

Australian Standard[®]

Domestic outdoor gas barbecues



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 - Australian Liquefied Petroleum Gas Association
 - CSIRO Energy Technology
 - Committee AG-001-03
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 - Energy Retailers Association of Australia
 - Gas Appliance Manufacturers Association of Australia
 - Gas Technical Regulators Committee
-

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Australian Standard[®]

Domestic outdoor gas barbecues

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PREFACE

This Standard was prepared by the Standards Australia Working Group AG-001-00-08, Barbecues, under the responsibility of Standards Australia Committee AG-001, Gas Appliances to supersede AS 4557/AG 107—2001, *Domestic outdoor gas barbecues*.

This Standard incorporates Amendment No. 1 (May 2009) and Amendment No. 2 (June 2012). The changes required by the Amendment 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 manufacturers, designers, regulatory authorities, testing laboratories and similar organizations with uniform minimum requirements for the safety, performance and use of domestic outdoor gas barbecues.

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;
- (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 principal differences between this edition and AS 4557/AG 107—2001, are:

- (i) Appliance gas piping connection requirements.
- (ii) Device to shut off or reduce gas flow requirements.
- (iii) Requirements for dismantling, replacement and reassembly by the user.
- (iv) Provision of hose assembly.
- (v) Changes to permanent markings.
- (vi) Changes to instructions requirements.
- (vii) Changes to gas leakage requirements.
- (viii) Changes to warning labels requirements.
- (ix) Changes related to outdoor areas.

AS 5601/AG 601, *Gas Installations* provides essential requirements and basic standards for gas installations.

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.

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STANDARDS AUSTRALIA

Australian Standard

Domestic outdoor gas barbecues

SECTION 1 SCOPE AND DEFINITIONS

1.1 SCOPE

This Standard applies to domestic outdoor gas barbecues and solid fuel-to-gas conversion kits intended for use with natural gas, town gas, tempered liquefied petroleum gas (TLP) and low pressure (2.75 kPa) liquefied petroleum gas (LPG).

NOTES:

- 1 AS 2658 covers various types of portable appliances not exceeding 12 MJ/h (250 g/h): with vaporized LP Gas to the inlet at the vapour pressure within the gas container (vapour pressure appliance), AG 403 covers radiant tube heaters.
- 2 Other statutory and regulatory requirements 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 DEFINITIONS

1.2.1 Appliance regulator

A device fitted to an appliance to control the gas pressure or gas volume delivered to that appliance.

1.2.2 Atmospheric burner

A burner system where all the air for combustion is introduced by the inspirating effect of a gas injector and/or by the natural draught in the combustion chamber without mechanical assistance.

1.2.3 Authority

Means the authority having jurisdiction or such authority as delegated, i.e. Technical Regulator.

1.2.4 Automatic burner

A burner system that, on starting, follows a self-acting sequence that has been manually or automatically initiated, to provide gas and ignition to the burner without any intermediate manual operation.

1.2.5 Automatic ignition

The lighting of gas at a burner without a manual operation whenever gas flows from the burner.

1.2.6 Available gas (Line gas)

Readily available gas with similar characteristics to the reference test gas.

1.2.7 Barbecue

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

1.2.8 Bayonet fitting

A bayonet-style plug and mating socket designed for attachment so that the gas is turned on only when the plug is inserted and secured in a lock-fit recess.

1.2.9 Burner port

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

1.2.10 Certified

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

1.2.11 Certifying body

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

1.2.12 CO/CO₂ ratio

The ratio by volume of carbon monoxide to that of carbon dioxide in the combustion products.

1.2.13 Combination gas control

An assembly of two or more different control functions in a single body.

1.2.14 Combustible material

Materials made of or surfaced with wood, compressed paper, plant fibres or other materials that will ignite and burn.

1.2.15 Combustion products

Constituents resulting from the combustion of a fuel with oxygen, including the inerts associated with the fuel and the oxygen but excluding any other diluent or contaminant.

1.2.16 Consumer piping

A system of pipes, fittings, components and equipment which conveys gas from the outlet of the consumer billing meter installation, or for gases stored in a tank or cylinder from the outlet of the first gas pressure regulator, to the appliance inlet.

