Cooking Gas Appliances

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

The first definite step toward the preparation of gas range specifications appears to have been taken by The Philadelphia Gas Works Company in 1903, after several years' observation had indicated the desirability of preparing general specifications which would enable manufacturers to build their ranges to meet certain specific requirements.

In Volume 4 of the 1909 Proceedings of the American Gas Institute there is a report of the Committee on Utilization of Gas Appliances which includes the specifications in use by two large purchasers of gas ranges. In the 1912 proceedings: (1) specifications for gas ranges were submitted for approval which had been prepared jointly by the Committee of the American Gas Institute and a similar Committee of the National Commercial Gas Association, and (2) recommendation was made that a standing committee be appointed to continue the standardization and simplification of gas appliance specifications.

These specifications were revised several times between 1914 and 1918. In June 1918 the American Gas Institute and the National Commercial Gas Association amalgamated to form the American Gas Association. During 1919 a Committee on Standardization of Gas Appliances was formed by the American Gas Association to carry out revisions of existing gas appliance specifications.

In 1925 the Subcommittee on Approval Requirements for Domestic Gas Ranges was formed for the purpose of revising existing standards of the American Gas Association and placing them in a form adaptable to industry's needs and readily capable of enforcement by the newly created Testing Laboratories of the American Gas Association. The first American Gas Association Approval Requirements for Gas Ranges were released to the gas industry in 1926. Revised editions were published in 1928 and 1930.

In September 1930, the American Gas Association Approval Requirements Committee became Sectional Committee Z21 of the American Standards Association. Consequently, the Subcommittee on Approval Requirements for Domestic Gas Ranges became a subcommittee of the Z21 Committee.

During 1930 and 1931, general revision and enlargement of the standards were undertaken by the subcommittee and the Z21 Committee. The resulting standard, the most comprehensive ever issued for gas ranges, was submitted to the American Standards Association for adoption and accepted in 1932.

Revisions to this standard reflecting the latest developments and improvements were approved by the subcommittee during 1932. This draft standard was adopted by the Z21 Committee at its May, 1933 meeting and approved as American Standard by the American Standards Association in 1933. Following this procedure, seven subsequent editions of this standard were approved by the American Standards Association from 1935 to 1955.

Up to this point, the domestic gas range standard (Z21.1) covered both free-standing and built-in cooking units; however, in view of the rapid development of built-in units (formerly classified as recessed range sections) as well as other considerations as to the testing of these types of units, it was deemed advisable to have a separate standard devoted to each type of appliance. Consequently, the standard was divided

into two volumes: the fourteenth edition, Volume I, Free-Standing Units (Z21.1.1), and the first edition, Volume II, Built-In Domestic Cooking Units (Z21.1.2), which were approved as American Standard by the American Standards Association in 1956. New editions of Z21.1.1 and Z21.1.2 were approved in 1959.

As a result of the use of domestic gas ranges by the trailer coach and mobile home industry, the standards were modified to cover the special construction and performance features deemed necessary for ranges for installation in such vehicles. These revisions were included in first addenda to the standards approved as American Standards in 1960. Subsequent editions of both standards were approved in 1961 and 1964.

Continued progress in the development of domestic gas ranges prompted further revision of the standards. In the first addenda (Z21.1.1a-1965 and Z21.1.2a-1965) issued to the seventeenth edition of Z21.1.1 and the fourth edition of Z21.1.2, provisions covering outdoor gas broilers were incorporated.

In August 1966, the American Standards Association was reconstituted as the United States of America Standards Institute. As a result, the eighteenth edition of Z21.1.1 and the fifth edition of Z21.1.2, were approved as USA Standards by the United States of America Standards Institute in 1967.

In October 1969, the United States of America Standards Institute was renamed the American National Standards Institute, Inc.

As a result of continued progress and development of domestic cooking equipment designs plus the increasing similarity of some designs of free-standing and built-in ranges, the subcommittee concluded that reorganization and expansion of the domestic gas range standards was needed to adequately cover various types of cooking equipment. Accordingly, three draft standards were distributed for review and comment during September 1970: coverage for outdoor broilers contained in the existing standards, plus added coverage for outdoor top cooking units, was combined into a draft standard for outdoor cooking gas appliances; coverage for appliances for use with liquefied petroleum gases and for installation in travel trailers, as contained in the existing standards, was combined into a separate draft standard for recreational vehicle cooking appliances; and the remainder of Z21.1.1 and Z21.1.2 was combined into a draft standard for household cooking gas appliances.

The nineteenth edition of the former domestic gas range standards, Z21.1.1 and Z21.1.2, retitled and redesignated the American National Standard for Household Cooking Gas Appliances, Z21.1, was approved as American National Standard in 1972.

Further revisions in line with developments in gas utilization, including transfer of the remaining coverage for appliances for recreational vehicle installation to American National Standard for Recreational Vehicle Cooking Gas Appliances, Z21.57, were incorporated in the twentieth edition of the household cooking gas appliance standard which was approved as American National Standard by the American National Standards Institute, Inc., in 1974.

The twenty-first, twenty-second, twenty-third, twenty-fourth, twenty-fifth, twenty-sixth, twenty-seventh and twenty-eighth editions of the household cooking gas appliance standards were approved as American National Standards by the American National Standards Institute, Inc., in 1978, 1982, 1987, 1990, 1993, 1996, 2000 and 2005 respectively.

Following the procedures outlined above, further revisions to this standard, Z21.1, were developed in line with industry developments. This, the twenty-ninth edition of the household cooking gas appliance standard, was approved as an American National Standard by the American National Standards Institute, Inc. on November 17, 2010.

Previous editions of the household cooking gas appliance standard, and addenda thereto, approved by the American National Standards Institute or its predecessor organizations are as follows:

Z21A-1932
Z21.1-1933
Z21.1-1935
Z21.1-1937

Z21.1-1940	Z21.1-1942	
Z21.1-1948	Z21.1a-1949	
Z21.1-1952	Z21.1a-1953	Z21.1b-1954
Z21.1-1955		
Z21.1-1956	Z21.1.1a-1957	Z21.1.1b-1958
Z21.1.1-1959	Z21.1.1a-1960	
Z21.1.1-1961	Z21.1.1a-1962	Z21.1.1b-1963
Z21.1.1-1964	Z21.1.1a-1965	Z21.1.1b-1966
Z21.1.1-1967	Z21.1.1a-1968	Z21.1.1b-1969
Z21.1-1972		
Z21.1-1974	Z21.1a-1974	Z21.1b-1976
Z21.1-1978	Z21.1a-1979	Z21.1b-1981
Z21.1-1982	Z21.1a-1982	Z21.1b-1984
Z21.1-1987	Z21.1a-1989	Z21.1b-1989
Z21.1-1990	Z21.1a-1991	Z21.1b-1993
Z21.1-1993		
Z21.1-1996	Z21.1a-1997	Z21.1b-1998
Z21.1-2000	Z21.1a-2003	Z21.1b-2003
Z21.1-2005	Z21.1a-2007	Z21.1b-2008

The following identifies the designation and year of the twenty-ninth edition of the standard:

ANSI Z21.1-2010

NOTE: *This edition of Z21.1 incorporates changes to the 2005 edition and addenda thereto. Changes other than editorial, are denoted by a vertical line in the margin.*

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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 10 or Metric Practice Guide, 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 For Household Cooking Gas Appliances

Part I: Construction

1.1 Scope

1.1.1

This standard applies to newly produced household cooking gas appliances (see Part IV, Definitions), hereinafter referred to as units or appliances, constructed entirely of new, unused parts and materials. These appliances may be floor supported or built-in.

1.1.2

This standard applies to household cooking gas appliances:

- 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;
- e. For use with LP gas-air mixtures;
- f. For use with either natural, manufactured or mixed gas and convertible for use with liquefied petroleum gases (see Part IV, Definitions);
- g. For manufactured (mobile) home installation for use with liquefied petroleum gases only (see [1.2.25](#));
- h. For manufactured (mobile) home installation for use with either natural, manufactured or mixed gas and convertible for use with liquefied petroleum gases (see [1.2.25](#) and Part IV, Definitions);
- i. For Recreational Park Trailer installation for use with natural, manufactured, or mixed gases and convertible for use with liquefied petroleum gases (see [1.2.25](#) and Part IV, Definitions); and
- j. Provided with pyrolytic self-cleaning oven features or self-cleaning broiler features, or both (see [1.2.26](#)).

The construction of floor-supported units and built-in units for use with the above-mentioned gases is covered under Part I.

The performance of floor-supported units and built-in units for use with the above-mentioned gases is covered under Part II.

1.1.3

This standard does not cover the thermal efficiency of household cooking gas appliances since it is regulated by the Energy Policy and Conservation Act of 1975, the National Energy Conservation Policy Act of 1978 and the National Appliance Energy Conservation Act of 1987.*

1.1.4

This standard covers electrical equipment, wiring and accessories built-in or supplied for use with an appliance. For appliances which do not have sections which use electrical energy for cooking, it covers only appliances having current limitations of 20 amperes and whose electrical equipment, wiring and accessories are installed in accordance with the *National Electrical Code, ANSI/NFPA 70*.

This standard covers (a) appliances which use only gas for cooking and which are designed for connection to nominal 120-volt electrical supplies, or (b) appliances which also use electrical energy for cooking and which are designed for connection to either nominal 120-volt or 240-volt electrical supplies.

1.1.5

Appliances having sections which use electrical energy for cooking shall comply with the applicable provisions of the *Safety Standard for Household Electric Ranges, ANSI/UL 858*.

1.1.6

A microwave cooking appliance incorporated in a household cooking gas appliance shall comply with the applicable provisions of the *Safety Standard for Microwave Cooking Appliances, ANSI/UL 923*.

1.1.7

An exhaust hood incorporated in an appliance shall comply with the applicable provisions of the *Safety Standard for Electric Fans, ANSI/UL 507*.

