

Australian Standard[®]

**LP Gas—Portable and mobile
appliances**



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The following are represented on Committee AG-001:

- AGA Certification Services
 - Appliance and Component Testing
 - Australian Greenhouse Office, Department of the Environment and Heritage
 - Consumers' Federation of Australia
 - Gas Appliance Manufacturers Association of Australia
 - Gas Association New Zealand
 - Gas Technical Regulators Committee
 - Gas Utilisation Institute
 - LPG Australia
 - Master Plumbers, Gasfitters and Drainlayers New Zealand
 - Ministry of Consumer Affairs New Zealand
 - New Zealand Employers and Manufacturers Association
-

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Australian Standard[®]

LP Gas—Portable and mobile appliances

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PREFACE

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee AG-001, Gas appliances to supersede both AS 2658—1988 and AS 2658—2003, LP Gas—Portable and mobile appliances. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

This Standard incorporates Amendment No. 1 (November 2009), Amendment No. 2 (February 2011) and Amendment No. 3 (June 2013). The changes required by the Amendments are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to provide uniform minimum requirements for the safe design and performance of LP Gas portable and mobile appliances supplied with gas at vapour pressure.

In the writing of this standard the committee considered relevant content from Underwriters Laboratories Inc (UL), Japan Industrial Standards (JIS), Korean Industrial Standards (KIS), American National Standards Institute (ANSI), EN (CEN-European Committee for Standardisation) Standards.

This Standard should not be regarded as a design specification or as an instruction manual.

In its preparation, consideration has been given to—

- (a) continuity of satisfactory operation of appliances and equipment;
- (b) the prevention of fire hazards, and explosions;
- (c) the prevention of injury to persons or property;
- (d) gas rules and regulations now in force; and
- (e) relevant International Standards.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

The principal differences between this edition and AS 2658—2003 are—

- (i) the addition of requirements for portable water heaters;
- (ii) amendments to requirements for cookers; and
- (iii) amendments to test pressures.

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STANDARDS AUSTRALIA

Australian Standard
LP Gas—Portable and mobile appliances

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard applies to various types of portable appliances:

- A3 | (a) Supplied from a separate gas container with vaporized LP Gas to the inlet at the vapour pressure and designed to be used—
- (i) with cartridges complying with EN 417, UL 147A/B (or equivalent);
 - (ii) for connection directly or by flexible hose assembly to an LP Gas supply cylinder complying with AS 2030.1 (or equivalent); or
 - (iii) with non-refillable DOT 39 LP Gas cylinders with a maximum water capacity of 2 L.

NOTE: The gas pressure at the burner orifice may be regulated or at vapour pressure.

- (b) Having an integral gas supply with gas storage in excess of 50 mL water capacity.

Types of portable appliances covered are:

- (i) Cooking appliances (hotplates, ovens, grills, barbecues).
- (ii) Space heating appliances designed for outdoor use not exceeding 12 MJ/h (250 g/h).
- (iii) Lighting appliances designed for outdoor use.
- (iv) Hand-held heating tools.
- (v) Portable water heaters designed for outdoor use not exceeding 30 MJ/h (620 g/h).

A3 | This Standard does not cover refrigerators or appliances that—

- (A) incorporate a regulator/hose assembly where the hose is subject to regulated pressure, with the exception of ring burners;
- (B) are intended for connection to the mains electricity supply;
- (C) incorporate a fixed LP gas supply container which may or may not be refillable;
- (D) are intended for connection to a fixed piping system in a building, caravan or boat; or
- (E) incorporate an enclosed cartridge and are intended for commercial use.

Appliances covered by this Standard are not designed for connection to a flue for the discharge of products of combustion.

NOTES:

- A3 |
- 1 Requirements for storage and handling of LP Gas indoors and outdoors are specified in AS/NZS 1596.
 - 2 Requirements for gas cylinders are specified in AS 2030.
 - 3 Requirements for cooking appliances designed to operate with regulated inlet pressure are specified in AS 4551.
 - 4 Requirements for water heaters designed to operate with regulated inlet pressure are specified in AS 4552.

- A3 |
- 5 Requirements for space heaters designed to operate with regulated inlet pressure are specified in AS 4553.
 - 6 Requirements for gas refrigerators are specified in AS 4555/AG 105.
 - 7 Requirements for barbecues designed to operate with regulated inlet pressure are specified in AS 4557.

Other statutory and regulatory requirements that may be applicable to the product(s) that fall within the scope of this standard. It is the manufacturer's, importer's or distributor's responsibility (as appropriate) to ensure that products comply with such requirements.

1.2 APPLICATION

This Standard specifies the construction and safety requirements for portable and mobile appliances. It also defines performance test methods, and requirements for markings and the information to be provided in instructions.

Appliances other than hand-held heating tools shall comply with the requirements of Section 2, and with the requirements of the following Sections according to the nature of the appliance:

- (a) Cookers: Section 3.
- (b) Heaters: Section 4.
- (c) Barbecues: Section 5.
- (d) Gas lights: Section 6.
- (e) Hand-held heating tools shall comply with Section 7.
- (f) Portable water heaters for outdoor use: Section 8.

1.3 REFERENCED DOCUMENTS

The documents listed in Appendix F are referred to in this Standard.

1.4 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.4.0 Ambient temperature

The temperature of the air surrounding the appliance, as measured by a dry bulb thermometer or equivalent.

1.4.1 Barbecue

An underfired cooking appliance with either an open grid or solid cooking top. The food is cooked by a combination of radiant and convective heat and may be assisted by flared fat.

1.4.2 Burner

1.4.2.1 General definition

A device that positions a flame in the desired location by delivering gas and air to that location in such a manner that continuous ignition is accomplished.

1.4.2.2 Hotplate burner

A burner on a cooking appliance intended to heat vessels placed on a pan support.

1.4.2.3 Main burner

A burner designed to fulfil a thermal function of the appliance.

NOTE: Main burners are also referred to as 'burner' throughout this Standard.

A3 1.4.2.4 *Ring burner*

A burner consisting of one or more concentric rings or ports with an integral pan support and gas control(s).

1.4.3 **Burner port**

The opening in a burner through which gas or an air/gas mixture issues to be ignited and burned.

1.4.4 **Cartridge**

1.4.4.1 *Gas cartridge*

A non-refillable container with a capacity from 50 mL to 1000 mL (see EN 417 or JIS S 2148) fitted with a gas release control device and filled with gas or a mixture of gases for fuelling portable gas appliances.

NOTE: These cartridges are equivalent to UN 1950 in the Australian Dangerous Goods Code.

1.4.4.2 *Pierceable gas cartridge*

A cartridge without a gas release control device. The gas supply is obtained by piercing the cartridge by means of a specific device which is an integral part of the portable appliance with which the cartridge is to be used.

NOTE: These cartridges are equivalent to UN 2037 in the Australian Dangerous Goods Code.

1.4.5 **Certified/Certification**

Assessed by a certifying body and having a certificate number to demonstrate compliance with a Standard.

1.4.6 **Certifying body**

A body acceptable to the Technical Regulator that provides assurance of compliance of appliances and components with nominated Standards and other accepted safety criteria.

1.4.7 **Control**

Component designed to be operated manually so as to operate a control of the appliance, such as a valve, thermostat, etc.

1.4.8 **Cooking device**

Devices supplied with the appliance designed to hold or receive the food to be cooked (grid, turnspit, baking tray etc.).

1.4.9 **Cooking grid**

Cooking device designed to hold the food to be cooked; its useful component(s) can be rigid or flexible.

1.4.10 **Detachable**

That which can be dismantled without using a tool.

A3 1.4.10A **Enclosed cartridge**

A gas cartridge that is—

- (a) directly connected to the appliance; and
- (b) contained within the appliance.

1.4.11 **Flame abnormality**

A3 A flame condition that results in spitting, sputtering, lifting or floating flames, lighting back, extinction, yellow tipping causing carbon deposition, carbon deposition, objectionable odour or undue noise.

1.4.12 Flame safeguard

A safety device that automatically cuts off the gas supply if the actuating flame is extinguished.

1.4.13 Flame supervision device

Device that, due to the presence of a flame on the sensing element, permits gas flow to the burner and any pilot and which cuts off the gas supply to the burner in the event of extinction of the supervised flame.

1.4.14 Flame lift

Phenomenon characterized by the partial or total movement of the base of the flame away from the burner port.

1.4.15 Flame stability

Phenomenon characterized by absence of flame lift or light-back.

1.4.16 Gas circuit

The pipe work and components between the gas supply inlet and the injector.

1.4.17 Gas consumption

A measure of the energy introduced into an appliance under specified conditions, expressed in megajoules per hour or g per hour.

1.4.18 Gas container

Includes cartridges, cylinders and integral gas storage means.

1.4.19 Gas manifold

A common supply pipe or chamber into which valves are fitted to supply gas to burners.

1.4.20 Glass panel

Glass surface or part of a glass surface allowing the inside of an enclosure to be seen.

1.4.21 Griddle

Part of a hotplate consisting of a plate placed above a burner that allows the cooking of food by direct contact with the surface of the plate that is brought to a high temperature.

1.4.22 Griller

A part of an appliance used for cooking food by radiant heat.

1.4.23 Gripping area

Part of a handle designed to be gripped in normal use.

1.4.24 Hand-held heating tool

Devices such as blowlamps, hand-held brazing torches, hot air guns for heat shrinking or paint stripping, and laboratory burners, which utilize atmospheric oxygen supply mixtures without mechanical pressurized assistance.