NOTE: In the case of a reticulated LP Gas system, the 'first gas pressure regulator' refers to the first regulator on the site if no meter is installed.

1.2.17 Cooking grid

The surface upon which the food to be cooked is placed.

1.2.18 Cross lighting

Lighting of one burner from another either directly or by means of an intermediate flame.

1.2.18A Cylinder compartment

A compartment beneath a barbecue or side burner, enclosed on at least three sides, that is intended to contain an LPG cylinder or cylinders either for storage or for direct connection to an inlet.

1.2.18B Detachable trolley

A trolley designed to allow the removal of a BBQ by the user without the use of tools or undue force.

1.2.19 Determined gas consumption

Gas consumption rate, measured in megajoules per hour, using reference gas at specified test pressures and with ambient conditions corrected to standard temperature and pressure.

A2

1.2.19A Enclosed burner

A burner that is not readily visible to the operator during normal operation of the appliance.

1.2.20 Flame abnormality

A flame condition that results in lifting, floating, lighting back, appreciable yellow tipping, carbon deposition or objectionable odour.

1.2.21 Flame establishment period

A1

The total time for which the fuel valve is energized, beginning with the first energization of the valve and ending when the flame supervision system is first required to supervise the flame.

1.2.22 Flame failure response time

The time taken for the flame safeguard to detect loss of flame and de-energize the shut off valve.

1.2.23 Flame proving period

The supervised period following the flame establishment period and before any further operation other than shutdown is permitted.

1.2.24 Flame safeguard

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

1.2.25 Flame safeguard system

A system consisting of a flame detector(s) plus associated circuitry, integral components, valves and interlocks the function of which is to shut off the fuel supply to the burner(s) in the event of ignition failure or flame failure.

1.2.26 Flash tube

A device for igniting a gas burner in which a flame is made to travel to the burner ports through a tube in which an inflammable mixture of gas and air has been induced.

1.2.27 Gas

A combustible fuel gas that may be one of the following:

1.2.27.1 Natural gas (NG)

A hydrocarbon gas consisting mainly of methane.

1.2.27.2 Simulated natural gas (SNG)

A gas comprising a mixture of LPG and air, in the approximate proportions of 55% gas and 45% air for commercial propane.

1.2.27.3 Town gas (TG)

A gas manufactured from coal or petroleum feedstock.

1.2.27.4 Tempered liquefied petroleum gas (TLP)

A gas comprising a mixture of LPG and air, in the approximate proportions of 27% gas and 73% air for commercial propane.

1.2.27.5 Liquefied petroleum gas (LPG)

A gas composed predominantly of any of the following hydrocarbons, or any combination of them in the vapour phase—propane, propene (propylene), butane, butene (butylene).

1.2.28 Gas consumption

The rate of energy consumed by an appliance under specific conditions and expressed in megajoules per hour (MJ/h).

1.2.29 Heating value, gross (at constant pressure)

The number of megajoules liberated when one cubic metre of dry gas, at standard conditions of temperature (15°C) and absolute pressure (101.325 kPa), is completely burnt in air with all the water formed by the combustion process in the liquid state and with the products of combustion at standard conditions.

NOTE: Calculation of heating value based upon ISO 6976 given in AS 4646.

1.2.30 Hose

Flexible tube or pipe of multiple construction.

1.2.31 Hose assembly

Flexible hose including end fittings connecting the gas supply to the appliance inlet.

1.2.32 Hotplate burner

A burner that heats from underneath, by direct flame contact, the base of vessels placed over it.

1.2.33 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.

1.2.34 Jointing compound

A manufactured liquid, paste-like or semi-solid material used to seal joints.

1.2.35 Jointing material

A manufactured solid material that may be in tape, cord or sheet form, used to seal joints.

1.2.36 Light back

Transfer of the flame from burner port(s) into the body of the burner or back to the injector.

1.2.37 LPG

See Gas.

1.2.38 Manual ignition**1.2.38.1 Direct manual ignition**

The lighting of a burner by the use of a hand held ignition device.

1.2.38.2 Remote manual ignition

The lighting of a burner by a manual operation where the ignition activating device is remote from the ignition point.

1.2.39 Mixing tube

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

1.2.40 Mobile appliance

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

1.2.41 Natural draught burner

See Atmospheric burner.

