

American National Standard For
**Recreational Vehicle
Cooking Gas Appliances**

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AMERICAN NATIONAL STANDARD
ANSI Z21.57-2010

Tenth Edition - 2010
This Standard is based on the Standard for
Recreational Vehicle Cooking Gas Appliances

ANSI Z21.57-2005
Addenda Z21.57a-2007, and
Z21.57b-2008



APPROVED
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American National Standards Institute, Inc.

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Preface

This publication represents a standard for safe operation, substantial and durable construction, and acceptable performance of recreational vehicle cooking gas appliances. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection and research on appliances designed for the utilization of gas. There are risks of injury to persons inherent in 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 recreational vehicle cooking gas appliances, the construction and performance of which may exceed the various provisions specified herein. In its preparation, full recognition has been given to possibilities of improvement through ingenuity of design. As progress takes place, revisions may become necessary. When they are believed desirable, recommendations should be forwarded to CSA America, Inc., 8501 East Pleasant Valley Road, Cleveland, Ohio 44131.

Safe and satisfactory operation of a recreational vehicle cooking gas appliance depends to a great extent upon its proper installation and it should be installed in accordance with the *Standard for Recreational Vehicles, ANSI A119.2*, or the *National Fuel Gas Code, ANSI Z223.1/NFPA 54*, manufacturers' installation instructions, and local municipal codes.

Users of this American National Standard are advised that the devices/products/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.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time.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

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 Standard For Recreational Vehicle Cooking Gas Appliances

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

Although the preparation and promulgation of standards for domestic gas ranges had been in progress for almost thirty years, the first American Standard for gas ranges approved by the American Standards Association was in 1932. This latest and most comprehensive standard was the result of a general revision and enlargement of the previous standards by the domestic gas range subcommittee of ASA Sectional Committee Z21 under the sponsorship of the American Gas Association.

Following this edition of the domestic gas range standard (Z21.1), a number of subsequent editions were issued which included revisions deemed necessary in line with industry developments. In each case, draft revisions were distributed for review and comment and reviewed by the subcommittee prior to finalization of the revised standard.

Following the thirteenth edition of the standard, which was approved as American Standard in 1955, the domestic gas range standard was divided into two volumes. These became 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 Standards by the American Standards Association in 1956.

As a result of the use of domestic gas ranges by the recreational vehicle and manufactured (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 the first addenda to the standards approved as American Standards in 1960. Subsequent editions of both standards were approved in 1961 and 1964.

On August 24, 1966 the American Standards Association was reconstituted as the United States of America Standards Institute. On October 6, 1969, the United States of America Standards Institute was renamed the American National Standards Institute, Inc.

With the increasing popularity of recreational vehicles, the subcommittee concluded that provisions to recognize special appliance designs and use conditions were needed in the domestic gas range standards. Rather than attempting to add this coverage to the existing standards, the subcommittee prepared a draft standard to cover recreational vehicle cooking gas appliances for use with liquefied petroleum gases. This draft standard, which was comprised of the related coverage from the eighteenth edition of Z21.1.1 and the fifth edition of Z21.1.2, plus additional coverage for vibration, compactness of design, etc., was adopted by the Z21 Committee in March 1971. The first edition of the recreational vehicle cooking gas appliance standard was approved as American National Standard by the American National Standards Institute, Inc., in 1972.

Further revisions in line with developments in gas utilization, including the transfer of the remaining coverage for appliances for recreational vehicle installation from American National Standard for Household Cooking Gas Appliances (Z21.1) were incorporated in the second edition of the recreational vehicle cooking gas appliance standard which was approved as American National Standard by the American National Standards Institute, Inc., in 1974. The third, fourth, fifth, sixth, seventh, eighth and ninth editions of the recreational vehicle cooking gas appliance standard were approved as American National Standards by the American National Standards Institute, Inc., in 1978, 1982, 1987, 1990, 1993, 2001 and 2005 respectively.

This, the tenth edition of the recreational vehicle cooking gas appliance standard was approved by the American National Standards Institute on November 29, 2010

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Previous editions of the recreational vehicle cooking gas appliances standard, and addenda thereto, approved by the American National Standards Institute are as follows:

Z21.57-1972		
Z21.57-1974	Z21.57a-1974	Z21.57b-1976
Z21.57-1978	Z21.57a-1979	Z21.57b-1981
Z21.57-1982	Z21.57a-1982	Z21.57b-1984
Z21.57-1987	Z21.57a-1989	Z21.57b-1989
Z21.57-1990	Z21.57a-1991	Z21.57b-1993
Z21.57-1993	Z21.57a-1997	Z21.57b-1998
Z21.57-2001	Z21.57a-2003	Z21.57b-2004
Z21.57-2005	Z21.57a-2007	Z21.57b-2008

NOTE: This edition of Z21.57 incorporates changes to the 2005 edition of Z21.57 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 IO, is used as a guide in making metric conversion from yard/pound quantities.) If a value for a measurement and an equivalent value in other units, the first stated is to be regarded as the requirement. The given equivalent value may be approximate. If a value for a measurement and an equivalent value in other units, are both specified as a quoted marking requirement, the first stated unit, or both shall be provided.