1.1.8

A gas-fired room heater incorporated in a household cooking gas appliance shall be of the vented type and shall comply with the applicable construction provisions of the *Standard for Vented Gas-Fired Space Heating Appliances, ANSI Z21.86 • CSA 2.32*.

A household cooking gas appliance incorporating a functional section other than that covered by this standard shall comply with the applicable standards covering that function.

1.1.9

Outdoor cooking gas appliances are covered in the Standard for *Outdoor Cooking Gas Appliances, ANSI Z21.58 • CSA 1.6*.

1.1.10

Compact cooking gas appliances (See Part IV, Definitions) for installation in recreational vehicles, including recreational park trailers, are covered in the *Standard for Recreational Vehicle Cooking Gas Appliances, ANSI Z21.57*.

1.1.11

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.

* At the time of this printing, the above acts regulate the thermal efficiency of household cooking appliances. For information, contact the U.S. Department of Energy, Conservation and Solar Applications, Consumer Products Efficiency Branch, 20 Massachusetts Ave., N. W., Washington, DC 20545.

1.1.12

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

1.1.13

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

It is the responsibility of the user of this standard to determine which referenced standard applies based on the requirements of the authority having jurisdiction at the location of the installation.

1.1.14

Special construction provisions applicable to an appliance designed for use with an optional listed conversion kit are outlined under Exhibit B, (Optional) Provisions for Listed Gas Appliance Conversion Kits.

1.2 General Construction And Assembly

1.2.1

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

1.2.2

The construction of all parts, whether specifically covered by the various sections of 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.

1.2.3

Asbestos shall not be used in construction of a range.

1.2.4

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

1.2.5

Materials used in the construction of an appliance shall be suitable for temperatures to which they will be exposed in use. (Also see [1.2.7](#).)

1.2.6

Every part of the appliance shall be of such construction as to be secure against displacement, distortion, warping or other damage and shall be supported to maintain a fixed relationship between essential parts. Such 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.

1.2.7

The cooking grid, the burner(s), heat distribution plate or flame spreader, and the radiant support grate of an open top broiler section or unit shall not show evidence of corrosion or distortion when exposed to elevated temperatures in accordance with the following Method of Test.

Method of Test

For the purpose of this test, 75 percent of the effective area of the cooking grid shall be covered with insulating firebrick measuring approximately $9 \times 4\frac{1}{2} \times 2\frac{1}{2}$ in ($229 \times 114 \times 63.5$ mm) and weighing approximately $2\frac{1}{2}$ lb (1.1 kg) per brick, with the $9 \times 4\frac{1}{2}$ in (229×114 mm) side down. The uncovered area shall comprise a space of about equal width around the perimeter of the uncovered area.

The burner(s) shall be adjusted with the test gas providing the highest specified input rating (see 2.1.2) and then placed in operation under the appropriate test condition in Table X, Gas Pressure and Input Conditions for Use in the Various Performance Tests. The appliance shall be operated continuously for a period of 8 hours, after which time the burner(s) shall be turned off and the appliance allowed to cool to room temperature. This cycle of operation shall be continued for a total operating time of 96 hours.

After 96 hours of operation, the specified parts shall be inspected and shall comply with the following specifications:

- a. There shall be no evidence of flaking, spalling or corrosion of parts;
- b. There shall be no leakage, fusion, deformation or loosening of burner parts sufficient to cause malfunctioning of the burner(s); and
- c. Any sagging, distortion or warping of the cooking grid, heat distribution plate or flame spreader, and the radiant support grate shall not exceed $\frac{1}{2}$ in (12.7 mm).

1.2.8

All components requiring adjustment during or after installation shall be accessible for adjustment from the front of the appliance when installed in accordance with the minimum clearances specified by the manufacturer.

An appliance equipped with casters may be designed so servicing can be accomplished when the appliance is removed from its installed position. (See 1.28.1-b6.) Gas-air adjustments, if provided, must be capable of being made with the appliance in its installed position.

If operation of the appliance is necessary to make such adjustments, making the adjustment shall be possible without exposing electrically live parts operating at more than 30 volts or disturbing wiring.

Means shall be provided for changing fuses and lamps without exposing electrically live parts operating at more than 30 volts except screw shells or clips of lamp holders and fuse holders. Partial disassembly for this purpose is permissible provided wiring is not exposed in such a manner as to be damaged or have strain applied to connections during the servicing.

1.2.9

Electrical devices or electrically actuated controls, or both, which control the gas supply shall be removable without breaking permanent wiring connections.

1.2.10

A lens, shield or shade employed as a guard for an oven lamp shall not be supported by the lamp and shall be made of material that will not be adversely affected by temperatures encountered during normal oven operation.

1.2.11

A lamp in an oven or broiler, if provided, shall be so installed that it cannot be contacted by an oven or broiler rack during or after proper installation of the rack.

1.2.12

If an oven or broiler lamp extends into the cavity more than 3½ in (88.9 mm) from the rear wall of the cavity, it shall be guarded against contact by a utensil.

1.2.13

Lights, wiring and other electrical parts, when used, shall comply with 1.27, Electrical Equipment and Wiring.

1.2.14

Adjustable orifices and primary air adjustment means shall be capable of being adjusted from the front of the appliance.

1.2.15

Valves or orifice fittings equipped with double coaxial orifices shall employ the same burners for use with the two gases for which the appliance is marked (see 1.29.4-a2).

1.2.16

The centers of knobs or buttons located on the backguard of an appliance, excluding single-purpose, time-of-day set knobs of clocks, shall be at least 6 in (152 mm) above the plane of the utensil support surface.

1.2.17

Clearance shall be provided to afford manipulation of tools when connecting the appliance to house piping.

On a floor-supported unit, this shall be possible with the appliance installed at its minimum clearances.

On a built-in unit, it shall be possible to perform this manipulation and make the necessary electrical supply connections at the appliance from the front of the installed appliance.

1.2.18

On a built-in unit, all controls (see 1.9.5 for gas appliance pressure regulators), the gas manifold, gas supply tubing or piping to burners, electrical bases and the flue collar shall be located within the confines of the appliance. Gas supply tubing or piping to burners of a built-in oven or broiler need not comply with this provision if protected by rigid spacers.

1.2.19

If an appliance is designed to have an exterior surface applied using materials supplied by the installer, the appliance shall be self-sufficient without the applied material and shall be sufficiently rigid to be secure against displacement, distortion, warping or other damage when such material is applied following either the manufacturer's instructions or normal installation practices. Such an appliance shall be designed so operating parts of the appliance can be serviced and removed and replaced without disturbing the applied exterior surface.

1.2.20

Backguard or radiation shields supplied with a built-in unit shall be part of and attached to the appliance structure. Such parts, if removable, shall be designed to preclude their being attached in other than the correct manner.

Spacers on a built-in unit shall be nonremovable and of such strength and bearing surface as to maintain required clearance from building materials.

1.2.21

On a floor-supported unit for installation with zero clearance to adjacent combustible construction, spacing means for holding finished side panels away from such combustible construction are not permitted.

1.2.22

An oven or enclosed broiler or a combination oven and enclosed broiler unit shall be equipped with an extreme top cover to protect controls from damage and to prevent material from contacting the flue collar or flue gas carrying conduits.

1.2.23

Sheet-iron or steel parts, if unfinished, shall be at least 0.0195 in (0.495 mm) thick. Sheet-metal parts fabricated from corrosion-resistant metals or alloys, or sheet-steel or iron parts finished in porcelain enamel or otherwise finished to equal the durability and strength of 0.0195 in (0.495 mm) thick sheet steel, need not comply with this provision if the structures into which they are incorporated comply with [1.3, Appliance Structure](#). Ornamental trimmings and finishing strips need not comply with this provision.

1.2.24

Tap bolts shall be of corrosion-resistant material or, if of steel, shall have a metallic, corrosion-resistant coating.

1.2.25

Special constructional provisions applicable to appliances for manufactured (mobile) home installation are specified in [1.1.2-g, -h and -i, 1.3.7 and 1.28.1-a2, 1.29.4-d, and 1.29.4-e](#).

1.2.26

Special constructional provisions applicable to appliances provided with pyrolytic self-cleaning oven or broiler features are specified in [1.1.2-j, 1.7.13, 1.27.25, 1.28.12, and 1.29.10](#).

1.3 Appliance Structure

1.3.1

The materials used and the construction and assembly of the body of a floor-supported unit shall be such that the application of a diagonal force of 350 lb (1.56 kN) applied from front to rear, and a diagonal force of 275 lb (1.22 kN) from side to side, will not result in a temporary deflection in excess of 0.1 in (2.5 mm) in the direction and plane of the horizontal component of the diagonal force.

Method of Test

Compliance with this provision shall be determined by two tests as follows:

- a. Application of a diagonal force of 350 lb (1.56 kN) to the uppermost member of the front or back of the appliance body proper, or body frame, relative to the base (Figure 1, Example of Apparatus for Determining Strength of Floor Supported Unit Bodies, as Set-Up for Testing End Frames, illustrates an arrangement of the apparatus for conducting this test); and
- b. Application of a diagonal force of 275 lb (1.22 kN) to the uppermost member of the side of the appliance body proper, or body frame, relative to the base.

Sections or panels, such as backguards, which do not contribute to the rigidity of the main structural frame, may be removed for the purpose of this test.

The legs and ornamental finishing strips shall be removed and the body of the appliance shall be firmly supported on wooden beams resting on the floor or some equally stable foundation.

Rigid angle-iron beams $3 \times 3 \times \frac{5}{16}$ in (76.2 x 76.2 x 7.9 mm) shall be placed on diagonally opposite edges of the appliance body proper, or body frame, in such a manner that the upper beam is along the edge of the uppermost member of the body and the lower beam is on the edge of the base of the appliance diagonally opposite the upper beam and parallel to it. For example, in applying test “-b” to a cabinet type unit (see Figure 2, Typical Floor-Supported Cooking Units) having either a single or double oven, the upper beam should be placed along the edge of the uppermost member of the body proper on either side of the appliance. In applying test “-a,” the upper beam should be placed along the uppermost edge of the body proper, or body frame, of either the front or rear of the appliance, depending on whichever is more convenient.