1.2.42 Natural gas

See Gas.

1.2.43 Nominal gas consumption

The appliance gas consumption, in megajoules per hour, as stated in manufacturer's specifications, data plates, instructions and general communications.

NOTE: This is the fundamental quantity on which all methods of test are based and is the starting point for all performance requirements.

1.2.44 Nominal test point pressure

The gas pressure specified by the manufacturer, at which the appliance is designed to operate, and measured at a test point.

1.2.45 Normal test gas pressure

0.75 kPa for town gas and TLP gas, 1.13 kPa for natural gas and SNG, 2.75 kPa for LPG.

1.2.46 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 F provides diagrammatical representations of outdoor areas.

1.2.47 Outdoor appliance

An appliance designed for outdoor installation or use.

1.2.48 Outdoor gas barbecue

1.2.48.1 Portable

A gas-fired barbecue that is obviously compact and light in weight and can be readily carried by one person.

1.2.48.2 Mobile

A gas-fired barbecue provided with wheels to allow for movement.

1.2.48.3 Post-mounted

A gas-fired outdoor barbecue for installation directly on an attachment to a post provided as part of the appliance by the manufacturer.

1.2.48.4 Built-in

A gas-fired outdoor barbecue designed for installation in a surrounding structure which may be provided as part of the appliance by the manufacturer, or which may be built or supplied separately.

1.2.49 Pan support

A grid located over any side burner(s) to support vessel(s) being heated.

1.2.50 Permanent pilot

A pilot that is permanently alight while the appliance is in service and which is controlled independently of the main burner.

1.2.51 Pilot

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

1.2.52 Primary air

That portion of the total air required for combustion that is mixed with the gas prior to burning on the burner ports.

1.2.53 Primary air ports

The openings in an aerated burner for primary air.

1.2.54 Programmable electronic system (PES)

A system based on one or more central processing units (CPUs), connected to sensors and/or actuators, for the purpose of control, protection or monitoring.

NOTES:

- 1 The term PES extends to and includes all elements in the system such as —
 - (a) sensors and/or other input devices;
 - (b) data links and/or other communication paths; and
 - (c) actuators and/or other output devices.
- 2 The term PES includes system software such as executive, users and communication, etc. which is configured to operate a process.
- 3 The term PES is used to cover systems incorporating a wide range of programmable electronic devices and includes systems incorporating —
 - (a) microprocessors;
 - (b) programmable controllers (PCs);
 - (c) programmable logic controllers (PLCs);
 - (d) programmable state controllers;
 - (e) other computer based devices.
- 4 A PES can include a microprocessor-based temperature, pressure, air/fuel ratio, or level controller or monitor.

1.2.55 Quick-connect device

A two-part mating plug and socket assembly for connecting an appliance to a gas supply without the use of tools.

1.2.56 Reference gas

The gas corresponding to an average of the gases most currently distributed, and for which the appliance has been specifically designed (see Test gases).

1.2.57 Relative density

The ratio of the mass of a volume of gas to the mass of the same volume of dry air under the same conditions of temperature and pressure.

NOTE: Calculation of Relative Density based upon ISO 6976 given in AG 701 (to be AS 4646).

1.2.58 Rotisserie

A rotating spit, manual or automatic, enclosed or otherwise, heated by radiation and/or convection.

1.2.59 Safety shut off system

An arrangement of valves and associated control systems which shuts off the supply of gas when required, by a device that senses the approach to an unsafe condition.

1.2.60 Safety shut off valve

An automatic valve used to shut off gas supply to an appliance when a signal is generated indicating the approach to an unsafe condition.

1.2.61 Secondary air

Air required for completion of combustion, admitted to the combustion zone after combustion with primary air has commenced.

1.2.62 Self-latching gas valve

A gas valve with a built-in safety catch, which locks automatically when the valve is turned off. A separate and distinct movement is required to unlock before the valve can be turned on.

1.2.63 Side burner

A hotplate burner either sold with the appliance or separately as an accessory to be fitted later.

1.2.64 Simulated natural gas (SNG)

See Gas.

1.2.65 Specific gravity

See Relative density.