American National Standard For Recreational Vehicle Cooking Gas Appliances

Part I: Construction

1.1 Scope

1.1.1

This standard applies to newly produced compact cooking gas appliances (see Part IV, Definitions) hereinafter referred to as units or appliances, constructed of entirely new, unused parts and materials, intended for installation in recreational vehicles, including recreational park trailers:

- a. For use with propane gases only; or
- b. For use with natural gas convertible for use with propane gas (see 1.1.3-e).

The construction of units is covered under Part I.

The performance of units is covered under Part II.

1.1.2

Larger cooking gas appliances intended for recreational park trailers are covered by the *Standard for Household Cooking Gas Appliances, ANSI Z21.1*.

1.1.3

This standard applies to cooking appliances designed to be recessed into, placed upon and attached to the construction of a recreational vehicle. Built in units are further classified as:

- a. Top or surface unit. A unit for installation in or on a counter top.
- b. Oven unit. A unit for installation in a cabinet, wall or partition, or for installation on a counter. It may be a separate oven, may be equipped with a broiler that uses the oven burner, or the oven may serve as a broiler with a burner in the upper portion of the oven.
- c. Broiler unit. May have an open top or be enclosed, may be a separate broiler, or may be combined with a rotisserie.
- d. Combinations of "-a," "-b" or "-c" above, or any other cooking device that may be for similar installation.
- e. Convertible unit. A unit for use with natural gas and propane gases with provisions for the simple conversion from one gas to the other, equipped with double coaxial main burner orifices and a convertible gas appliance pressure regulator. (Also see Part IV, Definitions.)

1.1.4

For the purposes of this standard, units are also classified as:

- a. Full-Sized Unit. Any unit which does not qualify as a compact unit.
- b. Compact Unit. A unit whose outer casing 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). For the determination of volume, back-guards, vent extensions, handles, etc., may be removed. For the determination of weight, other easily removable parts such as conventional top burners, oven racks, etc., may also be removed.
- c. Convertible Unit. A unit for use with natural gas and liquefied petroleum gases with provisions for the simple conversion from one gas to the other, equipped with double coaxial main burner orifices and a convertible gas appliance pressure regulator. (Also see Part IV, Definitions.)

1.1.5

This standard covers all electrical equipment, wiring and accessories built in or supplied for use with an appliance for use with low-voltage direct current or alternating current. Appliances for use with alternating current shall have a current limitation of 20 amperes and have its electrical equipment, wiring and accessories 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 either a low-voltage direct current supply or nominal 120 volt alternating current 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 alternating current supplies.

1.1.6

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*.

1.1.7

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

1.1.8

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

1.1.9

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

1.1.10

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

1.1.11

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

1.2 General Construction 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, vibration 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 top broiler section shall not show evidence of corrosion or distortion when exposed to the 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 covered 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 I, Gas Pressure and Input Rate 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.

At the conclusion of 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.

If operation of the appliance is necessary to make such adjustments, it shall be possible to make the adjustments without disturbing wiring, and without exposing electrically live parts if the electrical system is for operation at more than 30 volts.

Means shall be provided for changing fuses and lamps. 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. If the electrical system is for operation at more than 30 volts, this shall be possible without exposing electrically live parts except screw shells or clips of lamp holders and fuse holders.

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 $3\frac{1}{2}$ 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 1.24, Electrical Equipment and Wiring.

1.2.14

The means provided for adjusting the main burner minimum flame and the gas input to pilot burners shall be accessible from the front of the appliance.

1.2.15

Primary air adjustment means shall be capable of being adjusted from the front of the appliance.

1.2.16

The centers of knobs or buttons located on the backguard of an appliance, excluding single-purpose, time-of-day set knobs or 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 the vehicle piping it is permissible to make the electrical connection, and then lift the unit into the recess.

1.2.18

All controls (see 1.7.3 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 the burner(s) of a built-in oven or broiler need not comply with this provision if protected by rigid spacers.

1.2.19

Backguard or radiation shields supplied with the 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.

1.2.20

Spacers shall be nonremovable and of such strength and bearing surface as to maintain required clearances from combustible materials.

1.2.21

An oven, enclosed broiler or 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.

1.2.22

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.

1.2.23

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

1.2.24

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

1.2.25

Wrench head bolts and nuts used in the construction or assembly of an appliance shall conform to the *Standard for Square and Hex Bolts and Screws-Inch Series*, ANSI B18.2.1, and the *Standard for Square and Hex Nuts (Inch Series)*, ANSI/ASME B18.2.2.