1.4.25 Hotplate

Cooking appliance incorporating one or several burners and pan support(s) designed in such a way that it supports the vessels containing the food.

1.4.26 Ignition device

Device to ignite one or more burners directly or indirectly.

1.4.27 Injector

A device that causes air to mix with a stream of gas. In the case of an aerated burner it incorporates an orifice discharging gas into the mixing throat or tube.

1.4.28 Integral container

A gas container that is not intended to be disconnected for refilling.

1.4.29 LP Gas (Liquefied petroleum gas)

A hydrocarbon fluid composed predominantly of any of the following hydrocarbons, or mixtures of all or any of them: propane (C_3H_8), propylene (C_3H_6), butane (C_4H_{10}) or butylenes (C_4H_8). Unless specifically stated otherwise, any reference to 'propane', 'butane', etc. means the commercial grade of that product.

NOTE: The characteristics of the various LP Gases, either pure or of commercial grades, together with methods for their determination, are given in the ALPGA publication, *Liquefied petroleum gas for heating use - Specification 2000*.

1.4.30 Light-back

Phenomenon characterized by the return of the flame inside the body of the burner.

1.4.31 Maximum working water pressure

The pressure setting of the water pressure relief valve, or its equivalent.

1.4.32 Mixing tube

That part of an aerated burner in which the air and gas are mixed.

1.4.33 Mobile appliance

An appliance with one or more wheels, designed to be easily moved from place to place by one person.

1.4.34 Nominal gas consumption

The gas consumption as stated by the manufacturer on the appliance data plate, in instructions and in general communications.

1.4.35 Normal pressure

In the case of vapour pressure appliances the gas pressure at the appliance inlet as nominated by the manufacturer to give the nominal gas consumption (see Table 9.2(a)).

In the case of appliances supplied with gas from a refillable container and using a regulator, the gas pressure at the appliance inlet or test point (if provided), as nominated by the manufacturer to give the nominal gas consumption

NOTE: Appliances supplied with gas supplied from non-refillable containers are considered to be non-regulated vapour pressure appliances.

1.4.36 Orifice

A precise aperture in an injector that functions as a metering device to control the gas consumption of a burner. It is also a directional guide for the gas injected into the burner throat.

1.4.37 Outdoor

An above ground open air situation with natural ventilation, without stagnant areas, where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

NOTE: Appendix D provides diagrammatical representations of outdoor areas.

1.4.38 Oven

That portion of a gas cooker or separate unit consisting of an enclosed, insulated cabinet in which food is cooked.

1.4.39 Overload gas consumption

In the case of—

- (a) appliances supplied with gas from a refillable container and using a regulator: 1.25 times normal pressure; or
- (b) vapour pressure appliances: the gas consumption that results when gas at an elevated pressure equivalent to vapour pressure at 40°C ambient is supplied to the gas manifold at the inlet of the burner injector orifice.

1.4.40 Oxygen depletion system

A system which causes the gas supply to be shut off when the oxygen content of the ambient air is depleted to a specified concentration.

1.4.41 Pan support

Support placed above a hotplate burner and designed to support the vessel to be heated.

1.4.42 Pilot

A permanently located burner, independent of the main burner and small in relation to it, arranged to provide ignition to the main burner.

1.4.43 Portable appliance

An appliance designed to be carried by hand from place to place, as required.

1.4.44 Regulator

A device that automatically regulates, to a predetermined value, the outlet pressure or outlet volume of gas passing there through.

1.4.45 Removable

Components that are intended to be removed with or without the use of a tool.

1.4.46 Safety shut off valve

An automatic valve that shuts off the gas supply to an appliance when a signal level indicates that a dangerous condition has developed.

1.4.47 Soft solder

Solder for which the lowest temperature of the melting range, after application, is less than 450°C.

1.4.48 Spitting; sputtering

Flame phenomena where the escape of non-evaporated liquefied gas produces a shower of burning liquid droplets that separate from the main flame.

1.4.49 Standard test vessels

Vessels of the dimensions specified in Table 1.1 and illustrated in Figures A5 and A6.

TABLE 1.1
STANDARD TEST VESSELS

Vessel		
Diameter mm	Height mm	Water content kg
200	140	2.3
Stability pan 120	83	—
230	155	4.5
300	190	10

1.4.50 Sustained self-ignition

Propagation of a flame by other than deliberate manual operation, such as by dropping the appliance, so as to cause the ignition system to be activated and the flame to continue to burn.

1.4.51 Technical Regulator

The Government appointed person, body or authority that has jurisdiction over gas safety legislation (or other entity authorized by that person, body or authority).

1.4.52 Valve

A device for the purpose of controlling or shutting off flow.

1.4.53 Vapour pressure appliance

An appliance supplied with gas where the pressure at the inlet of the appliance is equal to the pressure in the gas container.

If the appliance is fixed directly to the gas cylinder by a rigid connection, or if the gas container is incorporated as part of the appliance, the appliance inlet is the part of the connection that takes the gas from the cylinder.

If the appliance is connected to the gas container by a flexible hose, the pressure in the flexible hose, once it is connected to the gas container, is equal to the pressure in the gas container.

1.4.54 Water heater

1.4.54.1 General definition

An appliance that is designed to heat and supply water at a temperature not exceeding 99°C for drinking and/or sanitary purposes.

1.4.54.2 Unvented water heater

A water heater having no provision for a vent permanently open between the water circuit and atmosphere.

1.4.54.3 Vented water heater

A water heater having provision for a vent permanently open between the water circuit and atmosphere.

SECTION 2 GENERAL REQUIREMENTS

2.1 INTRODUCTION

This Section sets out requirements for portable and mobile LP Gas appliances in general.

Requirements for appliances designed to operate on a gas pressure of 2.75 kPa or lower are specified in other standards see Clause 1.1 for further details.

A3 | Where the overpressure protection test is required, this test shall be carried out before any other testing.

2.2 GENERAL REQUIREMENTS

2.2.1 Portable appliances

Portable appliances shall weigh not more than 20 kg. Where an appliance is directly attached to a full cylinder, this weight limitation shall apply to the combined system.

2.2.2 Mobile appliances

All mobile appliances shall provide adequate support for an associated LP Gas cylinder and operate only from the associated LP Gas cylinder.

2.3 COMPONENTS

2.3.1 Certification of safety components

All components relating to the safety of the gas burning operation shall be separately certified or shall be certified as part of the appliance against the requirements of the relevant component Standard(s).

This includes, for example, flexible gas hoses, gas valves, automatic ignition systems, flame safeguards, regulators and pressure switches whether or not these carry gas.

2.3.2 Limitation of gas flow

Where a supply hose connects an appliance directly to the LP Gas cylinder, provision shall be made to limit the flow of gas immediately after the cylinder to less than 1 kg/h when the cylinder temperature is maintained at 15°C.

2.3.3 Holes for screws, pins, etc

Screws, pins, etc., intended for the assembly of components shall not penetrate the gas circuit leading to the injector.

2.3.4 Metal-to-metal joint or joints

The soundness of parts and assemblies connected to the gas circuit shall be assured by means of metal-to-metal joint or joints with seals (for example, flat-faced joints, O-rings or gaskets), i.e. excluding the use of any product which ensures soundness in the threads. For parts that do not require to be dismantled during normal maintenance the use of certified thread sealing compounds is permitted (see Clause 2.16.1.3).

2.3.5 Removable components

Removable components or the threaded parts of the gas circuit which may be dismantled during normal maintenance shall remain sound after five disconnections and re-connections in accordance with the instructions. Where a gasket is used then replacement of the gasket is permitted.

2.3.6 Soft solder

Soft solder (see Clause 1.4.47) shall not be used to ensure the soundness of the gas circuit. However it is permitted for internal connections within the gas circuit when they do not involve soundness.

2.3.7 Flame supervision devices

Flame supervision devices shall comply with the following:

- (a) Flame supervision devices shall be certified (refer to Clause 2.2.1).
- (b) Where a flame safeguard system is fitted to a burner, in the event of flame failure at the point of supervision, the flame safeguard system shall shut off all the gas to the burner.
- (c) The appliance shall not incorporate any device that allows the flame supervision device to be overridden.
- (d) On carrying out the normal lighting procedure on a manually ignited atmospheric burner protected by a thermoelectric flame safeguard system, the flame safeguard shall hold open within 20 s of igniting the operating flame.
- (e) The combined time for the safety shut off system and its associated valves to shut off the gas supply in the event of flame failure at the point of supervision shall not exceed 60 s.

2.4 MECHANICAL DESIGN

2.4.1 Stability

Unless otherwise stated in Sections 3 to 8, the appliance shall comply with the following:

- (a) The appliance supporting members shall be firm and shall support the appliance in such a way that it cannot rock when placed on a level surface.
- (b) If the appliance is fitted with a foldable support, it shall be possible to lock this in the position of use (e.g. stop, locking device).
- (c) If the radiant device of a barbecue or a grill can have several positions, a stop shall be provided for each of them.
- (d) A cylinder valve shall not be used as a means of support where the appliance has a maximum horizontal dimension exceeding 300 mm.
- (e) The stability of an appliance designed to rest on a table or on the ground shall allow safe use on level ground. In addition, the appliance shall not fall over when it is placed on a slope of 15° and any gas container shall not be dislodged. Any parts that are attached to a gas container to achieve stability shall be omitted for this test.