1.2.66 Standard conditions

A temperature of 15°C and an absolute pressure of 101.325 kPa.

1.2.67 Standard test vessels

TABLE 1.1
STANDARD TEST VESSEL DIMENSIONS

Burner	Vessel		
Gas consumption MJ/h	Diameter mm	Height mm	Water content kg
0–9	195	140	2.3
Over 9 and up to 12	230	155	4.5
Over 12 and up to 17	270	160	6.0
Over 17 and up to 24	315	190	10
Over 24 and up to 30	395	440	40

NOTE: For fish burners use special purpose pots as recommended in the manufacturer's operating instructions.

1.2.68 Start gas

The gas flowing at a pilot burner or, when no pilot burner is fitted, at a main burner during the flame establishment period for initial ignition.

1.2.68A Storage compartment

A compartment beneath a barbecue or side burner, enclosed on at least three sides, that is capable of containing an LPG cylinder but which is not intended by the manufacturer to contain an LPG cylinder.

1.2.68B Tabletop barbecue

A BBQ designed to be supported by furniture or a fixture and/or located in a detachable trolley.

1.2.69 Tempered liquefied petroleum gas (TLP)

See Gas.

1.2.70 Test gases

The test gases used in these requirements are defined in the Test Gas Table (Table 1.2) that is based on pure components. Actual test gases are made up using constituent test gases of the purities listed below to the respective Wobbe index $\pm 2\%$. Purities of the constituent gases are to be not less than—

- (a) 99% for hydrogen and nitrogen;
- (b) 95% for methane ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$);
- (c) 95% for propane ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$);
- (d) 95% for propylene ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$);
- (e) 95% for butane ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$).

Where base gases of the required composition or purity are not readily available, suitable blended gases of the same Wobbe index and other combustion characteristics may be used. In case of dispute, the purity of the constituent gases shall not be less than the above values.

1.2.71 Town gas

See Gas.

1.2.72 Turndown gas consumption

The lowest gas consumption to which the burner control can be set.

1.2.73 Wobbe index (Wobbe number)

The Wobbe index (expressed as MJ/m^3) of a gas is:

$$\frac{\text{Heating value}}{\sqrt{\text{Relative density}}}$$

1.2.74 Working surface

A surface that is intentionally heated by an internal heat source and that has to be hot to carry out the function for which the equipment is intended to be used.

NOTES:

- 1 For example, burners and BBQ plates.
- 2 Hot surfaces on equipment may be as a consequence of how the output is generated (e.g. flue outlets, hot air vents, draught diverters, BBQ hoods, cooking hobs), and these surfaces are considered, in terms of their treatment, as equivalent to a working surface.

TABLE 1.2
TEST GAS TABLE

Test gas	Application	Composition percent							*Characteristics		
		Hydrogen	Methane	Propane	Propylene	Butane	Nitrogen	Air	Heating value MJ/m ³	Relative density	Wobbe index MJ/m ³
N	NG	-	97.5	1	-	-	1.5	-	37.8	0.571	50.0
S		-	-	55	-	-	-	45	52.1	1.296	45.7
X	LPG	-	-	100	-	-	-	-	95.8	1.553	76.9
Y		-	-	-	-	100	-	-	125.7	2.078	87.2
Z		-	-	-	100	-	-	-	88.5	1.476	72.9
T	TLP	-	-	27	-	-	-	73	25.4	1.142	23.8
D	TG	50	-	15	-	-	35	-	20.2	0.602	26.0

* The reference conditions for the characteristics are 15°C, 101.325 kPa, dry. The test gases shall be of a composition and of combustion characteristics as shown in the table. Where base gases of the required combustion purity are not available suitably blended gases of the same Wobbe index and other combustion characteristics may be used. In case of dispute gases strictly shown in the table shall be used.

NOTE: The listed characteristics for test gas 'Y' are based on the properties of iso-butane.

SECTION 2 DESIGN AND CONSTRUCTION

2.1 GENERAL

2.1.1 Preliminary specification

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

2.1.2 Physical inspection

Before any physical performance testing, as set out in Sections 3, 4 and 5 takes place, the appliance must satisfy the requirements as set out in this section to ensure that it does not possess any obvious features which would prevent its certification. If the appliance is not considered satisfactory, adjustments must be made prior to the commencement of testing.