1.3 Appliance Structure

1.3.1

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

1.3.2

The bottoms of units shall have no sharp edges.

1.3.3

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.

1.3.4

Each appliance shall be fitted with means for permanent attachment to its enclosure, such as by the use of screws or bolts.

1.4 Glass and Ceramic Panels

1.4.1

Electrical Enclosures

Glass covering the front surface of a control panel, the front or an exposed bottom surface of a backguard, 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.

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

1. Be of a nonshattering or tempered type that complies with the requirements in the *Safety 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.

1.4.2

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 nonshattering or tempered type that complies with the requirements in the *Safety 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.

1.4.3

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 larger 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 cm ³ of water containing 0.25 g 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 fiber 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

1.5 Gas Supply Lines

1.5.1

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*.

1.5.2

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

1.5.3

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*, or an SAE flared tubing fitting.

1.5.4

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

1.5.5

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

1.5.6

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.

1.5.7

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

1.5.8

The pathway for gas supply tubing shall be smooth and entirely free from sharp edges, burrs, fins, etc., which may cause abrasion to the tubing wall because of vibration during road use of the vehicle. In order to prevent abrasion of the tubing, openings in metal walls through which tubing passes shall be provided with smoothly rounded bushings or shall have smooth, well-rounded surfaces formed by rolling or extruding the metal around the opening, or the insertion of a smooth metal eyelet. Bushings, if used, shall be phenolic, porcelain, hard fiber or other suitable material having a smoothly rounded surface.

1.5.9

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 vehicle piping or during the handling of the appliance.

1.5.10

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

1.5.11

On a convertible appliance (see 1.1.4-c), copper semi-rigid tubing or tubing with internal copper surfaces shall be internally tinned or equivalently treated to resist corrosion by sulfur compounds.

1.5.12

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

1.5.13

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 2.17, Wall, Floor and Enclosure Temperatures.

1.5.14

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.

1.6 Manual Gas Valves And Other Energy Controlling Devices

1.6.1

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.

1.6.2

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).

1.6.3

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 1.25.1-i). (Also see 1.9.3 and 1.9.6.)

1.6.4

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.

1.6.5

A manual valve(s) or a pilot shutoff device(s) 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.

On an appliance equipped with a top lighter(s), the shutoff means for the top lighter(s) shall be available to the operator.

1.6.6

Each top surface cooking section burner control shall be clearly identified with the burner it services. The identification shall be visible 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.

1.6.7

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.

1.6.8

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 the plugs under any conditions of operation.

1.6.9

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.

1.6.10

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.

1.6.11

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

1.6.12

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.

1.6.13

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.

1.6.14

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 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).

1.6.15

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.

1.6.16

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 IV](#), 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 5 ft (1.52 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.

1.6.17

It is recommended that the D-shaped cavities of handles for gas valves comply with the dimensional specifications shown in Figure 1, Recommended Dimensions for D-Shaped Handle Cavity for Valve Stems of $\frac{11}{32}$ in (8.7 mm) Diameter.

1.6.18

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 *Slotted and Recessed Head Machine Screws and Machine Screw Nuts*, ANSI B18.6.3, except that indented hex head type machine screws shall not be acceptable for this application.

1.6.19

If an oven or broiler is not under the control of a safety shutoff device of the complete shutoff type, a gas valve controlling the section shall comply with one of the following:

- a. The valve shall be mounted in a horizontal surface in such a manner that when the unit is installed in accordance with the manufacturer's installation instructions, the center line of the valve stem will be not less than 6 in (152 mm) from the nearest counter edge;
- b. The valve shall be mounted in a recess in a horizontal surface of a sufficient depth that a straight edge laid across the surrounding plane surface will not contact any part of the valve handle;
- c. The valve mechanism shall be provided with a positive detent, and the valve handle or thermostat dial shall be substantially rounded and smooth; or
- d. The valve shall be of the latching type.

1.7 Gas Appliance Pressure Regulators

1.7.1

A gas appliance pressure regulator shall be provided with each appliance. 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*. The regulator shall be leak resistant to excessive pressure in accordance with the requirements for *Gas Appliance Pressure Regulators, ANSI Z21.18 • CSA 6.3*, for a regulator marked "EP".

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.

1.7.2

The regulator outlet pressure (normal manifold pressure) shall be nominally either 4, 5 or 6 in wc, as specified by the manufacturer, for natural gas. The regulator outlet pressure for propane gas shall approximate that specified by the manufacturer.

1.7.3

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 **P** adjacent to the model number.

1.7.4

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.
- 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.

1.7.5

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 2.17, Wall, Floor and Enclosure Temperatures, 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 instruction for installing the regulator. (Also see 1.26.4-c.)

1.8 Automatic Valves

1.8.1

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

1.8.2

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.