This requirement shall also be met when the appliance is fitted with optional parts (e.g. lamp extension posts).

2.4.2 Displacement of parts

The construction of an appliance shall be such that, during normal conditions of use, any displacement of parts likely to impair safe operation does not occur.

2.4.3 Gas containers and associated flexible hose assemblies

Gas containers and associated flexible hose assemblies shall comply with the following:

- (a) Any gas cylinder/cartridge, and any associated valve and associated flexible hose supplied with the appliance, shall be certified to an appropriate Standard.
- (b) Any cylinder/cartridge for direct connection with a portable or mobile LP Gas appliance shall be certified to any of EN 417, JIS S 2148, UL 147A and UL 147B (or equivalent), and shall be marked accordingly.

- (c) When the instructions are followed, the connection of the gas container to the appliance shall be easy with minimal, if any, gas leakage, during the connection process.
- (d) Connections at the gas container shall—
 - (i) be leak proof at operating pressures up to 2600 kPa for propane/propane-butane mixes, or 1000 kPa for butane;
 - (ii) comprise parts which, if subject to wear, are easily replaceable (see Clause 2.16.1.3 (e)); and
 - (iii) be capable of withstanding normal use in operation and be such that they cannot be accidentally displaced.
- (e) Where the appliance may be connected by a flexible hose, of the length indicated in the instructions, the hose shall not come into contact with sharp edges or surfaces likely to exceed the temperature rating of the hose.
- (f) With the exception of those connecting hand-held tools to gas containers, e.g. paint strippers, flexible hoses shall—
 - (i) not exceed 1500 mm in length;
 - (ii) shall be certified to AS/NZS 1869 class C or D or equivalent (see Clause 2.12.5.3); and
 - (iii) connections shall allow the flexible hose to move freely without risk of coming into contact with a part of the appliance whose temperature exceeds the maximum temperature for that class of hose when fitted in accordance with the instructions.

2.4.4 Appliances connected to the gas container by a flexible hose assembly

An appliance connected to the gas container by a flexible hose assembly shall be supplied with a certified flexible hose assembly.

2.4.5 Appliances connected directly to the gas container

For an appliance with direct rigid connection to the gas container, the appliance specifications and instructions shall include diagrams and specifications of the gas containers (including their gas outlet connections) intended for the gas supply to the appliance.

2.4.6 Appliances connected directly to a disposable cartridge

Appliances designed for direct connection to a disposable cartridge that incorporates a mechanical connection device shall—

- (a) be designed to ensure correct alignment and engagement of the cartridge with the appliance connection point;
- (b) be designed to ensure the cartridge is positioned so that when in the normal operating position, the appliance can only be supplied with gas in the vapour state; and
- (c) incorporate a manually operated shut off valve.

2.4.7 Appliances directly fitted to a pierceable gas cartridge

In addition to the requirements of Clause 2.4.6, when following the instructions, it shall not be reasonably possible to pierce the cartridge unless it is properly secured in the appliance.

The cartridge holder and the piecing device shall—

- (a) be such that the piercing is centred in the position provided;

- (b) be such that a gas tight seal is made during connection to the container before piercing; and
- (c) incorporate a manually operated shut off valve.

After the fitting of the cartridge it shall not be possible to remove it, without abnormal effort.

2.4.8 Locations and compartments for gas containers

2.4.8.1 *Compartments for gas containers*

If the appliance has a compartment for a gas container, this compartment shall be designed in such a way that—

- (a) effective ventilation is provided by openings in its base and upper section. The total area of the openings in the upper section shall be at least equal to 1% of the base area of the compartment and the total area of the openings at the base at least equal to 2% of the base area of the compartment;
- (b) the support for the gas container has sufficient mechanical strength to resist permanent distortion under the load of a full gas container;
- (c) the gas container can be easily inserted, or removed from the compartment and when in place the container shall be firmly fixed in accordance with manufacturer's instructions;
- (d) the gas container valve, if any, is readily accessible and remains easy to manipulate when the gas container is in place; and
- (e) the temperature of the container does not exceed the requirements of Clause 2.12.5.6 during normal operation.

2.4.8.2 *Location for a gas container*

When the appliance has provision to support a gas container, it shall incorporate a device allowing the safe fixing of the container onto the appliance.

The support for the gas container shall have sufficient mechanical strength to resist permanent distortion under the load of a full gas container.

2.4.9 Burners and radiant elements

Burners, burner caps and radiant elements shall be designed in such a way that they cannot move inadvertently during use or movement of the appliance.

2.4.10 Unburnt gas release from burner system

Unburnt gases shall not spill from any part of the burner system except for the burner ports.

2.4.11 Burner mixing tubes

Burner mixing tubes shall be positively located and secured in position in relation to gas injectors.

2.4.12 Gas manifolds

Gas manifolds shall be firmly fixed to prevent their displacement.

2.4.13 Flash lighting systems and cross lighting devices

2.4.13.1 *Flash lighting tubes*

Flash lighting tubes shall be positively located in relation to their respective sources of ignition and flame ports so as to prevent misalignment or rendering of the flash lighting system inoperative by normal handling, dismantling, reassembling or cleaning of the appliance.

2.4.13.2 *Cross lighting devices*

Cross lighting devices shall have a fixed position relative to the burners that they control so as to prevent misalignment or rendering of any flash lighting system inoperative by normal handling, dismantling, re-assembly, cleaning or carriage of the appliance, and shall not distort in normal use.

2.4.14 **Jointing**

Joints shall not depend for their mechanical strength upon cement or jointing compounds. Jointing compounds, when used, shall be of a type demonstrated as suitable for the conditions of use.

2.4.15 **Utensil supports**

Utensil supports shall be such that they are not displaced from their working positions under conditions of normal use.

2.4.16 **Cooking grids**

2.4.16.1 *General*

Grids shall be detachable.

2.4.16.2 *Grid with a rigid useful area*

In the useful area of the grid, the bars, if any, shall not be more than 20 mm apart.

The grid shall be capable of withstanding, without deterioration likely to impair its use, an evenly distributed load of 5 g/cm² of useful area. Under this load, it shall remain stable on its supports.

2.4.17 **User adjustment for different gases**

The appliances shall not incorporate any adjuster for user adjustment to operate the appliance on a gas different to that specified by the manufacturer.

2.5 MATERIALS AND FINISHES

2.5.1 **Suitability of materials and finishes**

Materials and finishes, including dressings, lubricants, rubber or synthetic based materials used in the construction of an appliance shall be suitable for the conditions of use, e.g. corrosion, temperature and handling.

2.5.2 **Materials containing asbestos**

Materials containing asbestos are prohibited.

2.5.3 **Materials in contact with gas**

Materials in contact with gas shall be suitable for use with LP Gas.

2.5.4 **Materials in contact with food**

The nature and finish of materials likely to be in contact with food shall be such that they cannot contaminate or affect the food.

2.5.5 **Copper tubing**

Copper tubing shall be used upstream of the injector only if its temperature does not exceed 50°C above ambient.

2.5.6 **Brass tubing and fittings**

Brass tubing and fittings that come in contact with gas shall not exhibit stress corrosion cracking when tested and examined in accordance with AS 2136.

2.5.7 Die-casting

Zinc-based alloys shall not be used in contact with water.

Where failure of zinc-based alloys may affect the safe operation of the appliance—

- (a) the alloy shall comply with TYPE ZN AL 4 in AS 1881;
- (b) the temperature shall not exceed 80°C; and
- (c) the alloy shall not swell, crumble or develop cracks when exposed to saturated water vapour at 97°C for 10 days.

2.6 GAS CONNECTIONS

2.6.1 Connection to appliance and container

All gas connections to the appliance and the gas container shall—

- (a) be constructed so that they cannot be accidentally displaced or disconnected and be capable of withstanding normal use in operation; and
- (b) be such that they provide leak proof connections—
 - (i) for appliances designed for propane or propane/butane mix operation, at 2600 kPa; or
 - (ii) for appliances designed for butane operation, at 1000 kPa.

2.6.2 Appliance connections to non-refillable containers

In addition to the requirements of Clause 2.6.1, appliance connections to non-refillable containers shall—

- (a) comply with an appropriate Standard; and
- (b) be compatible with the container to be used with the appliance as nominated by the manufacturer.

The manufacturer shall state the Standard used to demonstrate compliance with Clause 2.6.2 (a).

2.7 DESIGN FOR USE

2.7.1 Assembly

The manufacturer shall assemble the entire appliance gas circuit, including the injector, to the point of appliance inlet supply connection.

NOTE: This does not include attaching the hose assembly.

2.7.2 Prevention of incorrect assembly

Parts intended to be removed and replaced by the user shall be designed so that their incorrect assembly will not give rise to any hazardous situation.

It shall not be possible, without using tools, to dismantle parts that are adjusted at the factory, which are not intended to be dismantled by the user and whose dismantling would affect safety.

If a pressure-reducing device is integrated in the gas circuit, it shall not be removable or replaceable by the user. This device may also provide the functions of adjustment and opening and closing of the gas flow.

2.7.3 Accessibility of controls and working parts

Controls and working parts shall be accessible and easily operated by the user.

2.7.4 Viewing of burner flames

It shall be possible to view burner flames either directly or by use of a mirror.

2.7.5 Control valve

2.7.5.1 General

Each burner shall have an independent control (valve or device) allowing the opening and closing of its gas supply. For appliances incorporating only one burner, this closing device may be that of the gas container.