Precautions should be taken in placing both beams to arrange them as symmetrically as possible with respect to the edge of the body or frame along which the components of the diagonal force will be applied. When the design of the appliance is of an unusual nature, making it difficult to apply the test exactly as prescribed herein, the arrangement of the apparatus shall be left to the discretion of the testing agency.

Each end of the upper beam shall be connected to the corresponding end of the lower beam by a drawbar in series with a spring scale graduated in no greater than 5 lb (22.2 N) intervals.

The tension on each drawbar shall be increased until the readings of the two scales are equal and their sum is equal to the diagonal force to be applied.

Deflection readings shall be made with two Ames dials or similar instruments graduated to 0.001 in (0.025 mm), located respectively on the extreme ends of the uppermost edge of the appliance body opposite and in the same horizontal plane as the horizontal component of the applied diagonal force.

Figure 1, Example of Apparatus for Determining Strength of Floor-Supported Unit Bodies, as Set-Up for Testing End Frame,s shows the placement of the Ames dials when applying test “-a.” A corresponding location of these instruments should be selected for test “-b.”

The temporary deflection shall be considered the average of the readings of the two instruments and shall in no case exceed 0.1 in (2.5 mm).

1.3.2

Base frames, front frames and top frames, or their equivalent, when subjected to a load of 300 lb (136 kg) applied for a period of 5 minutes, shall not show:

- a. Breakage or permanent damage to any part; or
- b. A maximum permanent deformation in excess of 0.02 in (0.51 mm).

Method of Test

Removable utensil supports shall be removed during this test.

If the cooking top is not a structural member, it shall be removed and the load applied to the top structural or frame members.

Application of the load shall be made over a width of approximately 4 in (102 mm) and a depth approximately that of the cooking top. The load shall be placed as close as possible to the center of the top of the appliance and shall not be applied closer than 1 in (25.4 mm) to the front and back of the appliance.

1.3.3

Collars around burner or valve stem or other similar openings, on an appliance designed to have an exterior surface applied using materials supplied by the installer, shall be of sufficient height to accommodate the surfacing material contemplated by the manufacturer, assuming normal procedures for applying such material. If the contemplated surfacing material is ceramic tile, collars shall be at least $1\frac{1}{8}$ in (28.6 mm) in height.

Such collars shall be designed so they will support aeration bowls, valve stem cover plates, etc., which are intended to rest on them, and shall prevent such members from resting upon the surface intended to be applied by the installer.

1.3.4

Drop doors, when fully open, shall remain in position.

1.3.5

A broiler drawer, when subjected to a load of 50 lb (22.7 kg) uniformly applied for a period of 5 minutes without impact along a strip 4 in (102 mm) wide and the full width of the drawer equidistant from the face of the appliance and outer edge of the drawer when fully open, shall not show:

- a. Breakage or permanent damage to any part; or
- b. Deflection, during application of the load, from its normal position in excess of 0.5 in (12.7 mm) at a point 6 in (152 mm) from the face of the appliance.

1.3.6

Means shall be provided to assure a proper fit between oven and broiler doors and the body of the appliance.

1.3.7

If the appliance is for manufactured (mobile) home installation, means for permanent attachment of the appliance to the vehicle shall be available from the manufacturer.

1.4 Bases, Legs, Casters And Frames

1.4.1

The bottoms of built-in appliances and bottoms of bases and legs of floor-supported appliances shall have no sharp edges in contact with the floor.

1.4.2

The base of a built-in oven, broiler, or combination oven and broiler unit shall not be permanently deformed or damaged by moving the assembled appliance on its base along a smooth plywood surface endwise and sidewise in any direction.

1.4.3

Band iron, angle iron or other structural shapes used in the construction of bases and frames shall have joints securely riveted or welded together, or to the body sides.

1.4.4

Cast bases and frames, when not cast in one piece, shall have joints securely fastened to be comparable to a one-piece construction.

1.4.5

For floor-supported appliances employing casters, adjustable means to level the appliance shall be provided.

1.4.6

Detachable legs and casters which are not interchangeable shall be identified by a Class VI marking with reference to proper location, unless the shape and dimensions are such as to preclude wrong assembly. (See 1.29.5.)

1.4.7

Construction of appliances which are designed to be used both with and without bases, legs or casters shall be such that the combustion will not be affected when the legs or casters are detached or the base is removed and the appliance is set directly on the floor.

1.4.8

Bases, legs, casters and frames shall be substantial and rigid to the extent that they will not be permanently deformed or damaged by moving the assembled appliance, without a load, 3 ft (914 mm) along a smooth concrete floor endwise or sidewise by pressure exerted in a normal manner against the end or side, respectively, sufficient to cause the appliance to move freely with all bases, legs, casters or frames remaining in contact with the floor.

1.4.9

The total area of contact between the base or legs of a floor-supported unit and the floor shall be large enough to provide at least 1 in² (6.5 cm²) of contact for each 50 lb (22.7 kg) of appliance weight.

Exception: When casters are employed on two or more legs (1.29.5), installation instructions must specify for installation on $\frac{1}{8}$ in (2 mm) thick commercial grade vinyl composition floor finishing materials or equivalent. (see 1.28.1-a7)

1.4.10

Casters may be of swivel or rigid type construction and shall have a minimum total rated capacity of the weight of the appliance plus maximum anticipated load (as determined by the appliance manufacturer). Individual caster loads shall be determined by dividing the gross weight by the number of casters on the appliance.

1.4.11

Caster wheels and treads shall be of a material that can withstand exposure to oils, grease, water, cleaning compounds and elevated temperatures of at least 150°F (65.5°C).

1.4.12

On an appliance equipped with casters, means accessible from the front of the appliance shall be provided to prevent movement of the appliance under normal use.

1.5 Glass/Ceramic Panels

1.5.1

Electrical Enclosures

Glass covering the front surface of a control panel, the front or an exposed bottom surface of a background, and constituting a part of the electrical enclosure shall:

- a. Be reliably secured so that it cannot be readily displaced;
- b. Not be less than 0.115 in (2.92 mm) thick; and
- c. Not be utilized for the support of any component.

Exception: Can only be utilized for the support of an electrical component containing low voltage (see Part IV, Definitions).

In addition, glass having a dimension, including diagonal, more than 12 in (305 mm) shall:

1. Be of a non-shattering or tempered type that complies with the requirements in the *Standard for Glazing Material Used in Buildings Safety Performance Specifications and Methods of Test, ANSI Z97.1*; or
2. Withstand an impact test, without cracking or breaking to the extent that pieces are released or dropped from their normal position, when subjected to the following Method of Test.

Method of Test

An impact is to be applied to the panel by allowing a solid steel sphere, 2 in (50.8 mm) in diameter and weighing 1.18 lb (535 g), to fall through a vertical distance of 25¹/₂ in (648 mm). The fall through the vertical distance may be accomplished through pendulum action as well as a vertical drop. The test is to be conducted with the glass at room temperature.

1.5.2

Oven Doors

An inner or outer glass panel in an oven door shall:

- a. Be reliably secured so that it cannot be readily displaced;
- b. Not be less than 0.115 in (2.92 mm) thick; and
- c. Not be utilized for the support of any component.

In addition, glass having any dimension, including diagonal, more than 18 in (457 mm) shall:

1. Be of a non-shattering or tempered type that complies with the requirements in the *Standard for Glazing Material Used in Buildings Safety Performance Specifications and Methods of Test, ANSI Z97.1*; or
2. Withstand an impact test, without cracking or breaking to the extent that pieces are released or dropped from their normal position, when subjected to the following Method of Test.

Method of Test

An impact is to be applied to the panel by allowing a solid steel sphere, 2 in (50.8 mm) in diameter and weighing 1.18 lb (535 g), to fall through a vertical distance of 25¹/₂ in (648 mm). The fall through the vertical distance may be accomplished through pendulum action as well as a vertical drop. The test is to be conducted with the glass at room temperature.

1.5.3

Cooktops

Test Condition A

The cooking surface of a glass/ceramic-top appliance shall withstand a thermal-shock without cracking or breaking when subjected to the following Method of Test.

Method of Test

The largest surface unit is to be operated for ¹/₂ hour at its maximum heat setting. After ¹/₂ hour, 500 cm³ of water at room temperature is to be poured over the hottest area of the cooking surface.

Test Condition B

Each glass/ceramic panel of a glass/ceramic-top appliance that constitutes a part of the electrical enclosure shall withstand impact tests without cracking, breaking or exposing live parts, when subjected to the following Method of Test. Breaking or cracking of the panel is acceptable if the leakage current does not exceed 5.0 milliamperes, when measured as specified in the following Method of Test.

Method of Test

With regard to Test Condition B, each glass/ceramic panel is to be subjected to the impact produced by dropping a steel sphere, 2 in (50.8 mm) in diameter and weighing 1.18 lb (535 g), through a distance of 20¹/₄ in (514 mm). The test is to be conducted with the panel at room temperature.

Each glass/ceramic panel shall be subjected to ten impacts produced by dropping a 3.96 lb (1.8 kg) weight through a vertical distance of 6 in (152 mm). The weight is to be shaped as a cooking utensil, have a diameter of 4¹/₄ to 5¹/₈ in (108 to 130 mm) and have a corner radius of ³/₈ in (9.5 mm). The ten impacts shall be equally distributed over the panel. The weight is to be dropped so that it strikes the panel as flatly as possible. The test is to be conducted with the panel at room temperature.

To determine whether a broken or cracked panel is acceptable, a test using the following steps shall be performed.

- Step 1. A solution of 500 cm³ of water containing ¹/₄ gram of ordinary table salt shall be poured over the broken or cracked area of the panel.
- Step 2. A layer of metallic foil shall then be placed over the panel.
- Step 3. The foil shall be covered with a 1 in (25.4 mm) thick layer of 1 lb/ft³ (16 kg/m³) glass fibre insulation.
- Step 4. A 10 in (254 mm) diameter pan filled with a sufficient amount of water to make it weigh 10 lb (4.54 kg) shall then be placed directly on the insulation over the broken or cracked area.