1.8.3

Automatic valves for oven and broiler burners, if provided with means for manual operation in the event of power failure, shall be of a type that resumes full automatic operation upon the resumption of power.

1.8.4

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

1.8.5

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

1.9 Thermostats

1.9.1

Thermostats shall comply with the applicable construction provisions of either the *Standard for Gas Appliance Thermostats, ANSI Z21.23*, or 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, Z21.78* • CSA 6.20.

1.9.2

Each oven shall be equipped with a thermostat.

1.9.3

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

1.9.4

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

1.9.5

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 [2.11, Thermostats](#).

1.9.6

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).

1.9.7

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

1.9.8

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 [2.11.2](#).

1.9.9

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

1.9.10

The thermostat dial and control mechanism shall be designed to protect against the possibility of displacement due to vibration, road shock or accidental contact when the control is in the off position.

1.10 Orifices And Orifice Fittings

1.10.1

Main burners of appliances for use with propane gas only shall be provided with fixed orifices.

1.10.2

Double coaxial orifices for main burners shall be provided for convertible appliances with the fixed orifice in the needle sized for liquefied petroleum gases and the orifice in the hoods sized for natural gas at the manifold pressure specified by the manufacturer.

When a convertible appliance is equipped with an infrared burner, this burner may be provided with fixed orifice hoods or spuds for natural gas and liquefied petroleum gases.

1.10.3

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.

1.10.4

When the appliance is supplied with dual outlet valves, the outlet for the section with the lower gas input may be provided with a standard orifice which may be changed for different gases.

1.10.5

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

1.10.6

Orifice hoods, spuds and orifice fittings shall be constructed of metal having a melting point not less than 800°F (426.5°C).

1.10.7

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

1.11 Main Burner And Pilot Input Ratings

1.11.1

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

1.11.2

A continuous pilot used on top surface cooking section shall be rated at not more than 175 Btu/hr (51 W). This input 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.

1.11.3

The combined input rating of a continuous and an intermittent pilot assembly shall not exceed 600 Btu/hr (176 W). This input rating may be limited by a fixed orifice(s) or adjustment means up to the maximum of 600 Btu/hr (176 W).

1.11.4

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 I, Gas Pressure and Input Rate Conditions for Use in the Various Performance Tests.

1.12 Burners

1.12.1

Burners and burner supports shall be designed so they will not be likely to cause damage to orifices or other parts due to vibration during road use of the vehicle.

1.12.2

Burners shall be bolted or locked in place to prevent vibration during road use of the vehicle. These bolting or locking means shall be of such materials and design that burners will be removable.

1.12.3

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.

1.12.4

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

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

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.

1.12.5

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) and then placed in operation under the appropriate test conditions in Table I, Gas Pressure and Input Rate 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 been 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.

1.12.6

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.
- 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.

1.12.7

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

1.12.8

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

1.12.9

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

1.12.10

Top burners shall be centered, within 1/8 in (3.2 mm), with respect to aeration bowl openings.

1.12.11

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.

1.12.12

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.

1.12.13

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.

1.12.14

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

1.12.15

An air shutter shall be constructed of a 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.

1.12.16

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

1.12.17

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.

1.12.18

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

1.13 Top Surface Cooking Section Burner Lighters

1.13.1

Any top surface cooking section burner, where the flames can be readily observed by the operator, may be manually lighted or lighted from a continuous pilot(s) or an electric ignition system.

1.13.2

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* or the *Standard for Manually Operated Piezo-Electric Ignition Systems, ANSI Z21.77 • CSA 6.23*.

1.13.3

Lighter assemblies shall be designed and supported so a permanently fixed relationship will be maintained between essential parts, such as the pilot tip, igniter, 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.

1.13.4

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.

1.13.5

Pilot burners or pilot burner tips, or both, shall be rigidly supported to prevent any possibility of accidental dislodgment.

1.13.6

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.

1.13.7

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

1.13.8

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.

1.13.9

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

1.13.10

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.

1.14 Automatic Gas Ignition Systems

1.14.1

Automatic gas ignition systems shall comply with the applicable construction provisions of the *Standard for Automatic Gas Ignition Systems and Components, ANSI Z21.20* or the *Standard for Manually Operated Electric Gas Ignition Systems and Components, ANSI Z21.92 • CSA 6.29*.

1.14.2

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.

1.14.3

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.

1.14.4

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.

1.14.5

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.

1.14.6

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

1.14.7

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

1.14.8

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.

1.14.9

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.

1.14.10

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

1.14.11

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

1.14.12

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

1.14.13

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

1.14.14

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.

1.14.15

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.

1.15 Pilot Gas Filters

1.15.1

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

1.15.2

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.

1.15.3

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.

1.16 Cooking Tops, Surface Cooking Section Covers And Utensil Supports

1.16.1

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.

1.16.2

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.