2.1.3 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).

NOTE: This includes, for example, automatic ignition systems, flame safeguards, devices to shut off or reduce gas flow and pressure switches whether or not these carry gas.

2.1.4 Programmable electronic systems

A2

Where a programmable electronic system (PES) is employed for safety-related functions of burner management systems, the PES shall conform to the relevant requirements of AS 4625 and EN 298 (or equivalent).

2.1.5 Manual shut off valves

Manual shut off valves fitted to an appliance shall be certified as Type 1 or Type 2 in accordance with the classification specified in AG 201.

2.1.6 Power failure

During a power failure the appliance shall not be activated automatically when the appliance controls are in the 'OFF' position.

2.1.7 Sharp edges

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

2.1.8 Continuation of satisfactory operation

Construction of an appliance shall be such that continuity of satisfactory operation can be expected during normal usage.

2.1.9 Compliance in alternative forms

If an appliance is so designed that certain components may be fitted or omitted, the appliance shall comply with all requirements of this Standard in its alternative forms.

2.1.10 Locking means for adjusting devices

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

2.1.11 Means for gas pressure measurement

An appliance designed specifically for connection to a reticulated gas supply shall have means provided to allow the gas pressure to be measured. The following conditions apply:

- (a) Where an appliance incorporates only one injector, a separate pressure test point shall be provided.
- A1 (b) Where a separate pressure test point is fitted, it shall contain a limiting orifice not exceeding 1.0 mm diameter or equivalent restriction and be designed to accept 6 mm bore flexible tubing.

2.1.12 Design to minimize contact with hot surfaces

Handles and knobs shall be so designed as to minimize accidental touching of hot surfaces.

2.1.13 Protection of vitreous enamel

Screw heads in contact with cover coat vitreous enamel shall be provided with means of preventing enamel damage.

This provision is optional in the case of ground coat or wiped areas.

A1 2.1.14 LPG cylinder mounting means

A2 Mobile LPG barbecues shall be provided with—

- (a) integral mounting means for a cylinder externally on the appliance; or
- (b) a cylinder compartment.

2.1.14A Separation of cylinder compartments

A2 A compartment shall be permanently separated from the combustion area to prevent the ignition of escaping gas within the cylinder compartment.

A2 2.1.15 Ventilation of cylinder compartment

2.1.15.1 *Ventilation of cylinder compartments for cylinders exceeding 1.25 kg gas capacity*

Cylinder compartments shall have permanent openings ventilating directly to the outside of the appliance, and consisting of either—

- (a) perforations, uniformly distributed over the height of the enclosure and with a total free area of not less than 25% of the sidewall area; or
- (b) separate openings at high and low level, such that—
 - (i) the total free area at high level is not less than 20 000 mm² and is within 125 mm of the top of the cylinder compartment; and
 - (ii) the total free area at low level is not less than 20 000 mm², and—
 - (A) at least 25% of the required area is within 15 mm of the base of the cylinder compartment;
 - (B) the total required area is within 125 mm of the base of the cylinder compartment; and
 - (C) the openings cannot be obstructed by the cylinder(s).

A1 2.1.15.2 *Cylinder compartments for cylinders not exceeding 1.25 kg gas capacity*

Ventilation openings shall be provided at high and low level and shall have a total free area of not less than 10% of the sidewall area.

A1 **2.1.15.3 Accessibility of cylinder valve**

The cylinder valve shall be readily accessible for manual operation. A door or removable cover in the cylinder compartment to gain access to the cylinder valve is acceptable provided it is non-locking and can be opened or removed without the use of tools.

2.1.16 Means to prevent accidental closure of cover

A cover permanently attached to an appliance shall be provided with suitable means to prevent accidental closure.

2.1.17 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.

2.1.18 Design to prevent ignition of accumulated grease

Appliances shall be so designed that accumulation of grease below the burner(s) cannot be ignited readily (see Clause 5.1.4.8).

A2 **2.1.19 Protection of cylinder, hose and regulator**

Any cylinder, hose or regulator shall be permanently protected from spillover from vessels or cooking residues, fats or other falling particles. Compliance shall be assessed with removable grease trays and cups omitted.