Control valves shall—

- (a) incorporate at least two stops: one at the closed position and one at the end of travel;
- (b) be installed in such a way that their strength, operation, manipulation and accessibility undergo no change from actions subjected to in normal use; and
- (c) be mounted in such a way that no accidental movement relative to fixed gas supply pipework is possible.

2.7.5.2 Needle valves

The number of turns of a needle valve knob from the closed to the fully open position shall not exceed six complete turns nor shall the spindle be capable of complete withdrawal from the valve housing during normal operation.

When the valve is in the closed position, no gas pressure shall be exerted on the valve gland.

When closing, the pressure of the needle on its seat constitutes the stop.

2.7.6 Gas control

It shall be obvious which burner each control supplies.

Controls shall be—

- (a) arranged relative to one another so that the movement of one does not cause inadvertent movement of another control;
- (b) designed so that control knobs cannot be fitted in the wrong position or move by themselves; and
- (c) designed so that safety devices and or interlocks and their associated parts shall be adequately protected and shall not be capable of being inadvertently overridden.

2.7.7 Accumulation of unburnt gas

Any enclosure containing at least one burner shall have one or several openings in its lower part allowing the discharge of any unburnt gas released by the burners.

These openings shall not be obstructed when the appliance is in the position of normal use.

2.7.8 Adjusting devices

Adjusting devices shall be provided with locking arrangements that shall be sufficiently positive to prevent subsequent movement, either through accident or through the creep of sealing material. The setting shall not alter after locking.

2.7.9 Wheels

Wheels allowing the movement of the appliance shall be—

- (a) sufficiently strong to support the appliance and, if necessary, its full container, if this is specified in the instructions; and
- (b) provided with means to prevent accidental movement during use.

2.7.10 Gas systems—Resistance to displacement

Gas systems shall be so constructed that the relative position of components will be retained when subject to displacement and reassembly.

2.8 PREVENTION OF INJURY DURING IGNITION

The method of ignition shall be such that it is not necessary to place the hand in a position where injury may occur when ignition takes place.

2.9 DESIGN FOR MAINTENANCE (GENERAL)

2.9.1 Sharp edges

Parts with which the installer, serviceperson or user are likely to come in contact shall not have sharp points or edges.

2.9.2 Injectors

A3 | Injectors shall have flats and be sufficiently robust to enable them to be tightened to their correct position without suffering damage, if they are intended to be removed with a spanner.

2.9.3 Dismantling and replacement by user

Any dismantling or assembly required by the user following the instructions provided shall be easily carried out without undue force. Any replacement shall not require undue force, and incorrect replacement shall be either impossible or completely obvious (see Clause 2.16.1.1).

The following parts shall be readily removable for cleaning and maintenance:

- (a) Burners.
- (b) Mantles and glasses.
- (c) O-rings and packing.

The only exception to the requirements in this Clause are for hand-held heating tools. These tools shall instead comply with the requirements of Clause 7.5.

2.9.4 Cleaning, maintenance and removability of parts by an authorised person

The following parts shall be readily removable for cleaning and maintenance (see Clause 2.16.1.3 (p))—

- (a) Burner injectors.
- (b) Control valve spindles.
- (c) O-rings, packing and sealing washers.
- (d) Restrictors.

2.10 GAS LEAKAGE

2.10.1 Gas tightness

All gas-carrying components of appliances up to and including the injector shall not leak at a pressure of 14 kPa or twice the normal operating pressure, whichever is the greater, except components carrying full cylinder pressure, for which the test pressure shall be as follows:

- (a) For appliances designed for use with propane and universal LP Gas, 2600 kPa.
- (b) For appliances designed for use with butane only, 1000 kPa.

Hoses and connections shall not leak after a force of 150 N is applied for 1 min along the axis of the flexible hose.

2.10.2 Gas tightness after testing

The appliance shall be gas tight (as in Clause 2.10.1) at the conclusion of all certification tests.

2.10.3 Needle valves—Gas tightness

Needles valves shall not leak:

- (a) At the pressures shown in Table B1 with the valves both open and closed (injector sealed) under the following conditions—
 - (i) at ambient temperature;
 - (ii) at ambient temperature after exposure to a temperature of $40 \pm 5^\circ\text{C}$ for 120 h; and
 - (iii) after cooling to $-20 \pm 5^\circ\text{C}$ for 24 h then raising to:
 - (A) $0 \pm 5^\circ\text{C}$.
 - (B) $70 \pm 5^\circ\text{C}$.
 - (C) Ambient temperature.
- (b) At the end of 2000 cycles, tested at the pressures shown in Table B1.

NOTE: Needle valves certified to EN 521:2006 are deemed to comply with this requirement.

2.11 NOMINAL GAS CONSUMPTION

2.11.1 General

The nominal gas consumption as specified by the manufacturer is the fundamental quantity on which all methods of test are based and is the starting point for all performance requirements.

2.11.2 Tolerance on determined gas consumption

A3 | For each individual burner, the determined gas consumption shall be within the following limits:

- (a) 20% of nominal gas consumption for burners with inputs less than 2 MJ/h.
- (b) 15% of nominal gas consumption for burners with inputs greater than 2 MJ/h but less than 12 MJ/h.
- (c) 10% of nominal gas consumption for burners with inputs greater than 12 MJ/h but less than 30 MJ/h.

NOTE: ULP gas appliances are tested using propane.

A3 | (d) 5% of nominal gas consumption for burners with input 30 MJ/h or above.

2.12 TEMPERATURE HAZARDS

2.12.1 Test conditions

An appliance shall comply with the requirements listed from Clauses 2.12.2 to 2.12.7 (inclusive) when it has been operated under the following conditions:

- (a) The appliance shall be set up in accordance with any special conditions as indicated by a permanent marking on the appliance. If any such special conditions are specified, the test of surrounding surfaces shall be repeated with the appliance set up without those conditions, unless the clearance is assured by permanently attached spacers.
- (b) The appliance is operated until thermal equilibrium is reached, or for 1 h, whichever is the lesser, (unless otherwise specified in Sections 3 to 8).

2.12.2 Floor, wall, overhead and bench surfaces

The temperatures of floor, wall, overhead and bench surfaces shall not exceed 65°C above ambient, when set up in accordance with the manufacturer's instructions. This includes all adjacent surfaces and overhangs.

2.12.3 Surfaces intended to be handled

The temperatures of surfaces intended to be handled, except those parts that are located in an area where they are obviously hot, shall not exceed—

- (a) 35°C for metals;
- (b) 45°C for porcelain or vitreous enamel; or
- (c) 60°C for plastics, timber or equivalent materials

All temperatures are above ambient.

NOTES:

- 1 Parts in this category include control knobs, control valve handles, push buttons, carry and door handles (gripping area only).
- 2 The temperatures for plastics refer to components that are substantially, if not entirely, manufactured from plastics material.

2.12.4 Temperatures of surfaces likely to be accidentally touched

All other surfaces not closer than 25 mm to a working surface, e.g. surface likely to be accidentally touched, shall not exceed—

- (a) 80°C for metals;
- (b) 95°C for vitreous enamelled steel, glass and similar surfaces; or
- (c) 100°C for plastics, timber or equivalent materials.

All temperatures are above ambient.

2.12.5 Temperatures of components

2.12.5.1 Bodies of gas valves, thermostats, etc

Temperatures of bodies of gas valves, thermostats, etc. shall not exceed the temperature for which they have been certified.

2.12.5.2 Components containing non-metallic diaphragms

Temperatures of components containing non-metallic diaphragms shall not exceed 45°C above ambient, unless specifically certified for higher temperatures and so marked permanently.

2.12.5.3 *Flexible hoses*

Temperatures of flexible hoses shall not exceed the maximum temperature for that class of hose.

2.12.5.4 *Joints sealed with jointing materials*

Temperatures of joints sealed with jointing materials shall not exceed the maximum temperature recommended by the manufacturers of the materials, under the conditions of use.

2.12.5.5 *Glass components*

The temperature of glass components shall not exceed the maximum temperature specified by the manufacturer of the glass.

2.12.5.6 *Gas container*

The temperature of the container shall not exceed ambient.

2.12.6 Gas container safety at high temperature

The pressure in the container shall not exceed the following:

- (a) For cartridges, the pressure of the gas equivalent to 50°C.
- (b) For other gas containers, the pressure of the gas at 35°C.

2.12.7 Gas container safety at overload gas consumption

When operating at overload gas consumption, the vapour pressure within the gas container shall not exceed the maximum working pressure for which the gas container has been specified or approved.

The temperature of the container shall not exceed the following:

- (a) For cartridges, ambient temperature.
- (b) For other gas containers, 20°C above ambient.

2.13 HEAT RESISTANCE

2.13.1 General

These requirements are in addition to the requirements in Clause 2.12.

2.13.2 Normal operation

After 2 h of operation —

- (a) surface finishes shall show no signs of deterioration, other than discoloration of burner caps and portable lamp caps;
- (b) there shall be no deterioration that could impair safe operation of the appliance; and
- (c) the ease of changing the gas container and of operating the controls shall not have changed.

2.13.3 Light-back operation

Burners in which a light-back condition can be established shall be constructed of materials that will not melt or distort.

Where a burner can be operated in a light-back condition there shall be no damage to the appliance or overheating of the gas container when the burner is operated at the maximum gas rate at which the light-back condition can be maintained.