1.16.3

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 (3.2 mm).

1.16.4

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.

1.16.5

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 and shall not restrict the oven vent opening either in the open or closed position.

1.16.6

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.

1.17 Drip Trays

1.17.1

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 burners.

1.17.2

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

1.17.3

Drip trays may be bolted or locked in place and shall be easily removable.

1.17.4

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

1.17.5

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

1.17.6

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

1.18 Oven And Broiler Linings And Oven Bottoms

1.18.1

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.

1.18.2

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.

1.18.3

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.

1.18.4

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.

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

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

1.18.5

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.

1.19 Oven Racks, Rack Supports And Broiler Pans

1.19.1

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 V, Oven Rack Loading](#), when distributed over $\frac{2}{3}$ of the area of the rack.

1.19.2

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.

1.19.3

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.

1.19.4

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.

1.19.5

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 2 in (50.8 mm).

This dimension shall apply to the 80 percent of the entire grill area except that a pilot and bracket assembly may intrude upon this area as long as the pilot and bracket assembly is located above the rear one-third of the broiler grill when the broiler pan is positioned as specified by the manufacturer. The grill area shall be considered as the area provided for broiling, such as that of a removable grid inserted in the broiling pan. In this case, there shall not be less than $1\frac{1}{2}$ in (38.1 mm) clearance between the pilot and bracket assembly and the surface of the grill.

1.19.6

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.

1.20 Thermal Insulation

1.20.1

Thermal insulation material shall be suitably enclosed and protected from objectionable exposure to air and flue gases. It shall be applied so as to produce and maintain uniformity of insulation under conditions of vibration likely to be encountered during road use of the vehicle.

1.20.2

Electrically conductive thermal insulation shall be spaced from electrically live parts in accordance with the spacing provisions of 1.24, Electrical Equipment and Wiring.

1.21 Venting And Combustion Air Supply

1.21.1

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

1.21.2

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 or smoking material ahead of the outlet(s) after all sections of the appliance have been in operation for 15 minutes under Test Condition 1 in Table I, Gas Pressure and Input Rate Conditions for Use in the Various Performance Tests, and with a vertical stack attached to the flue collar terminating 6 $\frac{1}{2}$ ft (1.98 m) above the floor.

1.21.3

Vent openings and flue deflectors shall not be located on a front vertical surface below the 36 in (914 mm) level.

1.21.4

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 [2.20, Draft Hoods](#).

1.21.5

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.

1.21.6

When air for combustion is supplied through a removable grill, duct or fitting, such grill, 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 (3.2 mm).

1.21.7

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

1.21.8

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 I, Gas Pressure and Input Rate 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, a suitable fuming or smoking 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.

1.22 Flue Collars

1.22.1

A flue collar, when provided shall be located within the body of the appliance. The outlet collar shall be at least $1\frac{1}{4}$ 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.

1.22.2

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.

1.23 Flue Deflectors

1.23.1

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

1.23.2

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).

1.23.3

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).

1.23.4

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.

1.23.5

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

1.24 Electrical Equipment And Wiring

This section covers appliances which are equipped for use with electrical energy from an external source by means of:

- a. Connection to nominal 120 volt 60 hertz line voltage by means of a flexible cord as described in 1.24.7;
- b. Connection to nominal 240-volt 60 hertz line voltage by means of a flexible cord or by permanent connection as described in 1.24.7; or
- c. Connection to a nominal 12 volt direct current circuit. A flexible cord and plug cap such as those described in 1.24.7 are not acceptable for this purpose.

1.24.1

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

1.24.2

Electrical equipment and line-voltage and low-voltage safety-circuit wiring supplied on an appliance shall be of approved types or shall be investigated as integral parts of the appliance for construction and performance equivalent to approved types. Electrical equipment and wiring shall also be judged with respect to their suitability for the particular application.

All other low-voltage wiring used in alternating current circuits shall be suitable for the particular application with neoprene, thermoplastic or equally durable insulation with a minimum thickness of 0.012 in (0.305 mm).

Wiring used in direct current circuits shall be provided with insulation as required for line-voltage alternating current circuitry, and have adequate current-carrying capacity.

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 of an approved type.

1.24.3

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.

1.24.4

The electrical circuitry on a direct current appliance shall be of the two-wire type. The body of the appliance shall not be used as the return leg of the circuitry.

1.24.5

Thermoelectric circuit wiring shall be judged with respect to good wiring practice and its suitability for the application. Such wiring shall be positively located and adequately supported. It shall be adequately protected against damage from movable parts. Terminals in a thermoelectric circuit which acts as a safety

circuit shall be recessed and located so the terminals are shielded from accidental shorting or damage, or shall be otherwise protected. With these exceptions, thermoelectric circuit wiring is exempt from the provisions of this section.

1.24.6

Appliances shall not be provided with electrical convenience outlets.