Step 5. The leakage current between the metallic foil and live parts of the appliance shall then be measured.

The appliance frame shall be isolated from the leakage current test circuit and the appliance shall not be connected to the power supply. The test potential for the leakage current circuit shall be the potential which normally exists between the appliance and electrical ground.

1.6 Stability Tests

1.6.1

Door Loading

A floor-supported, built-in or drop-in appliance shall be installed on a level surface in accordance with the manufacturers installation instructions with the following exceptions:

- a. The gas and electric supply shall not be connected;
- b. The broiler pan shall be removed;
- c. A floor-supported unit shall be not be secured to any adjacent structure;
- d. A floor-supported unit with adjustable feet shall be level with the feet adjusted at the most unfavorable position; and
- e. An appliance with plug-in modules is to be tested with the combination modules that will result in the most unfavorable condition. Any optional accessories (e.g., rotating spit or backguard) are to be removed or placed in the most severe normal operating position, whichever is deemed most critical for the test.

The appliance shall be subjected for 5 minutes to a static test load, as specified in [Table I, Door Loading](#).

For a swing door, the test load shall be uniformly applied without impact along the top edge of the fully open door midway between the vertical edges. For the purposes of this test, the “fully open” position of a swing door shall be the position at which the door is perpendicular to the face of the appliance to which the door is attached.

For a drop door, the test load shall be uniformly applied without impact across the full width of the door, along a line equidistant from the range front frame and the outer edge of the door when fully open.

For an appliance with two or more doors, the above test shall be conducted on one door at a time.

In the event the broiler door is hinged to the broiler drawer, the entire assembly shall be inserted into the appliance as far as the open door will permit or until the inner edge of the door, in the fully open position, coincides with the plane of the face of the appliance.

The application of the static load shall not show:

1. Breakage or permanent damage of any part thereof;
2. Deflection, measured at a point 6 in (152 mm) from the rear edge of the door, of more than 0.5 in (12.7 mm) from its normal position; or
3. The appliance to break contact with the floor or surrounding structure.

1.6.2

Abnormal Use

A floor-supported, built-in or drop-in appliance equipped with top burners and with a door or drawer located within 36 in (914 mm) from the floor when fully open shall be subjected to the following Method of Test.

Method of Test

This test shall be applied separately to each oven, broiler and storage cabinet or drawer if any part of the door or drawer is located within 36 in (914 mm) from the floor.

An appliance with removable components shall be tested with the items removed except one module and/or surface unit drop bowl (the most unfavorable one) is to remain in order to support the test pan described below. Any optional accessories (e.g., rotating spit, backguard or similar) are to be removed or placed in the most severe normal operating position, whichever is deemed most critical for the test.

The appliance is to be installed in accordance with the manufacturers installation instructions and without being connected to the gas supply or electric power. The appliance installation is to use any mounting brackets provided for securing the appliance to a wall, floor or cabinet structure. A floor mounted appliance with adjustable feet, shall be level with the adjustable feet set at their most unfavorable position.

An aluminum pan 9 in (229 mm) in diameter at the rim, having a flat bottom, vertical sides 4 in (102 mm) high, and containing a 4.6 lb (2.09 kg) weight uniformly placed inside, shall be centered on the utensil support (cooking) surface nearest the front edge of the appliance.

The test load shall be applied to the door or drawer as outlined in 1.6.1. Starting with a 75 lb (34 kg) test load, a gradually increasing load shall be applied at a loading rate not to exceed 20 lb (9 kg) per minute until a maximum load of 250 lb (113 kg) has been attained or until the door or drawer (including hinges) deforms to the extent that the test weight can no longer be supported, breaks away, or similar. If the maximum load can be applied, it is to remain on the door or drawer for 5 minutes.

The application of the above forces shall not cause the appliance to tip to the extent that the test pan slides off the appliance cooktop. Sliding of the pan on the utensil supporting surface or onto the cooktop is acceptable.

1.6.3

If mounting hardware for securing the appliance to the wall, floor, or cabinet structure is necessary to comply with the method of test under 1.6.2, the appliance shall comply with the following:

- a. All hardware, including fastening devices, screws, wall anchors, and similar, necessary to install the appliance in accordance with the manufacturers installation instructions to one or more of the constructions specified in 1.6.4, shall be provided with the appliance.
- b. Only ordinary tools shall be required to install the hardware and appliance in accordance with the manufacturers installation instructions.
- c. No tools shall be required to remove and replace a floor-supported appliance from a securing device.
- d. Clear and explicit instructions shall be provided with the appliance detailing the intended method of installation. Instructions for securing the appliance shall also be included to address installations when the enclosed hardware cannot be utilized. The instructions shall also warn the installer that a risk of tip-over may result if the appliance is not installed in accordance with the manufacturers installation instructions. (See 1.28.1.)

- e. The user's manual shall contain instructions regarding the intended method of appliance removal and replacement, and shall also warn the user of possible risks that may result from abnormal usage, including excessive loading of the oven door and of the risk of tip-over, should the appliance not be reinstalled in accordance with the manufacturers installation instructions.

1.6.4

If mounting to a wall, floor, cabinet, or countertop is required to comply with the method of test under 1.6.2, the mounting surface is to be fixed to prevent movement and is to be constructed as follows:

- a. Wall - $\frac{3}{8}$ in (9.5 mm) trade size plasterboard (dry wall) on nominal 2 x 4 in ($1\frac{5}{8}$ x $3\frac{5}{8}$ in) (41 x 92 mm) wood studs placed 16 in (406 mm) on center on a 2 x 4 sole plate.
- b. Floor - A single thickness of $\frac{3}{8}$ in (9.5 mm) thick plywood on nominal 2 x 4 in ($1\frac{5}{8}$ x $3\frac{5}{8}$ in) (41 x 92 mm) wood studs placed 16 in (406 mm) on center;
- c. Cabinet or Countertop - A single thickness of $\frac{3}{8}$ in plywood for the cabinets. The side cabinets to be $6 \pm \frac{1}{4}$ in (152 ± 6.4 mm) wide, 36 in (914 mm) high and the same depth as the cooktop of the range, except that they are to extend not less than 1 in (25.4 mm) beyond the junction of the door and the body of the oven. The base cabinet for a range not floor supported is to be the same depth as the side cabinets and a width sufficient to support the range.

1.7 Gas Supply Lines

1.7.1

Steel pipe employed as gas conduit on the appliance shall comply with the *Standard for Welded and Seamless Wrought Steel Pipe, ANSI/ASME B36.10M*.

1.7.2

Tapped holes for gas valves, pilots, lighters or other branch supply lines shall carry not less than $3\frac{1}{2}$ pipe threads in accordance with the *Standard for Pipe Threads, General Purpose (Inch), ANSI/ASME B1.20.1*.

1.7.3

Series 300 stainless steel corrugated tubing used as part of a manifold assembly shall not be exposed to temperatures in excess of 900°F (482°C) when the appliance is operated as specified in 2.23, Wall, Floor and Enclosure Temperatures. The tubing shall demonstrate compliance with the Tubing Structure, Bending Test, and Burst Test requirements specified in the *Standard for Connectors for Gas Appliances, Z21.24 • CSA 6.10*.

1.7.4

The gas supply system of the appliance shall terminate in a standard taper pipe thread in accordance with the *Standard for Pipe Threads, General Purpose (Inch), ANSI/ASME B1.20.1*.

1.7.5

Aluminum semi-rigid tubing shall not be acceptable for use where it may contact insulating material of other than neutral reaction.

1.7.6

Ends of pipe and tubing shall be carefully reamed to remove obstructions or burrs.

1.7.7

Supply piping and tubing shall have any bends smoothly made without any appreciable reduction in the cross-sectional area, shall reveal no imperfections occasioned by the bending process, shall be annealed if necessary to remove internal stresses, and shall be thoroughly cleaned inside to remove loose particles.

1.7.8

Gas supply piping and tubing shall be within the confines of the appliance, shall be supported and shall be removable. (Also see [1.2.18.](#))

1.7.9

Gas supply piping to which connections are made for burners, pilots, lighters or other branch supply lines shall be supported to prevent turning or displacement in making connections to the building piping or during the handling of the appliance.

1.7.10

Joint compounds and gas line gaskets shall be resistant to the action of liquefied petroleum gases.

1.7.11

Copper semi-rigid tubing or tubing with internal copper surfaces shall be internally tinned or equivalently treated to resist corrosion by sulphur compounds.

1.7.12

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

1.7.13

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

Tubing and fittings used as gas conduits shall not be exposed to temperatures in excess of those specified in Table III, Maximum Tubing and Fitting Temperatures, when the appliance is operated as specified in 2.23, Wall, Floor and Enclosure Temperatures, or [2.29.7](#), whichever is applicable.

1.7.14

A $\frac{1}{8}$ in NPT plugged tapping accessible for test gauge connection shall be furnished for measuring the manifold pressure under flow, unless some other accessible means for such connection, such as an orifice hood on a multiple burner appliance, is incorporated in the appliance. This tapping shall be at the outlet of, or downstream from, the gas pressure regulator. The plug used shall not be of the slotted head type.

1.7.15

Where the use of bushings cannot be avoided, only those of the face or recessed type shall be used. Nesting of bushings is prohibited.

1.8 Manual Valves And Other Energy Controlling Devices

1.8.1

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

1.8.2

The gas flow to each main burner or the energy flow to each heating element shall be under the control of a device having a mechanical off position (see Part IV, Definitions).

1.8.3

Any gas valve or energy controlling device intended for use during normal operation and which has an off position to shut off the gas to a main burner or the energy flow to a heating element shall necessitate not less than two separate operations to turn on and shall necessitate only one operation to turn off.