A3 | 2.14 BURNER OPERATION

2.14.1 Ignition device

Where an ignition device is fitted, it shall be designed and constructed in such a way that it provides rapid, quiet, complete and safe ignition. The method of ignition shall be such that it is not necessary to place the hand in a position where injury may occur where ignition takes place.

The components of the ignition device shall be designed to avoid damage and displacement during use. The relative positions of the ignition device and the burner shall be rigidly maintained and be sufficiently well defined to ensure safe operation of the assembly.

2.14.2 Ignition

When the normal lighting procedures are carried out, a burner shall ignite completely and quietly on each occasion within 5 s both when the appliance is hot and cold. The time shall be measured from the first flow of gas at the injector. There shall be no extinction or light-back. A slight tendency to lift is permitted at maximum test pressures provided that no parts of the flame are extinguished.

For a burner not protected by a flame supervision device, the gas shall light smoothly when it is turned on while another burner is already operating within the same enclosure.

A3 | 'Text deleted'

2.14.3 Delayed ignition

When the ignition of the burner is delayed for 10 s, or for 5 s for a burner fitted with a flame safeguard, the burner shall—

- (a) ignite completely;
- (b) remain alight;
- (c) not light back;
- (d) not burn outside the appliance;
- (e) not extinguish any other burner;
- (f) not damage the appliance;
- (g) ignite without undue noise; and
- (h) not form a carbon deposit.

A3 | 2.14.4 'Text deleted'

2.14.5 Burner stability when changing setting

Burners shall not light back or be extinguished when turned normally from full-on to turndown position, or from the turndown to full-on position.

A3 | The appliance is operated with the appropriate test gas at the normal inlet pressure shown in Table 9.2(a) or Clause 9.2.2.

The turndown position is—

- (a) the marked or fixed turndown position; or
- (b) 25% of nominal gas consumption where there is no marked or fixed position.

2.14.6 Flame stability to draught

Under either of the following conditions, when an appliance is subjected to an 8 km/h draught on all gases, the burner shall shut down safely or the flame shall completely reignite when the draught is removed.

- (a) For appliances with turndown, the burner is set to its lowest marked operating setting or to 25% of nominal gas consumption if no marked setting is provided.
- (b) For appliances without turndown the burner is operated at nominal gas consumption.

The flame may be fully extinguished on appliances equipped with a flame safeguard system.

2.14.7 Flame characteristics maximum and minimum limiting conditions

A burner shall exhibit no flame abnormality (see Clause 1.4.11) whether the appliance is hot or cold.

2.15 COMBUSTION TESTS

2.15.1 General

The requirements in Clauses 2.15.2 to 2.15.6 (inclusive) apply to all appliances other than hand-held heating tools.

2.15.2 Appliances other than heaters and lamps

The ratio of the concentration of carbon monoxide to that of carbon dioxide in the products of combustion shall not exceed 0.02 when the appliance is operated at overload gas consumption and 0.01 at normal test pressure.

2.15.3 Heaters and lamps

The ratio of the concentration of carbon monoxide to that of carbon dioxide in the products of combustion shall not exceed—

- (a) 0.002 when operated at normal pressure; and
- (b) 0.007 when operated at overload gas consumption.

2.15.4 Appliances fitted with surface combustion burners

The ratio of the concentration of carbon monoxide to that of carbon dioxide in the products of combustion when operated at underload gas test pressure shall not exceed the following:

- (a) For space heaters, operated at the lowest possible input setting 0.007.
- (b) For other appliances operated at the lowest possible input setting 0.02.

2.15.5 Sooting

During testing, there shall be no deposit of soot that is likely to impair safe operation of the appliance.

2.15.6 Condensation

Appliances shall be designed so that under normal operating conditions, no condensate shall escape from the appliance. Condensate, where present, shall not interfere with combustion.

2.16 INSTRUCTIONS AND MARKING

2.16.1 Instructions supplied with appliance

2.16.1.1 General

As a minimum all instructions and markings shall be in English.

Instructions for the user shall be supplied with each appliance, covering each separate function of the appliance including the dismantling, cleaning and assembly that is necessary.

2.16.1.2 *Information about the appliance*

The instructions supplied with the appliance shall include the following:

(a) The statement in bold, **‘Important. Read these instructions for use carefully. Familiarise yourself with the appliance before connecting it to its gas container. Keep these instructions for future reference.’**

(b) The nominal gas consumption for each burner in megajoules per hour and/or g per hour.

(c) The type of the gas container(s) intended to be used with the appliance, in the form: ‘This appliance shall only be used with a <type of gas>¹, <type of container>², certified to Standard XYZ>³’.

1 Butane, propane, butane/propane mix (including percentage of each gas in mix);

2 Gas cartridges or refillable container;

3 The Standard to which the container must be certified.

An example of this instruction is as follows:

‘This appliance shall only be used with a 70% butane/30% propane mix gas cartridge certified to EN 417.’

(d) The warning, ‘IT MAY BE HAZARDOUS TO ATTEMPT TO FIT OTHER TYPES OF GAS CONTAINERS’ immediately after the information shown in (b).

(e) The following text:

(i) For all types of appliances:

‘ONLY USE IN WELL-VENTILATED AREAS.’

‘CARBON MONOXIDE HAZARD—USING THIS APPLIANCE IN AN ENCLOSED SPACE MAY CAUSE DEATH. DO NOT USE IN CARAVANS, TENTS, MARINE CRAFT, CARS, MOBILE HOMES OR SIMILAR LOCATIONS.’

(ii) Additionally for water heaters, heating appliances, barbecues and ring burners:

‘CAUTION: accessible parts may be very hot. Keep young children away.’

‘USE OUTDOORS ONLY’

‘This appliance shall only be used in an above ground open air situation with natural ventilation, without stagnant areas, where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

Any enclosure in which the appliance is used shall comply with one of the following:

(A) An enclosure with walls on all sides, but with no overhead cover.

(B) Within a partial enclosure that includes an overhead cover and no more than two walls.

(C) Within a partial enclosure that includes an overhead cover and more than two walls, the following shall apply:

(1) At least 25% of the total wall area is completely open.

- (2) 30% or more in total of the remaining wall side, back and front wall areas is open and unrestricted.
- (3) In the case of balconies, 20% or more of the total wall area shall remain open and unrestricted.'

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- (f) For heating appliances, water heaters and barbecues, the diagrams in Appendix D.
- (g) The orifice size in millimetres or the BS number of removable injectors. Where colour coding is used, the meaning of the coding.
- (h) Details of the methods of connection and alternatives where applicable.
- (i) A statement that the appliance shall be used away from flammable materials and information on minimum distances from adjacent surfaces (e.g. wall, ceiling).
- (j) Removal of any transit protection.
- (k) Special conditions that must be avoided, e.g. marine environments, and any conditions necessary to ensure optimum performance.
- (l) Information regarding the location of, and a caution against obstructing any, combustion air openings.
- (m) Details of necessary testing, and instructions for minor adjustments.

2.16.1.3 *Safety information, abnormal operation, maintenance schedule, service and replacement parts*

The instructions shall—

- (a) assist the user to recognize abnormal operation which requires service;
- (b) recommend a maintenance schedule for the life expectancy of the appliance;
- (c) include information for general maintenance and repairs;
- (d) include the text, 'Do not modify this appliance';
- (e) include a reference as to where service and any necessary replacement parts may be obtained;
- (f) include details for the removal, cleaning, and replacement of devices (e.g. spider guards) that are used over primary air openings;
- (g) include details for cleaning any injector(s) where relevant;
- (h) include a drawing showing the position of seals replaceable by the user and clear instructions on how to replace them, if applicable;
- (i) where applicable, contain the statement, 'Check that seals between the appliance and the gas container are in place and in good condition before connecting the gas container.';
- (j) include the statement, 'Do not use this appliance if it has damaged or worn seals.';
- (k) include the statement, 'Do not use this appliance if it is leaking, damaged or does not operate properly.';
- (l) include a statement that the appliance is to be operated on a horizontal surface unless it is designed to be suspended during operation;
- (m) include a statement that gas containers shall be changed in a well-ventilated location, preferably outside away from people and any sources of ignition, such as naked flames, pilot flames, electric heaters/equipment;
- (n) include the following:

- (i) For appliances for use with cartridges—
 - (A) specific instructions on how to isolate the gas supply in the event of a leak (smell of gas); and
 - (B) the statement, ‘If there is a leak from your appliance (smell of gas) and you cannot stop the gas flow, remove the appliance to a well-ventilated location away from any ignition source. Check for leaks using soapy water. Do not try to detect leaks using a flame.’
- (ii) For appliances for use with cylinders—
 - ‘If there is a leak on your appliance (smell of gas), immediately attempt to turn off the cylinder valve. Remove the appliance to a well-ventilated location away from any ignition source. Check for leaks using soapy water. Do not try to detect leaks using a flame.’
- (o) include the statement, ‘Only use the hose assembly as supplied with this appliance for connection to the cylinder – DO NOT USE ADAPTORS.’; and
- (p) include the statement, ‘This appliance must only be serviced by an authorized person.’