1.24.7

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 VI, Maximum Allowable Rise Above Room Temperature for Various Component Parts, or its equivalent, and a suitable approved attachment plug cap of the parallel blade grounding type, constructed in accordance with the *Standard for Wiring Devices-Dimensional Requirements, ANSI/NEMA WD6*.

An appliance for connection to a nominal 240-volt electrical supply shall be provided with either (1) provisions for the permanent connection of the appliance to the power supply as outlined in the *Safety Standard for Household Electric Ranges, ANSI/UL 858*, or (2) a four-conductor grounding type flexible cord of type SRD, SRDT, S, SO or ST which terminates in an approved attachment plug cap suitable for the electrical system of the appliance and constructed in accordance with the *Standard for Wiring Devices-Dimensional Requirements, ANSI/NEMA WD6*.

The current-carrying capacity of the supply cord shall not be less than the rating of the appliance (see 1.24.31). 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 built-in unit, the supply cord shall be protected or otherwise arranged so during installation and servicing, pinching between the appliance and supporting cabinet can be readily avoided. The cord shall not extend more than 4 ft (1.22 mm) beyond the back of the appliance when properly engaged with the primary disconnect specified in 1.24.31.

1.24.8

An appliance for use with direct current shall be provided with one of the following means for connection to the electrical supply of the recreational vehicle:

- a. A supply cord which complies with 1.24.9;
- b. An electrical enclosure within the confines of the body of the appliance to which supply wiring can be connected; or
- c. A junction box which complies with 1.24.11.

1.24.9

The supply cord provided to connect a direct current appliance to the electrical supply shall comply with the following:

- a. A two-conductor flexible cord or the equivalent shall be provided.
- b. The cord shall be of one of the types shown in Table VI, Maximum Allowable Rise Above Room Temperature for Various Component Parts. In addition, it shall be suitable for maximum operating temperatures as determined during the conduct of tests specified in 2.17, Wall, Floor and Enclosure Temperatures.

- c. The supply cord shall be terminated according to the following:
 - 1. Wire ends may be left without termination fittings in anticipation of fittings to be provided by the manufacturer of the recreational vehicle;
 - 2. Wire ends may be provided with a standard SAE type of termination fitting; or
 - 3. An attachment plug cap suitable for connecting to a line voltage alternating current supply system shall not be used.
 - 4. Also see [1.26.5-c](#).
- d. If the supply cord is terminated within the unit in a disconnect fitting, this fitting shall be located and retained so as to be accessible from the front of the appliance after installation. The disconnect fittings shall be polarized. Strain relief shall be provided between the flexible cord and any such device to which it is connected.
- e. The supply cord shall be protected or otherwise arranged so during installation and servicing, pinching between the unit and any supporting cabinetry or floor of a recess can be readily avoided.
- f. The supply cord shall not extend more than 4 ft (1.22 m) beyond the back of the unit.

1.24.10

An electrical enclosure for use on a direct current appliance as specified in [1.24.8-b](#) shall comply with the junction box provisions specified in [1.24.11](#), except that steel used in the fabrication of the enclosure shall not be less than 0.021 in (0.533 mm) thick [0.024 in (0.61 mm) thick if zinc-coated].

1.24.11

A junction box provided for connection of an appliance to the electrical supply of a recreational vehicle 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 with the box, or surfaces of the box likely to be in contact with conductors, will not exceed 63°F (17°C) rise when the appliance is tested as specified in [1.24.32](#). During the 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 VII](#), . A conductor passing through the box is counted as one conductor, and each conductor terminating in the box is also counted as one 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.

1.24.12

Appliance wiring terminating in the junction box or electrical enclosure:

- a. Shall have at least 4 in (102 mm) free length available for making connections;
- b. Shall be terminated as described in [1.24.9-c1](#) or -c2; and
- c. Shall have strain relief sufficient to comply with the Method of Test of [1.24.15](#).

1.24.13

On a nominal 120-volt or 240-volt system, means shall be provided for physically and electrically separating the internal wiring from the supply cord, if provided, without leaving uninsulated live parts exposed. The disconnecting device shall be readily accessible from the front of the appliance. Any other disconnect shall be covered or located so as to prevent confusion with the primary disconnect. All disconnects shall be polarized.

This provision does not apply to built-in top units, provided the installation instructions include information relative to location of the wall receptacle and include a warning to the user to disconnect the electrical supply before servicing the appliance (see 1.25.8).

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.

When it is necessary to handle internal wiring to operate the disconnect, the wiring shall be either (1) a type of flexible cord shown in Table VI, Maximum Allowable Rise Above Room Temperature for Various Component Parts; or (2) conductors suitably jacketed, either individually or as a group, such as with woven fiberglass. If supplemental jacketing of a group of conductors is employed, it shall be secured in such a manner that it will not freely move and expose the conductors within. The length of the internal wiring to be handled or exposed shall not be in excess of 12 in (305 mm). For purposes of evaluation of such a 12 in (305 mm) section under 1.24.14, it may be considered as equivalent to one of the types of flexible cord.