Programmable timing devices need not comply with this provision (see 1.28.1-a11). (Also see 1.11.3 and 1.11.6.)

1.8.4

An oven or broiler section provided with an indirect control system, other than an electric system incorporating a normally closed valve in the main gas supply line, shall be designed so the thermostat and main burner gas supply line are under the supervision of a manual shutoff means, either integral with the thermostat or as a selector valve in the case of a single-cavity dual-burner unit. An electric control system shall include a manual shutoff means to the system gas supply, or the system gas supply shall pass through two automatic valves, both of which operate each time there is a call for heat.

1.8.5

A manual valve(s) or a pilot shutoff device shall be provided in the pilot gas supply line for turning on and shutting off the gas supply to all continuous pilots and shall be located so as to be accessible for adjustment.

1.8.6

Each top surface cooking section burner control shall be clearly identified with the burner it serves. The identification shall be by symbol or orientation, and shall not be by wording alone. The identification shall be visible and interpretable at a distance of 3 ft (914 mm) in front of the control when viewed from a height of 5 ft (1.52 m). Markings on user interchangeable parts are not considered acceptable.

1.8.7

The oven and broiler burner valve handles shall be readily distinguishable from the top surface cooking section burner valve handles, and each other, unless properly identified.

1.8.8

When interlocking means are provided between dampers and gas valve plugs, they shall be positive in their action and shall show no tendency to displace plugs under any conditions of operation.

1.8.9

Gas valves of the high-low type embodying a single jet orifice shall not have an "off" position between the "full on" and "low" positions.

1.8.10

All gas valves controlling top burners on the appliance shall have the same degree of valve handle rotation at which ignition takes place. Griddle, convertible griddle, open-top broiler and thermostatically controlled burners need not comply with this provision.

1.8.11

A manual valve intended for use during normal operation of the appliance shall have a non-displaceable valve member (rotor).

1.8.12

All valve handles controlling burners (except pilots) shall rotate in a clockwise direction to close. This provision does not apply to selector type valves for ovens and broilers.

1.8.13

Gas valve handles and thermostat dials shall be designed so they can be attached in the correct position only and shall not be subject to accidental displacement.

1.8.14

Each top surface cooking section burner control shall have markings to clearly and unmistakably indicate the "off" position, the "light" position, and the "full on" or heat level position. These markings shall be visible and interpretable at a distance of 3 ft (914 mm) in front of the control when viewed from a height of 5 ft (1.52 m).

1.8.15

Control handle covers, if used, shall be designed so they cannot cover the control handle when the control is in other than the "off" position.

1.8.16

There shall be a visible indication that a top surface cooking section burner control is in other than the "off" position.

Method of Test

A pan of the appropriate size, as specified in Table XI, shall be placed on each top burner utensil support. A top surface cooking section burner control shall be adjusted from the "off" position through all operating positions available to the user.

An indication that the control is in any position, other than the "off" position, shall be visible from any point on a line 10 ft (3.05 m) from the front of the appliance and within the projected width of the appliance, when viewed from a height of 5 ft (1.52 m).

This procedure shall be repeated with each top surface cooking section burner control.

1.8.17

It is recommended that the D-shaped cavities of handles for gas valves comply with the Dimensional Specifications shown in Figure 3, Recommended Dimensions for D-Shaped Handle Cavity for Valve Stems of $11/32$ in (8.7 mm) Diameter.

1.8.18

Adjustment retention screws provided on high-low valves of the trailer port type shall have slotted heads for operation by a screwdriver that conform to the Standard for *Machine Screws and Machine Screw Nuts*, ANSI/ASME B18.6.3, except that indented hex head type machine screws shall not be acceptable for this application.

1.9 Gas Appliance Pressure Regulators

1.9.1

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

1.9.2

A gas appliance regulator shall be provided with each appliance.

An appliance provided with fixed orifices shall be provided with either an adjustable or a nonadjustable gas appliance pressure regulator. An appliance provided with double coaxial orifices shall be provided with a convertible gas appliance pressure regulator.

The regulator outlet pressure (normal manifold pressure) shall be nominally either 4, 5 or 6 in wc (995 Pa, 1.24, or 1.49 kPa), as specified by the manufacturer, for natural, manufactured and mixed gases or LP gas-air mixtures. The regulator outlet pressure for liquefied petroleum gases shall approximate that specified by the manufacturer.

1.9.3

When a single gas appliance pressure regulator controls the pressure of both pilot and main burner gas, it shall be of the type suitable for pilot and main burner load application as designated by the symbol adjacent to the model number.

1.9.4

A gas appliance pressure regulator shall be equipped with a vent limiter and shall be rated as follows:

- a. The lower limit of the range of regulation capacity and the range of variable load capacity (see Part IV, Definitions) shall not be greater than the minimum flow rating of the smallest individual burner;
- b. The upper limit of the range of individual load capacity shall not be less than the largest individual burner rating; and
- c. The upper limit of the range of regulation capacity shall not be less than the manufacturers total hourly input rating at normal inlet test pressure.

1.9.5

The gas appliance pressure regulator provided on an appliance for use with either natural, manufactured or mixed gas and convertible for use with liquefied petroleum gases shall control the pressure of the liquefied petroleum gases as well as either the natural, manufactured or mixed gas which will pass through it. It shall be constructed so that by use of a tool-operated device, it can be set to a previously adjusted operating pressure for either gas without the necessity of measuring the pressure.

1.9.6

The gas appliance pressure regulator shall be installed in such a location that it will not attain a temperature in excess of that specified by the regulator manufacturer when the appliance is subjected to the tests specified in 2.23, Wall, Floor and Enclosure Temperatures, or 2.29.7, as applicable, and in such a manner that pressure adjustments may be made from the front of the appliance when the appliance is in the normally installed position. The gas appliance pressure regulator shall be:

- a. Installed as specified above and within the confines of the appliance body;
- b. Installed exterior to the appliance body; or
- c. Supplied separately, with complete instructions for installing the regulator which shall specify that the regulator must be installed where it will be accessible for adjustment.

1.9.7

A gas appliance regulator shall be removable from the appliance without disconnecting any gas supply lines within the appliance other than those connected directly to the regulator body.

1.10 Automatic Valves

1.10.1

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

1.10.2

Automatic valves controlling the gas supply to the main burner(s), pilot burner(s), or both, shall be of the normally closed type, except that clock-controlled valves may be of either the normally open or normally closed type.

1.10.3

Automatic valves for oven and broiler burners shall not be provided with means for manual operation.

1.10.4

Automatic valves shall be installed only in the operating position for which they were designed.

1.10.5

When an automatic valve is used with a gas supply line of semi-rigid tubing, the automatic valve shall be supported.

1.11 Thermostats

1.11.1

Thermostats shall comply with the applicable construction provisions of either

- a. The *Standard for Gas Appliance Thermostats, ANSI Z21.23*; or
- b. If the thermostat is part of a combination control, it shall comply with the applicable provisions of the *Standard for Combination Gas Controls for Gas Appliances, ANSI Z21.78 • CSA 6.20*.

1.11.2

Each oven shall be equipped with a thermostat.

1.11.3

Thermostats or devices incorporating thermostats shall have a mechanical “off” position independent of the thermal sensing means.

1.11.4

A graduating-type oven thermostat shall be bypassed to permit a minimum safe gas flow with the thermostatic valve closed.

1.11.5

A graduating-type top burner thermostat shall be bypassed (see Part IV, Definitions) to permit a minimum safe gas flow with the thermostatic valve closed and shall comply with the applicable provisions of [2.14, Thermostats](#).

1.11.6

Appliances shall have markings to indicate the “off” position of thermostats or devices incorporating thermostats. These markings shall allow interpretation at a distance of 3 ft (914 mm) in front of the appliance when viewed from a height of 5 ft (1.52 m).

1.11.7

Dials of thermostatically controlled burners shall be marked in degrees Fahrenheit or Celsius.

1.11.8

An oven thermostat provided with a dial position for holding food at serving temperature shall have a marked position identified for such use. This position shall be considered as a temperature marking of 170°F (76.5°C) for the purpose of thermostat calibration as specified in [2.14.2](#).

1.11.9

An indirect oven thermostat incorporating more than one gas supply tube shall be constructed so tubing cannot be interchanged.

1.12 Orifices And Orifice Fittings

1.12.1

Main burners of dedicated appliances shall be provided with fixed orifices. (See [1.29.4-a1](#).)

1.12.2

Main burners of universal appliances shall be provided with double coaxial orifices with the fixed orifice in the needle sized for liquefied petroleum gases and the orifice in the hood sized for the other gas at the burner rating and manifold pressure specified by the manufacturer (see [2.3.2](#)).

1.12.3

Main burners for convertible appliances shall be provided with fixed orifices or a combination of fixed orifices and double coaxial orifices. When double coaxial orifices are used, the fixed orifice in the needle shall be sized for liquefied petroleum gases and the orifice in the hood sized for the other gas at the burner rating and manifold pressure specified by the manufacturer (see [2.3.2](#)). When fixed orifices are used, one set of orifices shall be in place when the appliance is shipped from the factory.

1.12.4

Orifice hoods and needles of double coaxial orifices shall be constructed so neither the orifice hood nor the needle will be damaged or grooved when the hood is turned down tightly against the needle. The needle containing the inner orifice shall not project beyond the outer edge of the orifice hood in any position of the hood.

1.12.5

Orifice fittings shall be secured to prevent misalignment with the burner mixers.

1.12.6

Orifice hoods, spuds and orifice fittings shall be constructed of metal having a melting point not less than 800°F (427°C).

1.12.7

Double tube pilot assemblies employed with indirect oven thermostats shall be constructed so neither gas supply tubing nor pilot orifices are interchangeable.

1.13 Main Burner And Pilot Input Ratings

1.13.1

Main burner gas input ratings and manifold pressures shall be specified by the manufacturer.

1.13.2

A continuous pilot used on top surface cooking section shall be rated at not more than 175 Btu/hr (51 W). This input rating may be limited by a fixed orifice(s) or adjustment means.