2.16.1.4 *Information for use*

The operating instructions shall include the following information:

- (a) How to operate the appliance safely when hot.
- (b) How to store the appliance when it is not in use including, where appropriate, the disconnection and sealing of the cylinder.
- (c) Information on storing cylinders outdoors in a well-ventilated area out of the reach of children. Any indoor storage shall comply with AS/NZS 1596.
- (d) How to adjust the burner setting and the meaning of the symbols used for the various adjustment positions.
- (e) A warning not to move the appliance during operation unless designed specifically to allow movement.
- (f) For appliances with flexible hoses—
 - (i) the maximum hose length to be used;
 - (ii) where applicable a statement such as, ‘After use, turn the gas cylinder valve off, wait for the flame to go out, then turn the appliance control valve(s) off.’; and
 - (iii) the text, ‘Avoid twisting or kinking the flexible hose.’
- (g) The meaning of the symbols used to indicate the position of the control valves (see Clause 2.16.4.1 and 2.16.4.2 (a)).
- (h) How to check if the gas container is empty.

2.16.1.5 *Information for appliances with pierceable cartridges*

For appliances with pierceable cartridges, the following information:

- (a) Full details on how to connect and disconnect the pierceable cartridge safely.
- (b) The statements:
 - (i) ‘Check that burners are extinguished before disconnecting the gas container.’
 - (ii) ‘Check that the gas container is empty before removing it.’
 - (iii) ‘Change the gas container outside and away from people.’

- (iv) 'Check the seals visually before connecting a new gas container to the appliance.'

2.16.2 Assembly

Appliances that are supplied in kit form shall, in addition to any other instruction required by this Standard, be provided with assembly instructions that include, as a minimum, the following:

- (a) Model of appliance.
- (b) The removal of any transit protection.
- (c) List of tools necessary for assembly.
- (d) List of parts, including nuts, bolts, screws, washers, etc. with illustrated means of identification.
- (e) Step-by-step instructions of the assembly of the relevant components, including which nuts, bolts, washers are to be used with sufficient text and/or illustrations to ensure correct assembly.
- (f) Detailed instructions of any adjustment that may be necessary.
- (g) Complete instructions for testing for leakage.

2.16.3 Appliance markings

The following information shall be provided with the appliance:

- (a) Model or type of appliance.
- (b) The certificate of compliance number.
- (c) Manufacturer's trade name or symbol.
- (d) Month and year of manufacture or serial number where this is documented to show month and year of manufacture.
- (e) Total nominal gas consumption in megajoules per hour and/or g per hour.
- (f) The type of the gas container(s) intended to be used with the appliance, in the form: 'This appliance shall only be used with a <type of gas>¹, <type of container>², certified to Standard XYZ>³'
 - 1 Butane, propane, butane/propane mix (including percentage of each gas in mix).
 - 2 Gas cartridges or refillable container.
 - 3 The Standard to which the container must be certified.

An example of this marking is as follows:

'This appliance shall only be used with a 70% butane/30% propane mix gas cartridge certified to EN 417.'

- (g) The warning, 'IT MAY BE HAZARDOUS TO ATTEMPT TO FIT OTHER TYPES OF GAS CONTAINERS' immediately after the information shown in (f).
- (h) Clear indication for regulating control valves (clockwise to close – see Clause 2.16.4).
- (i) The orifice size in millimetres or the BS number of removable injectors. A colour coding is acceptable. Alternatively the injector size may be nominated on the data plate on the appliance.

(j) The following text:

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(i) For all types of appliances:

‘ONLY USE IN WELL-VENTILATED AREAS.’

‘CARBON MONOXIDE HAZARD—USING THIS APPLIANCE IN AN ENCLOSED SPACE MAY CAUSE DEATH. DO NOT USE IN CARAVANS, TENTS, MARINE CRAFT, CARS, MOBILE HOMES OR SIMILAR LOCATIONS.’

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(ii) Additionally for water heaters, heating appliances, barbecues and ring burners:

‘WARNING! USE OUTDOORS ONLY. See operating instructions.’

‘CAUTION: Accessible parts may be very hot. Keep young children away.’

NOTE: For appliances where it is impractical to mark the appliance directly, a swing tag is acceptable.

A3

All information from Items (a) to (j) shall be permanently marked on the appliance, unless it is impractical to do so, in which case, as a minimum—

(A) the information of Items (a) and (c) shall be permanently marked on the appliance;

(B) the information of Items (b), (d), (f) and (g) shall be permanently marked on a swing tag attached to the appliance;

(C) the information of Items (e), (i) and (j) shall be included on the packaging and the instructions; and

(D) the information of Item (h) shall be included in the instructions.

(k) For ring burners in addition to the markings required of Items (j)(ii), the following information shall be provided on the swing tag:

OUTDOOR USE ONLY

2.16.4 Marking of control valves

2.16.4.1 Plug type control valves

Markings shall be clearly visible and durable.

The closed, open, and reduced rate positions shall be permanently marked.

The closed position (see Clause 2.16.3 (h)), shall be marked by the word ‘OFF’, a full disc, or an open circle at least 3 mm in diameter. The markings shall be the same for all the control valves.

Examples of symbols suitable for marking plug type control valves include—

— Full rate position Large flame



— Reduced rate position Small flame



— Rate range Triangle



or

Scale

1234

or

4321

Other symbols, other than letters, are permitted provided that they give similar information clearly. They shall not give rise to any possibility of confusion with the identification of an 'OFF' position.

Additional markings are permitted provided that they do not create confusion for the appliance user.

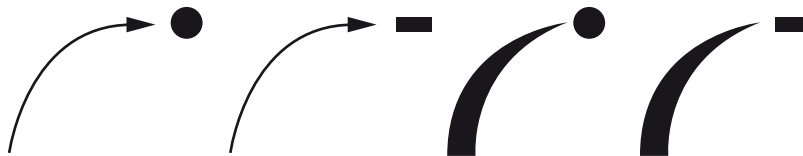
The meaning of the symbols used shall be given in the instructions (see Clause 2.16.1.4(g)).

2.16.4.2 Needle valves

Markings shall be clearly visible and durable.

The markings shall indicate the closing direction (see Clause 2.16.3 (h)), with an arrow (stylised is acceptable) and the tip shall point to either the word 'OFF', a full disc or an open circle at least 3 mm in diameter, or the mark '-' symbolizing the closed position;

Examples of symbols suitable for marking needle type control valves:



The markings are not required to mark the reduced rate.

Additional markings are permitted provided that they do not create confusion for the appliance user.

The meaning of the symbols used shall be given in the instructions (see Clause 2.16.1.4(g)).

2.16.5 Durability of permanent markings

Markings shall be sufficiently durable for their purpose and located where they will not be subjected to conditions which may lead to deterioration.

When tested the marking shall—

- (a) remain legible; and
- (b) show no signs of becoming detached from the surface to which it is applied.

2.16.6 Markings on packaging

Where the markings made in accordance with Clause 2.16.3 (a), (c), (f), (g) and (j) are obscured by the packaging, they shall be reproduced clearly on the packaging.

No information on the packaging shall conflict with the safety markings on the appliance or the instructions.

2.17 SPECIFICATIONS

2.17.1 Preliminary specification

Testing shall not commence until the manufacturer's written description (including engineering drawings, where appropriate) of the appliance and instructions for installation and operation (sufficient for testing) have been submitted to the testing body. The appliance shall not be dismantled for individual component or specification study until testing has been completed.

2.17.2 Provision of specifications

A written specification that adequately describes the appliance shall be provided.

SECTION 3 ADDITIONAL REQUIREMENTS FOR COOKERS

3.1 HOTPLATE BURNERS ON COOKERS

3.1.1 Turndown control

All hotplate burners on cooking appliances shall be capable of turndown.

3.1.2 Ignition

- A3 | Hotplate burners shall comply with the requirements of Clause 2.14.2 with and without a 200 mm diameter standard test vessel placed centrally over the burner (see Clause 1.4.49).

3.1.3 Flame characteristics

- A3 | The flames of hotplates burners shall comply with the requirements of Clause 2.14.7 with and without a 200 mm diameter standard test vessel placed centrally over the burner (see Clause 1.4.49).

3.1.4 Resistance to liquid spillage

- A3 | Burners shall not be extinguished when the cooker is subjected to a simulated spill over, unless this is caused by the action of a flame supervision device. Single burner cookers that use non-enclosed gas cartridges with a capacity less than 500 g are exempt from this requirement.

3.1.5 Pan stability

- A3 | Any pan support shall provide stable support for a 120 mm contact vessel located both centrally and up to 25 mm off centre. Special purpose burners (e.g. wok or fish burners) are exempt from this requirement.

3.1.6 Pan supports

- A3 | Positioning of pan supports shall be positive and shall prevent any re-arrangement or displacement from the design position (e.g. inversion) unless it can be demonstrated that the appliance complies with Clauses 3.4 and 3.5 in every reasonable alternative arrangement.

3.2 OVENS

3.2.1 Flame safeguards for cooker ovens

A flame safeguard system shall be fitted to all ovens, so that in the event of flame failure at the point of supervision, the flame safeguard system shuts off all the gas to the burner.

3.2.2 Shelves

Oven shelves shall be stable and horizontal when in position in the oven.

3.2.3 Shelf supports

Oven shelf supports shall prevent shelves from tilting to an angle greater than 5 degrees in any position between half and fully withdrawn to the shelf stop.

3.2.4 Fitting of thermostat

A thermostat shall be fitted to all ovens of gross volume in excess of 0.04 m³ unless the oven is specifically designed to cook by heat storage.

3.3 STRENGTH—APPLIED LOAD

No part of the appliance shall show permanent deformation or damage within a period of 5 min when a load of 10 kg is applied to the pan support assembly.