2.1.20 Design to avoid obstruction of air inlets and outlet for products of combustion

Appliances designed to be built-in shall be so designed that openings for entry of combustion air and the egress of combustion products, are part of the structure and are unlikely to be obstructed when the appliance is installed in accordance with the manufacturer's instructions.

NOTE: Refer to Clause 2.9.5 for marking of clearances.

2.1.21 Weatherproofing

Appliances designed for fixed outdoor installation shall be provided with, or incorporate, adequate weatherproofing for use when the appliance is not in use.

2.1.22 Pan supports for side burners

The pan support(s) for side burners shall be secure against displacement during normal use.

2.1.23 Side burner pan support stability

Except for special purpose burners, e.g. wok or fish burners, any pan supports shall give stable support for a 120 mm contact diameter utensil located both centrally and up to 25 mm off centre.

The design of the utensil shall be such that it is stable when placed empty on a flat surface.

A2 **2.1.24 Jointing**

Joints shall not depend for their mechanical strength solely upon cement or jointing compounds.

2.1.25 Protection of wiring and controls from weather conditions

Appliances shall have all controls and electrical wiring adequately protected from damage and weather conditions to ensure safe and reliable operation.

2.1.26 Prevention of separation of barbecues from detachable trolleys

For a tabletop barbecue supported by a detachable trolley, means shall be provided to prevent inadvertent separation of the barbecue from the trolley.

2.1.27 Side burner pan support stability

A1 Except for special purpose burners, e.g. wok or fish burners, any pan supports shall give stable support for a 120 mm contact diameter utensil located both centrally and up to 25 mm off centre.

The design of the utensil shall be such that it is stable when placed empty on a flat surface.

2.2 MATERIALS AND STANDARDS

2.2.1 Suitability of materials and finishes

A2 The quality and thickness of the materials used in the construction of an appliance, and the method of assembling the various parts, shall be such that the constructional and performance characteristics do not alter significantly under normal conditions of installation and use for a reasonable life span.

In particular, when the appliance is installed according to accepted practice, all components shall withstand the mechanical, chemical and thermal conditions to which they may be subjected in the course of normal operation.

Materials containing asbestos are prohibited.

2.2.2 Materials in contact with gas

Materials in contact with gas shall be suitable for all gases.

A2 2.2.3 'Text deleted'

2.2.4 Zinc based alloys

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

Where zinc based alloy is used in any way that may affect the safe operation of the appliance—

- (a) the alloy shall comply with AS 1881 – TYPE ZN AL 4;
- (b) the temperature in use 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 d.

2.2.5 Thermal insulation

Thermal insulation shall not produce obnoxious odours or fumes or corrode materials with which it is in contact.

2.2.6 Compression fittings

Compression fittings on gas lines shall comply with the following conditions:

- (a) They shall be made to an acceptable standard and the mating surfaces shall be compatible.
- (b) The nominal outside diameter of the tube shall not exceed 20 mm.
- (c) Loose olives, where used, shall be symmetrical to prevent incorrect assembly, unless specifically designed to prevent such assembly.
- (d) Shear olives, where used, may be asymmetrical.
- (e) After making and breaking the fittings ten times, applying the torque value as listed in Table 2.1 to remake the fittings, the joints shall comply with the requirements of Clause 3.3.
- (f) The component parts shall be made of materials with a melting point of not less than 430°C.

TABLE 2.1
TORQUE VALUES

Nominal size mm	Torque Nm
6	15
8	20
10	35
15	50
20	75

2.2.7 Components required to be placed in a flame

Pilot burners, thermocouples and other components required to be placed in a flame shall be resistant to the effects of heat and corrosion. When refractory alloys are being used they shall not produce a catalytic cracking effect. Nickel alloys having less than 1% nickel such as AISI 416 / SUS 416 steel shall be acceptable.

2.2.8 Protection of aluminium tubing

The following measures shall be taken to protect aluminium tubing:

- (a) Aluminium tubing in areas of restricted ventilation shall be provided with a protective barrier to prevent corrosion due to contact with condensation, insulation and other materials of the appliance.
- (b) Aluminium tubing shall not be used where it may contact material of other than neutral reaction.
- (c) In post-mounted appliances, aluminium tubing within the post shall not be used less than 150 mm above the intended ground level. (See Clause 2.10.1 (o).)