A continuous pilot used on oven or broiler burners shall be rated at not more than 250 Btu/hr (73 W). This input may be limited by a fixed orifice(s) or adjustment means.

1.13.3

The combined input rating of a continuous and an intermittent pilot assembly shall not be more than 800 Btu/hr (234 W). This input rating may be limited by a fixed orifice(s) or adjustment means.

1.13.4

Means shall be provided to limit the gas flow of the combined oven or enclosed broiler pilot assembly(s) in one cavity to not more than 0.8 ft³/hr (6.29 cm³/sec.) of Test Gas E when tested under Test Condition 1 in Table X, Gas Pressure And Input Conditions For Use In The Various Component Parts.

1.14 Burners

1.14.1

Burners shall be removable and may be secured to their supports by corrosion-resistant fasteners.

1.14.2

Burners and burner supports shall be designed to prevent incorrect assembly, and their construction shall be such that burners cannot be installed in other than their correct position.

1.14.3

Burner assemblies (including air shutters) shall be made of materials having minimum melting points as follows:

Top and griddle burners: 950°F (510°C); and

Oven and broiler burners: 1450°F (788°C).

Method of Test

The melting point for 3 samples of each type material employed for each type burner shall be determined. The melting temperature of the material for each of the 3 melting point determinations shall not be less than the applicable temperature specified above.

1.14.4

Top and griddle burners shall be constructed in such a manner as to show no deformation or loosening of parts as determined by the following Method of Test.

Method of Test

This test shall be conducted on the burner having the maximum input rating and on each size and design of burner differing from the maximum input burner. When tests are required on more than one burner, the tests may be conducted separately or concurrently, at the option of the manufacturer.

The burner shall be adjusted with the test gas providing the highest specified input rating (see 2.1.2) under the appropriate test condition in Table X, Gas Pressure And Input Conditions For Use In The Various Performance Tests. Two standard No. 1 fireclay bricks, 9 x 4¹/₂ x 2¹/₂ in (229 x 114 x 63.5 mm), arranged side by side to form a square of 9 in (229 mm), shall be centered over the burner. The gas supply shall then be turned on and the burner placed in operation.

The burner shall be operated “full on” for 60 minutes and “off” for 30 minutes for a total of 100 cycles. During periods when gas is shut off, the burner shall be allowed to cool in a normal manner without removing the fireclay bricks from the burner grate. Following each 20 cycles, after the burner has cooled, the burner shall be removed and immersed in a water-bath for 1 hour. The initial temperature of the water shall be 140 ± 5°F (60 ± 3°C). The burner shall then be removed, drained and air-dried for a minimum of 8 hours. If no leakage, deformation or loosening of parts sufficient to cause malfunctioning of the burner occurs during the test, the burner shall be considered as complying with this provision. The water bath portion of this test shall only be applied to those portions of the burners designed to be removed for cleaning.

1.14.5

An open top broiler section equipped with an integral exhaust system shall be tested as follows:

- a. With the exhaust system both on and off:
 - (1) If the open top broiler can be operated with or without the exhaust system; or
 - (2) If the absence of the air stream would not be apparent to the user; or
- b. With the exhaust system on, if the open top broiler can be operated only with the exhaust system operating and the absence of the air stream would be apparent to the user.

1.14.6

Burner ports shall be machined or formed in an accurate manner.

1.14.7

Fasteners shall not penetrate gasways unless provision is made to provide gastightness.

1.14.8

Fasteners used in burner construction shall be constructed of corrosion-resistant material or have a corrosion-resistant finish. Fasteners, if removable, shall be reusable.

1.14.9

Top burners shall be centered, within 1/8 in (2 mm), with respect to aeration bowl openings.

1.14.10

Burner supports shall be of rigid construction and shall be securely held in place. They shall hold the burners permanently rigid so they lie level, cannot be easily tilted, and are secured against side-to-side or front-to-back displacement.

1.14.11

Supports for top surface cooking section burners shall be such that they will keep the burners fixed rigidly at a uniform distance below the cooking surface.

1.14.12

When air shutters are used, openings between air shutters and burners or around the orifice hoods or holders shall be reduced to a practical minimum.

1.14.13

Means shall be provided to hold air shutters securely in any adjusted position. This shall not preclude use of friction fits, such as by springs, except where the air shutter also serves as a means for supporting or aligning the burner venturi.

1.14.14

An air shutter shall be constructed of corrosion-resistant material or have a corrosion-resistant finish and shall be of sufficient strength not to be deformed during adjustment or during any test specified in this standard.

1.14.15

Means shall be provided for observing oven and broiler burner flames for service adjustment purposes.

1.14.16

Organic finishes are not considered acceptable for use on steel mixer tubes, unless it can be demonstrated that they approach the qualities of vitreous enamel.

1.14.17

The ports of pilot and main burners for open top broiler sections and units shall be protected from falling particles and grease drippings.

1.15 Top Surface Cooking Section Burner Lighters

1.15.1

Any top surface cooking section burner, when the flames can be readily observed by the operator, shall be lighted from a continuous pilot or an electric ignition system.

Electric ignition systems shall be activated by the process of establishing gas flow to the burner with the valve in the light position. Once activated, the electric ignition system, unless of the flame-proving type, shall remain in operation for at least 8.0 seconds with the valve in the light position. If a manual operation is needed to maintain the valve in the light position, such manual operation is permissible.

1.15.2

Electric ignition systems used to ignite gas at top surface cooking section burners shall comply with the applicable construction provisions of the *Standard for Automatic Gas Ignition Systems and Components, ANSI Z21.20 • CSA C22.2 No. 199*, or *Combination Gas Controls for Gas Appliances, ANSI Z21.78 • CSA 6.20*, as applicable.

1.15.3

Lighter assemblies shall be designed and supported so a permanently fixed relationship will be maintained between essential parts, such as pilot tip, igniters, lighter tube and burner ignition port, under normal and reasonable conditions of handling and usage. Such design and support shall prevent misalignment or the rendering of the lighter inoperative by normal handling of the appliance.

1.15.4

Lighter assemblies shall be such that parts not permanently secured cannot be incorrectly assembled and cannot be improperly located or misaligned in removing and replacing during cleaning or other servicing.

1.15.5

Pilot gas flow adjustment means shall be constructed so as not to be susceptible to accidental displacement during cleaning or other normal operations or due to vibration.

A needle adjustment valve with a simple lock nut, or with a coiled spring arranged so its torque may affect the setting of the needle, shall not be considered acceptable.

1.15.6

A pilot burner assembly shall be accessible from the front of the appliance for adjustment and for ignition of the pilot(s).

1.15.7

Pilot burners shall be equipped with durable burner ports. Alloys having a catalytic cracking effect, such as those having greater than 1.0 percent nickel content, shall not be acceptable.

1.15.8

Flames of multiple pilot burners controlled by a single adjustment means shall be substantially uniform in size.

1.15.9

Pilot gas flow adjustment screws shall be provided with screwdriver slots at least $\frac{3}{64}$ in (1.2 mm) wide and $\frac{1}{16}$ in (1.6 mm) deep.

1.15.10

Pilot burners and pilot burner tips shall be rigidly supported to prevent any possibility of dislodgement.

1.16 Automatic Gas Ignition Systems

1.16.1

Automatic gas ignition systems shall comply with the applicable construction provisions of the *Standard for Automatic Gas Ignition Systems and Components, ANSI Z21.20 • CSA C22.2 No. 199*, or the *Standard for Manually Operated Electric Gas Ignition Systems and Components, ANSI Z21.92 • CSA 6.29*.

1.16.2

A main burner(s) located in an oven, an enclosed broiler compartment or a warming oven, or in a location where the flames cannot be readily observed by the operator, shall be equipped with an automatic ignition system (see Part IV, Definitions). This system shall be designed to function in one of the following manners:

- a. Provide for ignition of main burners by means of a proved pilot.

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

- b. Provide for ignition of main burner gas using a direct ignition system which only supervises the main burner(s) flame.

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

- c. Provide for ignition of main burner gas using a direct ignition system incorporating a proved igniter which proves that the igniter is capable of ignition prior to initiation of main burner gas flow.

For systems which supervise main burner flame during an operating cycle and deenergize the igniter, provide for automatic shutoff of main burner gas in the event of main burner flame outage or provide for prompt and safe reignition of main burner gas by reenergizing the proved igniter.

1.16.3

Automatic gas ignition system components shall be installed so the operation of these devices and main burner ignition will not be affected by falling scale, lint or dirt during normal operation.

1.16.4

The main burner(s) shall not depend upon a runner arm for ignition from the pilot when a continuous pilot is maintaining the safety shutoff device in its open position.

1.16.5

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

1.16.6

An ignition device shall be designed and installed so the relative position of the device and main burner will be maintained.

1.16.7

An ignition device shall be removable. If the device is secured to the main burner, corrosion-resistant fasteners shall be used.

1.16.8

Manual reset means incorporated in a safety shutoff device shall be accessible from the front of the appliance, and clearance shall be provided so the hand and arm used in resetting the device need not contact other portions of the appliance.

1.16.9

When a pilot burner is provided, the design of the control system shall be such that main burner gas flow can occur only after the pilot has been ignited and proved. For electrical systems for which the manufacturer supplies instructions for manual pilot ignition during a power failure, either a period of at least 8.0 seconds shall elapse between ignition of the pilot and supply of gas to the main burner(s), or an additional manual operation of the control device shall be necessary to allow main burner gas flow.

1.16.10

A pilot igniter shall have the sole function of igniting pilot burner gas.

1.16.11

A pilot igniter shall light the pilot without requiring any manual operation other than turning on a gas valve.

1.16.12

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

1.16.13

A pilot which is normally lighted by a pilot igniter shall be accessible for manual ignition and adjustment from the front of the appliance.

1.16.14

In the event a pilot igniter fails to function, construction shall be such as to permit operation of the main burner(s) after manual ignition of the pilot(s). Operation of the main burner(s) under such conditions shall not nullify the control afforded by safety shutoff devices.