3.4 COMBUSTION

A3 | Hotplate burners shall comply with the requirements of Clause 2.15 while using a standard test vessel not less than 200 mm in diameter.

Where the maximum vessel size recommended by the manufacturer is greater than 200 mm in diameter, the smallest standard test vessel with diameter not less than the recommended maximum shall be used.

3.5 TEMPERATURE HAZARDS

The appliance shall comply with the requirements of Clause 2.12 under the following conditions:

- (a) The burners shall be lit and a 200 mm diameter standard test vessel (see Clause 1.4.49) containing water to a depth of 60 ± 10 mm shall be placed on each burner. When boiling, adjust burner to maintain gentle boiling in the vessel. The water shall be maintained to a depth of 60 ± 10 mm for the duration of the test.

NOTE: Lids are not to be fitted to the vessels.

- (b) For appliances incorporating a griller, the griller dish is 25% filled with water and the griller is operated for the last 15 min of the test.
- (c) For appliances incorporating an oven, the thermostat, where fitted, is set to 200°C, and the oven is operated for the entire test. Where no thermostat is fitted, manually maintain a temperature as close as possible to 200°C.

A3 | (d) For appliances with enclosed gas cartridges, Item (a) is repeated with all burners operating at maximum gas consumption. The test shall be conducted using the smallest standard test vessel at least 60 mm diameter larger than the maximum recommended by the manufacturer.

3.6 HEAT RESISTANCE

The appliance shall comply with the requirements of Clause 2.13 under the following conditions:

- (a) The burners shall be lit and a 200 mm diameter standard test vessel (see Clause 1.4.49) containing water shall be placed on each burner. When boiling, adjust burner to maintain gentle boiling in the vessel. The water shall be maintained to a depth of 60 ± 10 mm for the duration of the test.

NOTE: Lids are not to be fitted to the vessels.

- (b) For appliances incorporating a griller, the griller dish is 25% filled with water and the griller is operated for the last 15 min of the test.
- (c) For appliances incorporating an oven, the thermostat, where fitted, is set to 200°C, and the oven is operated for the entire test. Where no thermostat is fitted, manually maintain a temperature as close as possible to 200°C.

A3 | 3.7 ADDITIONAL REQUIREMENTS FOR COOKERS WITH ENCLOSED GAS CARTRIDGES

3.7.1 Overpressure protection

An overpressure cut-off device shall be fitted, and shall—

- (a) automatically operate to shut off the gas at a pressure lower than the cartridge pressure corresponding to a temperature of 50°C; and
- (b) not restore the gas flow automatically when the temperature is reduced to ambient.

A minimum of three appliances shall be tested for five consecutive trials. The release pressure for each individual trial shall be recorded and reported.

3.7.2 Instructions

Instructions for use shall include:

- (a) Diagrammatic, or diagrammatic and written warnings—
 - (i) to avoid overheating the gas cartridge and controls by the use of multiple or excessive sized cooking devices, plates, etc.;
 - (ii) not to use multiple appliances to heat a single utensil; and
 - (iii) that specify the maximum vessel size to be used.
- (b) Warnings—
 - (i) to avoid boil over and spillage;
 - (ii) not to use as a space heater;
 - (iii) not to use for any purpose other than cooking; and
 - (iv) to avoid using near combustible materials.
- (c) diagrammatic or diagrammatic and written descriptions of the locked and unlocked position of the cartridge securing mechanism.

3.7.3 Markings

3.7.3.1 General

Markings on the appliance shall include the following:

- (a) Diagrammatic or diagrammatic and written warnings—
 - (i) to avoid overheating the gas cartridge and controls by the use of multiple or excessive sized cooking devices, plates, etc.;
 - (ii) not to use multiple appliances to heat a single utensil.
- (b) Warnings—
 - (i) to avoid boil over and spillage;
 - (ii) not to use as a space heater;
 - (iii) not to use for any purpose other than cooking;
 - (iv) to avoid using near combustible materials; and
 - (v) the text 'NOT FOR COMMERCIAL USE' with a minimum text height of 5 mm.
- (c) Diagrammatic or diagrammatic and written descriptions of the locked and unlocked position of the cartridge securing mechanism.

3.7.3.2 Pan support—marking

For appliances where it is possible to install the pan support in other than the intended operating position the underside of the pan support assembly shall have a permanent marking warning the user against assembling the appliance with the pan support in the incorrect position.

3.7.4 Temperature hazards

The appliance shall comply with the requirements of Clauses 2.12 and 3.5 under the following conditions.

The burners shall be lit and the smallest standard test vessel, at least 60 mm diameter larger than the maximum recommended by the manufacturer (see Clause 3.7.2(a) (iii)), containing water to a depth of 60 ± 10 mm shall be placed on each burner. When boiling, adjust burner to maintain gentle boiling in the vessel. The water shall be maintained to a depth of 60 ± 10 mm for the duration of the test.

NOTE: Lids are not to be fitted to the vessels.

3.7.5 Cartridge—Maximum pressure

The gas pressure inside the cartridge shall not exceed 400 kPa under the test conditions in Clauses 3.4, 3.6 and 3.7.

3.7.6 Durability

3.7.6.1 General

The following requirements shall be assessed at ambient temperature.

3.7.6.2 Gas valve

Gas valves shall operate normally and the appliance shall comply with the requirements of Clause 2.10.1 after cycling for 12 000 cycles at a rate of 5 to 20 times per min.

3.7.6.3 Appliance regulator

Any regulator shall operate normally and the appliance shall comply with the requirements of Clause 2.10.1 after cycling as follows:

- (a) For 30 000 cycles with an air supply pressure of 200 kPa, applied in cycles of 2 s to 3 s on and 2 s to 3 s off.
- (b) For 1000 cycles with an air supply pressure equal to that which triggers the overpressure cut-off device, applied in cycles of 2 s to 3 s on and 2 s to 3 s off.

3.7.6.4 Overpressure shut off device

The overpressure shut off device shall operate normally and the appliance shall comply with the requirements of Clause 2.10.1 after 1000 operation cycles consisting of supplying air at a pressure equal to that which triggers the overpressure device followed by a reduction to atmospheric pressure, at a rate of between 5 and 20 times per min.

NOTE: An operation cycle is one in which the device actually detaches the cylinder or shuts off the gas flow depending on the design of the device.

3.7.6.5 Cartridge to valve connection

The cartridge to valve connecting mechanism shall operate normally and the appliance shall comply with the requirements of Clause 2.10.1 after 6000 operation cycles which consist of repeating the operation of attaching and detaching the cartridge following the manufacturer's instructions at a rate of 5 to 10 times per min.

3.7.7 Cartridge—Installation integrity

It shall not be possible to install the cartridge in any position other than that which supplies the appliance with gas in the vapour state, with the appliance in its normal operating position.

3.7.8 Retaining springs for cartridge retention mechanism

It shall not be possible to dislodge any spring used in the cartridge retention mechanism by the application of a pull equal to 10 N applied to the spring or any of its anchor points.

NOTE: An anchor point is the point where the spring is formed into a loop to retain it on any bracket.

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3.7.9 Protection of cartridge retention and overpressure safety system mechanisms

All parts of the cartridge retention and overpressure safety system mechanisms shall be fully enclosed in the body of the appliance and adequately protected against external interference and/or obstruction to correct operation.

A3 | **‘Text deleted’**

3.7.10 Drop test

A3 | All cookers with enclosed cartridges shall be capable of withstanding one drop onto a timber surface from a height of 0.3 m with the fuel container full and engaged, after which—

- (a) the fuel container shall not rupture, leak or separate from the device in any hazardous manner;
- (b) the gas cartridge is retained or can be refitted and the appliance complies with Clause 2.10.1, or it is impossible to reconnect and retain the cartridge in the appliance; and
- (c) the appliance shall either operate normally or failsafe.

SECTION 4 ADDITIONAL REQUIREMENTS FOR HEATERS

4.1 APPLICATION OF THIS SECTION

- A3 | This Standard covers heaters connected directly to a cylinder or cartridge with or without the use of a hose.

This Standard does not cover:

- (a) LP Gas mobile industrial direct fired air heaters (covered by AG 404, to be AS 4644).
- (b) Space heaters for indoor use (covered by AS 4553).

4.2 ENCLOSED FUEL STORAGE

Heaters with provision for enclosed fuel storage shall be designed to limit the maximum size of fuel cartridge to 250 g and shall not be capable of storing additional spare fuel cartridge.

4.3 MARKING

- A3 | The appliance shall carry the warning labels as shown in Figure A1, Appendix A, located on the outside of the appliance in a position where they are clearly visible to the user while operating the appliance.

If, due to space or design limitations, it is necessary to use an alternate layout, the elements of the label shall be kept as close as possible together and the specification regarding text and symbol heights and colours shall be used.

4.4 FLAME SAFEGUARDS

- A3 | Heaters with integral or enclosed fuel cartridges having a maximum capacity of 250 g, shall be fitted with a flame safeguard.

Any heaters with a nominal gas consumption exceeding 6 MJ/h shall be fitted with a flame safeguard.

4.5 VITIATION

4.5.1 Operation in a sealed test chamber—All heaters

When operated on available gases at normal test gas pressure in a sealed test chamber, a heater shall not produce a concentration of carbon monoxide in excess of 0.025% before the oxygen concentration decreases to 15%.