1.24.14

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 of nominal 120 volt and 240 volt systems 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, grates, loose aeration bowls, griddles and 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.

1.24.15

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 of an approved type.

1.24.16

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, and from vibration likely to occur during road use of the vehicle.

1.24.17

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 as short as possible and shall be provided at each end with brass loops, eyes or other equivalent means to facilitate positive connections. The leads may be integrally joined to the transformer windings, provided proper strain relief is furnished.

1.24.18

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.

1.24.19

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.

1.24.20

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.

1.24.21

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.

1.24.22

On a nominal 120-volt or 240-volt system, 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.)

1.24.23

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

1.24.24

An overcurrent protective device, if provided on a direct current appliance, shall be located as close as practical to the point of electrical supply connection. It shall be installed in the positive line and be accessible for servicing when the appliance is installed in accordance with the manufacturer's installation instructions.

An overcurrent protective device shall not be rated in excess of the ampacity of the conductors in the appliance circuit.

If an overcurrent protective device is provided on the appliance, the marking applying to fusing in the supply circuit as specified in 1.26.5-b is not necessary.

1.24.25

Circuit breakers or fuses shall be of a listed or approved type, including automotive types conforming to the requirements of the *Standard for Electric Fuses (Cartridge Type)*, ANSI/SAE J544, or the Safety Standard for *Automotive Glass-Tube Fuses*, ANSI/UL 275.

1.24.26

On a nominal 120-volt or 240-volt system, a transformer suitable for an NEC Class 2 circuit (see Article 725, Section 725-31, of the *National Electrical Code*, ANSI/NFPA 70) shall be employed with control and ignition systems operating at less than line voltage.

1.24.27

Materials used for electrical construction shall be suitable for their particular application.

- a. In determining the acceptability of an electrical insulating material, consideration shall be given to its mechanical strength, dielectric strength, heat-resistant properties, the degree to which it is enclosed or protected, and any other features having a bearing on the fire and accident hazards involved.
- b. Lamp holders having paper liners shall not be employed.
- c. Lamp holders having aluminum screw shells shall not be installed in ovens.

d. Switches controlling lamp holders shall be suitable for use with tungsten filament lamps.

1.24.28

The internal wiring shall consist of insulated conductors of adequate size and type(s) which are appropriate for the particular application, when considered with respect to:

- a. The temperature and voltage to which the wiring is likely to be subjected;
- b. Its exposure to oil, water or grease; and
- c. Other conditions of service to which it is likely to be subjected.

1.24.29

Switches shall have current and voltage ratings not less than those of the circuits they control.

1.24.30

Single-pole switches, including those of safety controls and protective devices, shall not be wired in neutral or grounded lines.

Screw shells of lamp holders shall be wired in neutral or grounded lines.

1.24.31

On a nominal 120 volt or 240 volt system, the current input to an appliance shall not be more than 110 percent of its marked rating, when measured with the appliance in operation under full load conditions at rated voltage.

1.24.32

Electrical equipment, including clock and rotisserie motors, and wiring shall have insulation suitable for the temperature to which they are exposed and for the service to which they are subjected. (See Table VI, Maximum Allowable Rise Above Room Temperature for Various Component Parts.)

Method of Test

The appliance shall be operated as specified in 2.17, Wall, Floor and Enclosure Temperatures, under Test Condition 1 in Table I, Gas Pressure and Input Rate Conditions for Use in the Various Performance Tests. At the conclusion of the operating period specified, temperatures of electrical components and wiring shall be determined for each component at points subjected to maximum temperatures. Temperatures shall be determined by means of bead-type thermocouples not larger than No. 24 AWG (0.20 mm²) placed in good thermal contact with the material. Observed temperatures shall not be in excess of those shown in Table VI, Maximum Allowable Rise Above Room Temperature for Various Component Parts.

With reference to electrical windings with Class A insulation, the temperature rise observed by means of thermocouples on the surface of a coil, where affected by an external source of heat, may be 27°F (15°C) higher than indicated in Table VI, Maximum Allowable Rise Above Room Temperature for Various Component Parts, provided the temperature rise by the resistance method is not more than 135°F (75°C).

The resistance measurement shall be obtained using a suitable impedance bridge and attendant circuits. The winding are to be at room temperature at the start of the test. The temperature rise of a winding shall be calculated as follows:

$$\Delta t = \frac{R}{r} (k + t_1) - (k + t_2)$$

where

Δt	=	temperature rise, °F (°C)
R	=	resistance winding at end of test, ohms
r	=	resistance of winding at beginning of test, ohms
k	=	390 for copper for U.S. customary units (234.5 for metric units)
t_1	=	room temperature at beginning of test, °F (°C)
t_2	=	room temperature at end of test, °F (°C)

1.24.33

On a system for use at more than 30 volts, the leakage current measured on an appliance tested as specified in the following Method of Test shall not exceed 0.5 milliamperere.