1.16.15

Automatic means for igniting pilot gas shall be designed and located so as to eliminate the collection of carbon or other materials, or the dislocation, distortion or burning of parts as the result of normal conditions of heating or vibration of parts.

1.17 Pilot Gas Filters

1.17.1

Pilot gas filters complying with the *Standard for Pilot Gas Filters, ANSI Z21.35 • CSA 6.8*, or *Combination Gas Controls for Gas Appliances, ANSI Z21.78 • CSA 6.20*, shall be provided for all continuous gas pilots.

1.17.2

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

1.17.3

A pilot gas filter shall be installed on the upstream side of and as close to the accessories which it is intended to protect as is practical. It shall be easily replaceable in service.

1.18 Cooking Tops, Surface Cooking Section Covers And Utensil Supports

1.18.1

A removable cooking top incorporating aeration bowls as integral parts shall be designed so as to prevent incorrect placement of the burner openings with respect to the burners.

1.18.2

Utensil supports shall be designed so either they cannot be firmly placed in other than the proper position, or, if improper or inverted placement is possible, combustion will be unimpaired when operating in that manner.

1.18.3

Individual utensil supports shall be firmly supported and positioned to prevent rocking in their supports and any shifting or lateral movement in excess of $\frac{1}{8}$ in (2 mm).

1.18.4

The bottom of a built-in top unit shall be closed to protect combustible construction from direct radiation of the burner flames, the dropping of incandescent particles and spill-overs, and to prevent interference from items stored in cabinets below the appliance.

1.18.5

A cover attached to a cooking top shall be provided with suitable means to prevent accidental closure, such as a counterbalance or a manually released catch arrangement.

1.18.6

The sensing element of a thermostatically controlled top burner, when subjected to a weight of 0.75 lb (0.34 kg), shall be depressed to a plane level with the top of the utensil support.

1.19 Drip Trays

1.19.1

In the absence of aeration plates or burner bowls serving the added purpose of collecting spill-overs, separate drip trays shall be provided for top and griddle burners.

1.19.2

Suitable drip trays shall be provided for built-in open top broilers.

1.19.3

Drip trays shall not be bolted or locked in place and shall be easily removable.

The simple opening of a service door or drawer or the removal of a panel not permanently fastened in place is acceptable.

1.19.4

A drip tray shall be constructed of corrosion-resistant material or have a corrosion-resistant finish.

1.19.5

A drip tray shall have the four sides raised, the corners made tight, and the edges smooth.

1.20 Oven And Broiler Linings And Oven Bottoms

1.20.1

A sheet-steel lining immediately over a broiler burner shall be at least 0.0304 in (0.772 mm) thick. When the space above such a lining constitutes a flue for the flue gases from the broiler burner, the top of such flue, if of sheet-steel, shall be at least 0.0254 in (0.645 mm) thick.

1.20.2

All parts of linings for ovens, broilers, deep well cookers or other heated compartments exposed to flue gases shall be constructed of a corrosion-resistant metal or have a corrosion-resistant finish. Painted or japanned finishes shall not be acceptable.

1.20.3

Linings shall be constructed, reinforced or braced so the size and shape of flue passages will not be appreciably altered by alternate heating and cooling of the oven or broiler, or both, simulating normal usage in service, or as the result of the tests specified in this standard.

1.20.4

The oven bottom shall be constructed and reinforced where necessary to prevent warpage. The upper sheet shall be constructed of corrosion-resistant metal or have a corrosion-resistant finish. Painted or japanned finishes shall not be acceptable.

1.20.5

The extreme bottom of an appliance incorporating an oven or broiler shall protect combustible construction or storage compartments below the appliance from direct radiation of the burner flames and the dropping of incandescent particles and spill-overs, and shall prevent interference from stored items. Compliance with this provision shall be determined with the broiler drawer and storage drawer in both the closed position and withdrawn to the fully open position.

1.21 Oven Racks, Rack Supports And Broiler Pans

1.21.1

Each baking oven of an appliance shall be equipped with one or more racks of sufficient strength to sustain, without becoming dislodged, the loads shown in [Table IV, Oven Rack Loading](#), when distributed over $\frac{2}{3}$ the area of the rack.

1.21.2

At least one rack position for each full $3\frac{1}{2}$ in (88.9 mm) of oven height shall be provided.

1.21.3

Oven racks and broiler pans shall be supported in a horizontal plane and shall not bind against the rack supports or linings when the oven and broiler are either hot or cold.

1.21.4

If removable oven rack supports are used, they shall be rigidly held in place and shall be supported and constructed so as to prevent racks from binding.

1.21.5

Rack supports shall be constructed so they will prevent racks from tilting when partially withdrawn. Effective stops shall be provided for all drawers and racks.

1.21.6

With the broiler pan in its lowest position, the minimum vertical clearance between the top surface of the broiler pan rack and the broiler burner ports or the bottom of any projection below the burner ports shall not be less than $3\frac{1}{2}$ in (88.9 mm). A $2\frac{1}{2}$ in (63.5 mm) clearance is permissible on a built-in unit whose outer casing, exclusive of backguards, vent extensions, handles, etc., encloses a volume not in excess of 6 ft³ (0.17 m³) and whose weight is not in excess of 80 lb (36.3 kg).

1.21.7

An enclosed broiler shall be provided with at least 3 rack positions located so as to permit effective utilization of the broiler. A built-in unit whose outer casing, exclusive of backguards, vent extensions, handles, etc., encloses a volume not in excess of 6 ft³ (0.17 m³) and whose weight is not in excess of 80 lb (36.3 kg) need have only 2 rack positions. Open top broiler sections or units need not comply with this provision.

1.21.8

A rack provided to support a broiler pan, when subjected to a load of 15 lb (6.8 kg) uniformly applied for a period of 5 minutes without impact along a strip 4 in (102 mm) wide and the full width of the rack equidistant from the face of the appliance and the outer edge of the rack when extended as far as the stops will permit, shall not show:

- a. Breakage or permanent damage to any part thereof; or

- b. Deflection, during application of the load, from its normal position in excess of 0.5 in (12.7 mm) at a point 6 in (152 mm) from the face of the front frame of the compartment.

1.22 Thermal Insulation

1.22.1

Thermal insulation material shall be installed and enclosed so as to maintain integrity of insulation.

1.22.2

Electrically conductive thermal insulation shall be spaced from electrically live parts in accordance with the spacing provisions 1.27, Electrical Equipment and Wiring.

1.23 Venting And Combustion Air Supply

1.23.1

When a flue collar is provided for a cooking section, it shall serve as an effective vent for all oven and enclosed broiler sections.

1.23.2

When both a flue collar and flue deflector are provided, the flue collar opening shall effectively vent the flue gases.

This provision shall be deemed met when no smoke (slight wisps of smoke may be permitted) can be observed escaping from the flue deflector outlet(s) of the appliance, following introduction of a fuming material such as titanium tetrachloride ahead of the outlet(s) after all sections of the appliance have been in operation for 15 minutes under Test Condition 1 in Table X, Gas Pressure And Input Conditions For Use In The Various Performance Tests, and with an 8 ft (2.44 m) stack attached vertically to the flue collar.

1.23.3

On a floor-supported unit for installation at zero clearance at the back, a concealed flue shall have a built-in type draft hood which shall comply with the applicable provisions of [2.26, Draft Hoods](#).

A built-in unit having a flue collar outlet shall be provided with a built-in type draft hood which shall comply with the applicable provisions of [2.26, Draft Hoods](#).

1.23.4

A built-in unit shall be constructed so air for combustion is supplied from spaces exterior to the cabinet, partition or wall in which it may be installed, either through fixed openings in the appliance structure or through ducts which are integral parts of and attached to the appliance structure.

1.23.5

When air for combustion is supplied through a removable grille, duct or fitting, such grille, duct or fitting shall be an integral part of the appliance and shall be designed so as to prevent its being attached in an improper position. The minimum dimension of any air opening in the grill shall be $\frac{1}{8}$ in (2 mm).

1.23.6

The construction of a built-in open top broiler section or unit shall provide a fixed minimum venting area.

1.23.7

A flue system beyond the oven and broiler outlets shall be constructed so no leakage of flue gases will occur at any joint in the flue system when the oven and broiler are in operation.

Method of Test

The oven and broiler burners shall be placed in operation under Test Condition 1 in Table X, Gas Pressure And Input Conditions For Use In The Various Performance Tests. The broiler burner valve and the oven thermostat shall be set to the full open position. The burners shall be operated for a period of 15 minutes.

At the end of the 15 minute period, 1 cubic centimeter of titanium tetrachloride, or other suitable fuming material, shall be atomized in 10 seconds in the oven and broiler compartments. This provision shall be deemed met when no smoke (slight wisps of smoke may be permitted) can be observed escaping from either the oven or broiler flue system or at their points of attachment with the splash panels or flue deflectors.

1.23.8

In the event a blower motor becomes inoperative when used on a built-in oven having provision for front flue discharge of flue products below the 36 in (914 mm) level, the appliance design shall comply with 2.21, Evaluation of Burn Hazard Potential of Exterior Surfaces, and [2.28, Oven Flue Discharge Temperatures](#).

A properly applied centrifugal, pressure operated or sail switch, thermal 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 flattened shaft, a locking type set screw on a flattened shaft, or the equivalent.

1.24 Fan And Limit Controls

1.24.1

Fan controls and limit controls shall be listed by a nationally recognized testing agency.

1.24.2

If an auxiliary temperature limit control is used to provide protection from excessive temperatures under blower and motor failure, it may be of the manual reset type.

1.24.3

Temperature limit control(s), when provided, shall be supplied and installed by the manufacturer.

1.25 Flue Collars

1.25.1

A flue collar, when provided on a floor-supported unit, shall be on the top or rear of the appliance. Provisions shall be made for supporting a draft hood or vent pipe on the flue collar.