A heater that has safely shut down prior to the oxygen concentration decreasing to 15% complies with this requirement.

Where an additional system or catalyst is fitted it shall be disabled for the duration of the test.

The test shall be continued if flashback occurs spontaneously.

4.5.2 Operation in a sealed test chamber—Heaters with gas consumption in excess of 6MJ/h

In addition to the requirements of Clause 4.5.1, for heaters with gas consumption in excess of 6 MJ/h, when operated on available gases at nominal gas consumption in a sealed test chamber, the gas supply to the appliance shall be shut off automatically before any one of the following conditions is reached:

- (a) 0.0075% CO.
- (b) 2.0% CO₂.
- (c) 18% O₂.

A system fitted to an appliance to meet the requirements of this Clause shall not be adjustable.

4.6 PRIMARY GUARD

4.6.1 General

Radiant heaters shall be provided with a primary guard.

4.6.2 Attachment to the appliance

Primary guards shall be permanently attached to the appliance and withstand a pull of 20 N in various directions without permanent damage or distortion. The attachment may be by a hinge(s), provided that a catch or similar device holds the guard in place in the closed position.

4.6.3 Openings in a primary guard

Openings in a primary guard or openings between the edge of the guard and the appliance shall comply with the following requirements:

- (a) For major dimensions excluding horizontal openings, where the minor dimension exceeds 6 mm, not greater than 150 mm.

NOTE: Limitations on vertical openings are intended to prevent entry of fabrics.

- (b) For minor dimensions, less than 6 mm or greater than 12 mm where finger entrapment is possible, but not greater than 35 mm.

NOTE: An opening with dimensions within the range 6 mm to 12 mm is such that a child's finger may be inserted with relative ease but may be withdrawn only with difficulty.

4.6.4 Cone test

When the cone specified in Figure C1 is applied to any opening in or around the guard with a force not exceeding 5 N, the cone shall not contact any heat source which has a temperature exceeding 200°C above ambient when the appliance, at its maximum setting, has been discharging heat at a steady rate for a period of not less than 30 min.

4.6.5 Smoulder test

A piece of fabric material shall not ignite or smoulder within 10 s of being placed over and in contact with an operating heater, as illustrated in Figure C2.

4.6.6 Glass components

Guards that include glass or similar material shall withstand impact energy of 0.50 J without damage, as illustrated in Figure C3.

4.6.7 Exposed surfaces

All exposed surfaces of a primary guard shall be smoothly finished to prevent the possibility of abrasion or laceration to the user, or the snagging of clothing.

4.6.8 Primary guard temperature

The temperature of a primary guard shall not exceed 200°C above ambient, unless it has an open area greater than or equal to 85% of the total guard.

4.7 TEMPERATURE HAZARDS

The appliance shall comply with the requirements of Clause 2.12 with the thermostat, if fitted, set at maximum.

4.8 HEAT RESISTANCE

The appliance shall comply with the requirements of Clause 2.13 with the thermostat, if fitted, set at maximum.

A3

4.9 ADDITIONAL REQUIREMENTS FOR HEATERS WITH ENCLOSED GAS CARTRIDGE

4.9.1 Overpressure protection

An overpressure cut-off device shall be fitted, and shall—

- (a) automatically operate to shut off the gas at a pressure lower than the cartridge pressure corresponding to a temperature of 50°C; and
- (b) not restore the gas flow automatically when the temperature is reduced to ambient.

A minimum of three appliances shall be tested for five consecutive trials. The release pressure for each individual trial shall be recorded and reported.

4.9.2 Tip over switch

A tip over switch shall be fitted to all heaters with enclosed fuel storage so that in the event of the appliance being knocked over or tipped in any direction to an angle of 45° from the vertical, all gas to the burner(s) shall be shut off.

A3

4.9.3 Durability

4.9.3.1 General

The following requirements shall be assessed at ambient temperature:

- (a) Gas valves shall operate normally and the appliance shall comply with the requirements of Clause 2.10.1 after cycling for 12 000 cycles at a rate of 5 to 20 times per minute.
- (b) Any regulator shall operate normally and the appliance shall comply with the requirements of Clause 2.10.1 after cycling as follows:
 - (i) For 30 000 cycles with an air supply pressure of 200 kPa, applied in cycles of 2 s to 3 s on and 2 s to 3 s off.
 - (ii) For 1000 cycles with an air supply pressure equal to that which triggers the overpressure cut-off device, applied in cycles of 2 s to 3 s on and 2 s to 3 s off.
- (c) The overpressure shut off device shall operate normally and the appliance shall comply with the requirements of Clause 2.10.1 after 1000 operation cycles consisting of supplying air at a pressure equal to that which triggers the overpressure device followed by a reduction to atmospheric pressure, at a rate of between 5 and 20 times per minute.

NOTE: An operation cycle is one in which the device actually detaches the cylinder or shuts off the gas flow depending on the design of the device.

- (d) The cartridge to valve connecting mechanism shall operate normally and the appliance shall comply with the requirements of Clause 2.10.1 after 6000 operation cycles consisting of repeating the operation of attaching and detaching the cartridge following the manufacturer's instructions at a rate of 5 to 10 times per minute.

A3

4.9.4 Cartridge-installation integrity

It shall not be possible to install the cartridge, in any position other than that which supplies the appliance with gas in the vapour state, with the appliance in its normal operating position.

4.9.5 Retaining springs for cartridges retention mechanism

It shall not be possible to dislodge any spring used in the cartridge retention mechanisms by the application of a pull equal to 10 N applied to the spring or any of its anchor points.

NOTE: An anchor point is the point where the spring is formed into a loop to retain it on any bracket.

4.9.6 Protection of cartridge retention and overpressure safety system mechanisms

All parts of the cartridge retention and overpressure safety system mechanisms shall be fully enclosed in the body of the appliance and adequately protected against external interference and/or obstruction to correct operation.

4.10 DROP TEST

A3

All heaters with enclosed gas cartridges and/or radiant burner plaque tiles shall be capable of withstanding one drop onto a timber surface from a height of 0.3 m with the fuel container full and engaged, after which—

- (a) the fuel container shall not rupture, leak or separate from the device in any hazardous manner;
- (b) the gas cartridge is retained or can be refitted and the appliance shall comply with Clause 2.10.1; or it is impossible to reconnect and retain the cartridge in the appliance;
- (c) the appliance shall either operate or fail safe; and
- (d) there shall not be cracks or other damage to the burner and tile face and combustion requirements of Clause 2.15.2 shall be met.

SECTION 5 ADDITIONAL REQUIREMENTS FOR BARBECUES

5.1 MARKING

The appliance shall be marked with:

- A3
- (a) The warning labels as shown in Figure A1, Appendix A, located on the outside of the appliance in a position where they are clearly visible to the user while operating the appliance.
If, due to space or design limitations, it is necessary to use an alternative layout, the elements of the label shall be kept as close as possible together and the specification regarding text and symbol heights and colours shall be used.
 - (b) The correct ignition procedure.
 - (c) For hooded appliances—
 - (i) a statement that the hood shall be in the open position prior to lighting and during operation unless the appliance is specifically designed to operate with the hood closed; and
 - (ii) clear marking indicating the manufacturer's indication for maximum cooking conditions with the hood closed.

5.2 COMBUSTION

Barbecues with griddle plates shall comply with the requirements of Clause 2.15 with the griddle plates fitted.

5.3 TEMPERATURE HAZARDS

5.3.1 General

The appliance shall comply with Clause 2.12 under the following conditions:

- (a) An open grid cooking top shall be covered by perforated metal having 25% open area.
- (b) A hooded appliance shall be set at the maximum cooking condition specified by the manufacturer.
- (c) An appliance specified by the manufacturer for both open and covered cooking shall be tested under the conditions of both (a) and (b).

5.3.2 Hood handles

Areas more than 50 mm from fixing points of hood handles shall comply with specified temperature limits in Clause 2.12.3.

5.3.3 Grease receptacle

Temperatures of the grease receptacle shall not exceed 220°C above ambient.

5.4 HEAT RESISTANCE

The appliance shall comply with Clause 2.13 under the following conditions:

- (a) An open grid cooking top shall be covered by perforated metal having 25% open area.
- (b) A hooded appliance shall be set at the maximum cooking condition specified by the manufacturer.

- (c) An appliance specified by the manufacturer for both open and covered cooking shall be tested under the conditions of both (a) and (b).

5.5 MECHANICAL DESIGN

5.5.1 Provision and location of grease receptacle

Any excess grease that may form shall be drained into a grease receptacle, which shall be positively located and capable of being removed without causing spillage of the collected grease.

5.5.2 Design to prevent ignition of accumulated grease

Appliances shall be so designed such that any grease accumulated below the burners cannot readily ignite.

5.5.3 Protection of ports and injectors

Any burner ports and injectors that may be exposed in their normal operation to falling particles or grease drippings shall be protected against blockage.

5.5.4 Glass components—Resistance to mechanical shock

Glass shall not break or be damaged when the hood is opened and then allowed to fall—

- (a) with the appliance at room temperature; and
- (b) after 15 min of operation with all burners on full setting.

5.5.5 Glass components—Resistance to thermal shock

Unless the glass is not subjected to thermal stress during use (for example, appliance with a glass panel lid, whose instructions for use prohibit operation with the lid closed) it shall not break when subjected to 50 mL of water poured across the full width of the mid line of the glass, after 15 min operation with all burners on full setting.