Method of Test

When connected to a supply circuit of rated voltage and frequency, the appliance shall be operated under Test Condition 1 in Table I, Gas Pressure and Input Rate Conditions for Use in the Various Performance Tests, as specified in 2.17, Wall, Floor and Enclosure Temperatures.

Prior to and at the conclusion of the operating period specified, and with continued application of rated voltage and frequency, leakage current between each of the supply terminals and all noncurrent-carrying metal parts (ungrounded) which might become energized shall be measured using the instrumentation specified in the *Standard for Leakage Current for Appliances, ANSI/UL 101*. The leakage current shall not exceed 0.5 milliamperere.

1.24.34

Electrical equipment of cooking appliances with the controls mounted in the horizontal cooking surface shall not be adversely affected by moisture spills.

Method of Test

The appliance shall be electrically energized with all controls in the off position. A solution of 500 cubic centimeters of water containing 0.25 grams of ordinary table salt is to be poured at random on horizontal top cooking surface. All sections shall then be operated for a period of 5 minutes.

At the end of the 5 minute period, the appliance shall be tested for compliance with [1.24.35-a](#).

1.24.35

Adequate dielectric shall be interposed between ungrounded current-carrying parts and those external surfaces which can be contacted.

Method of Test

When connected to a supply circuit of rated voltage and frequency, the appliance shall be operated under Test Condition 1 in Table I, Gas Pressure and Input Rate Conditions for Use in the Various Performance Tests, as specified in 2.17, Wall, Floor and Enclosure Temperatures. At the conclusion of the operating period specified, the applicable dielectric test(s) specified below shall be conducted.

If the appliance employs a component(s), such as a solid-state device, that can be damaged by the dielectric potential(s) specified in this provision, the point of connection of this component(s) to the chassis ground shall be disconnected for the purpose of this test in order to eliminate the likelihood of component damage while still retaining representative dielectric stress of the circuit.

During conduct of the dielectric withstand tests, a 500 volt-ampere or larger transformer, having an essentially sinusoidal output voltage which can be varied, shall be used. The applied potential shall be increased gradually from zero until the required test voltage is reached and shall be held at the value for 1 minute. The use of a 500 volt-ampere or larger transformer is not necessary if the high potential testing equipment used maintains the specified high potential voltage at the appliance during the test.

- a. An appliance for connection to an a.c. circuit shall be capable of withstanding, for 1 minute without breakdown, the application of a 60 hertz potential between high-voltage live parts and dead-metal parts, and between live parts of high- and low-voltage circuits. The test potential shall be 1000 volts.
- b. A low-voltage circuit shall be capable of withstanding, for 1 minute without breakdown, the application of a 60 cycle alternating potential of 500 volts applied between uninsulated low-voltage live-metal parts of opposite polarity (with contacts, if any, closed), and between uninsulated low-voltage live-metal parts and the enclosure and grounded dead-metal parts.

The dielectric withstand test between low-voltage parts of opposite polarity need not be conducted on the complete assembly if the components have been separately subjected to this test condition.

- c. An appliance for connection to a d.c. circuit shall be capable of withstanding, for 1 minute without breakdown, the application of a 60 cycle alternating potential of 500 volts applied between live parts and dead-metal parts.

The arrangement of the test circuit shall be such that if the dielectric material breaks down, a positive signal will be obtained, rather than depending upon a visual inspection of the material.

1.24.36

Electrical motors, such as provided for clocks and rotisseries, shall be designed for continuous duty and shall be provided with overcurrent protection in accordance with the *National Electrical Code, ANSI/NFPA 70*, and shall be protected with temperature- or current-sensitive devices or temperature- and current-sensitive devices which will prevent motor winding temperatures from exceeding those specified in Table VIII, Maximum Allowable Motor Winding Temperatures, °F (°C). If the impedance of the motor windings is sufficient to prevent winding temperatures in open motors or enclosure temperatures on totally enclosed motors of over 302°F (150°C) with the rotor locked, no additional motor protection is required but the motor shall be marked that it is impedance protected. The marking provision shall not apply to clock or timer motors. The above tests may be conducted using the resistance method for determining temperature rise, at the option of the manufacturer submitting the equipment.

1.25 Instructions

1.25.1

Each appliance shall be accompanied by clear, concise printed instructions and diagrams, stated in terms clearly understandable to the consumer, adequate for proper field assembly, installation, maintenance, safe use and operation. Instructions for testing the appliance for leaks shall be included.

The safety-related items included in the instructions shall be prominently displayed and shall precede the instructions concerning the functional use of the appliance.