1.25.2

A flue collar, when provided, on a built-in unit, shall be located within the body of the appliance. The outlet collar shall be at least 1¹/₄ in (31.8 mm) high. The appliance shall be provided with access openings through which the connection between the draft hood outlet and vent can be visually inspected from the front of the appliance. Means for the mechanical attachment of the vent pipe to the flue collar shall be provided. A single screw, or the equivalent, is acceptable for this purpose. The construction shall be such that the attachment means is accessible when the appliance is installed as specified in the manufacturer's installation instructions.

1.25.3

The outside circumference of flue collars, whether circular or elliptical, shall be of such length as to accept a vent pipe of integral inch diameter. It is suggested that the circumference of a pipe 4 in (102 mm) in diameter be the minimum size.

1.26 Flue Deflectors

1.26.1

Flue deflector outlet openings shall be located and designed so the direction of flue gas discharge will not be vertical.

1.26.2

The total free area of the flue deflector vent shall be adequate to pass all the flue gases discharged through the oven vent opening(s).

1.26.3

The minimum opening of any outlet or of any flue passageway in a flue deflector shall be at least $\frac{1}{4}$ in (6.4 mm) on the smallest dimension and have an area not less than $\frac{1}{4}$ in² (161 mm²).

1.26.4

The design of the outlet openings of a flue deflector or their position in respect to top surfaces shall be such as to prevent closure or restriction of such openings by utensils placed on the top surfaces.

1.26.5

Outlet grilles, flue deflectors or outlet fittings of flue deflectors shall be constructed so they cannot be installed in other than the correct position.

1.27 Electrical Equipment And Wiring

1.27.1

Electrical equipment, wiring and accessories built in or supplied for use with an appliance shall be submitted with the appliance.

1.27.2

Electrical equipment and wiring supplied on an appliance shall be of approved types or shall be investigated as an integral part of the appliance for construction and performance equivalent to approved types. Electrical equipment and wiring shall be judged with respect to its suitability for the particular application.

Electrical equipment and wiring listed or certified by a nationally recognized testing agency qualified to certify or list electrical equipment or wiring shall be deemed to be an approved type.

1.27.3

On a domestic gas cooking appliance, 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), 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.

1.27.4

Appliances shall not be provided with electrical convenience outlets.

1.27.5

The cord provided to connect an appliance to a nominal 120-volt electrical supply shall consist of a three conductor grounding type flexible cord of one of the types shown in Table V, Maximum Allowable Rise Above Room Temperature For Various Component Parts, or its equivalent, and a suitable approved attachment plug cap of the parallel blade type, constructed in accordance with the applicable Standard for *Wiring Devices-Dimensional Requirements, ANSI/NEMA WD6*.

An appliance for connection to a nominal 240-volt electrical supply shall be provided with provisions for the connection of the appliance to the power supply as outlined in the *Safety Standard for Household Electric Ranges, ANSI/UL 858*.

The current-carrying capacity of the supply cord shall not be less than the rating of the appliance (see [1.27.24](#)). The supply cord shall be terminated within the appliance in a polarized female cord connector body or receptacle, located and retained so as to be accessible from the front of the appliance after installation. Strain relief shall be provided between the flexible cord and the wiring terminals of each of the devices to which it is connected.

On a floor-supported unit, the supply cord shall be of such length that when properly engaged with the primary disconnect specified in [1.27.8](#), it can be extended at least 4 ft (1.22 m) beyond the back of the appliance.

On a built-in unit, the supply cord shall be protected or otherwise arranged so that during installation and servicing, pinching between the appliance and supporting cabinet can be avoided. The cord shall not extend more than 4 ft (1.22 m) beyond the back of the appliance when properly engaged with the primary disconnect specified in [1.27.8](#).

1.27.6

A junction box provided for connection of an appliance to the electrical supply shall be located on a part of the assembly that does not require movement for normal servicing and adjustment.

The box shall have provisions for strain relieving the field wiring entering the box.

This box shall be located so the temperature of the conductors within the box, or surfaces of the box likely to be in contact with conductors, will not exceed 63°F (35°C) rise when the appliance is tested as specified in [1.27.26](#). During conduct of this test, all unused electrical connection openings shall be closed.

The size of a junction box in which field-installed conductors are to be connected by splicing shall not be less than that indicated in [Table VI](#), . A conductor passing through the box is counted as 1 conductor, and each conductor terminating in the box is also counted as 1 conductor.

Steel used in the fabrication of a junction box shall not be less than 0.031 in (0.79 mm) thick [0.035 in (0.89 mm) thick if zinc coated]. Nonferrous metal shall not be less than 0.045 in (1.14 mm) thick at points where conduit or metal-sheathed cable is to be connected.

1.27.7

Appliance wiring terminating in a junction box shall have at least 4 in (102 mm) free length available for making connections and strain relief sufficient to comply with the Method of Test of [1.27.10](#).

1.27.8

When employed, all disconnects shall be polarized. There shall be sufficient free length of wire attached to the movable parts of the disconnect to permit connection and disconnection. The arrangement of the disconnect with respect to internal wiring shall be such as to prevent strain from being transmitted to internal wiring terminals and connections during disconnection.

1.27.9

All wiring other than the supply cord, electrically live parts, and electrical equipment whose approval anticipates an additional enclosure shall be located within the confines of the appliance structure, an enclosure or a raceway in a manner to:

- a. Provide protection for wiring and electrical equipment against strain and physical abuse which may, in the course of normal handling during and after installation, damage insulation or disrupt splices or terminal connections;
- b. Provide protection for wiring and electrical equipment from damage during normal cleaning and normal usage of the appliance;
- c. Prevent contact with combustible material;
- d. Prevent burning or molten wiring material from falling on combustible material; and
- e. Prevent exposure of uninsulated live parts to possible contact by the user. Such parts shall be guarded or positioned so they cannot be contacted by a $\frac{1}{4}$ in (6.4 mm) diameter rod, 4 in (102 mm) long, held in the hand. For the purpose of this test, all valve handles, utensil supports, loose aeration bowls, griddles and conventional top burners shall be removed. Access panels normally opened by the customer for cleaning purposes, such as hinge-type top panels, shall be open. Snap-on type top panels shall be removed. Clips of fluorescent lamp sockets, ignition coils or ignition electrodes need not comply; however, ignition coils or ignition electrodes shall be guarded to prevent accidental contact.

1.27.10

Strain relief between wiring and the device(s) to which it connects shall be provided whenever the conditions of normal servicing of the appliance create the likelihood of placing a strain on wiring junctions.

Method of Test

A pull of 35 lb (156 N) shall be applied to the wiring for a period of 1 minute without damage to the connection. If screw-type terminals are used, the screws shall be loosened before applying the force. This test need not be conducted if the assembly is an approved type.

1.27.11

The general construction and assembly of electrical equipment and wiring shall be of a neat and workmanlike character. The wiring shall be properly located and supported. Electrical wiring shall be protected against damage from movable parts and from utensils placed in a storage drawer or compartment.

1.27.12

High-tension leads shall be fabricated from cable recognized as acceptable for the purpose and conforming to a nationally recognized standard. Such leads shall be provided at each end with brass loops, eyes or other equivalent means to facilitate positive connection. The leads may be integrally joined to the transformer windings, provided proper strain relief is furnished.

1.27.13

Wireways shall be smooth and entirely free from sharp edges, burrs, fins, etc., which may cause abrasion of the insulation on wiring. In order to prevent abrasion of the insulation, openings in metal walls through which insulated wires not in wireways pass shall be provided with smoothly rounded bushings or an acceptable metal grommet, or shall have smooth well-rounded surfaces as formed by rolling or extruding the metal around the opening. Bushings shall be phenolic, porcelain, hard fiber or other suitable material having a smoothly rounded surface.

1.27.14

The wiring shall not pass through appliance flues even when enclosed in raceways. Wiring shall be located so as not to be in the direct path of spill-overs.

1.27.15

Conductors shall be spliced or joined so as to be mechanically secure without solder and, unless made with an approved splicing device, shall then be soldered with a fusible metal or alloy, brazed or welded. Provision shall be made to prevent mechanical strain on splicing devices. All joints and the free ends of conductors shall be covered with an insulation equal to that on the conductors.

1.27.16

The spacing between uninsulated live-metal parts of opposite polarity, and between such parts and dead-metal parts, shall not be less than $\frac{1}{4}$ in (6.4 mm) over surfaces or through air.

An insulating lining or barrier of fiber or similar material not less than $\frac{1}{32}$ in (0.8 mm) thick may be employed in conjunction with an air spacing of not less than $\frac{1}{16}$ in (1.6 mm), where spacings otherwise would be insufficient. Insulating material less than $\frac{1}{32}$ in (0.8 mm) thick may be employed if, upon investigation, it is found to be suitable for the particular application.

Uninsulated live-metal parts shall be secured so they will be prevented from turning or shifting by means other than friction between surfaces, if such motion may result in a reduction of spacings below the minimum required.

1.27.17

The appliance shall be constructed so the enclosure, frame and similar noncurrent-carrying metal parts are electrically continuous to the point of connection of the equipment grounding means. This provision shall be deemed met when the electrical resistance between the point of connection of the equipment grounding means and any noncurrent-carrying metal part is not more than 0.1 ohm.

Method of Test

The electrical resistance between the point of connection of the equipment grounding means and each noncurrent-carrying metal part shall be determined by either a Wheatstone bridge or by measuring the potential drop between the two points when an alternating current of 20 amperes, derived from a power supply of not more than 12 volts, is passed between the two points and dividing the measured potential drop by the current. The electrical resistance shall not be more than 0.1 ohm. (Insulating resistant finishes may be scraped from the enclosure test points.)

1.27.18

A lamp holder, fuse holder, receptacle or similar device provided as a part of the appliance shall be mounted securely and shall be prevented from turning by means other than friction between surfaces.

1.27.19

A transformer suitable for an NEC Class 2 circuit, (see the *National Electrical Code, ANSI/NFPA 70*), shall be employed with control and ignition systems operating at less than line voltage.