2.2.9 Use of soft solder

Soft solder 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.

2.2.10 Resistance to corrosion

All surfaces shall be resistant to corrosion under normal conditions of use and installation.

2.2.11 Spark electrodes

Spark electrodes shall—

- (a) be made of high grade alumina cement or equivalent; and
- (b) have the firing tip made of nickel chromium steel or equivalent.

2.3 ELECTRICAL REQUIREMENTS

2.3.1 Requirements for electrical components and their installation

Electrical components, and their installation in the appliance, shall comply with the relevant requirements of the appropriate electrical authority. Documentary evidence of the suitability of electrical components shall be provided to the Certifying Body.

2.3.2 Accessibility to electrical components

Accessibility shall be provided to adequately service the electrical installation in the appliance.

2.3.3 Connection of electrical components

Electrical components or assemblies which may be required to be removed from an appliance shall not be connected by permanent or soldered joints except in the case of extra-low voltage circuits (as defined in AS/NZS 3000).

2.3.4 Plug and socket connections

Multiple pin plug and socket connections of electrical components within the appliance shall not be interchangeable.

2.3.5 Protection against accidental contact

Electrical parts other than extra-low voltage terminals, shall be enclosed so as to provide protection against accidental contact. Checking shall be carried out in accordance with AS/NZS 3100.

2.3.6 Protection of low voltage electrical components and wiring

Low voltage electrical components and wiring, if required to be energized to permit servicing of gas components on the appliance, shall be adequately protected against accidental contact. Checking shall be in accordance with AS/NZS 3100.

A2

2.3.7 Protection of light globes

Electric light globes shall be protected from damage.

2.4 APPLIANCE GAS PIPING CONNECTION REQUIREMENTS

2.4.1 Appliances for connection to cylinders

2.4.1.1 *Assembly of gas handling components*

The inlet hose assembly, after the cylinder connection shall be fully assembled to the first inlet point on the appliance. As an alternative to full assembly of the hose assembly to the appliance, an appropriate certified quick connect is also acceptable.

Any special tool required to carry out appliance connections, other than cylinder connections, which are intended to be made by the user, shall be supplied with the appliance.

NOTE: The intent of this Clause is to reduce the number of connections required to be carried out by the customer.

A1

2.4.2 Appliances for connection to the consumer piping using a quick connect device

All gas handling components, after the consumer piping connection shall be fully assembled to the first inlet point on the appliance. As an alternative to full assembly of the hose assembly to the appliance, an appropriate certified quick connect is also acceptable.

Any special tool required to carry out appliance connections, other than cylinder connections, which are intended to be made by the user, shall be supplied with the appliance.

NOTES:

- 1 The intent of this Clause is to reduce the number of connections required to be carried out by the customer.
- 2 The implementation date for this Clause is 1 January 2005.

2.4.3 Appliances intended to be permanently connected to consumer piping

A1

Where the appliance is intended to be permanently connected to a reticulated supply of gas, the appliance inlet connection shall have a thread in accordance with AS ISO 7.1.

2.4.4 Disconnection of appliances from fixed installation

Appliances designed for fixed installation shall be so designed that they may be readily removed from the installed position by disconnecting service connections and joints, without the necessity for further dismantling of pipe work.

2.4.5 Thread connections

A1 Where threads are used for connection to the appliance, all union mating surfaces and threads shall be compatible, and—

- A2 (a) the connections shall be 3/8" SAE Flare with 5/8-18 UNF threads; or
(b) the threads shall comply with AS ISO 7.1 or AS 1722.2.

2.4.6 Restraining tether for appliances with hoses, for connection to fixed gas supply

A2 Where a mobile appliance is to be connected to a fixed gas supply via a flexible hose connection, a restraining tether of adequate strength shall be fixed to the appliance and be suitable to be fixed to the wall within 50 mm of each connection point. The length of the tether shall not exceed 80% of the length of the hose assembly.

NOTE: The restraining tether is intended to prevent stress being imparted onto the hose assembly when the appliance is moved out of its normal operating position.

2.4.7 Quick connect devices

Quick connect devices, if provided, shall be certified to AS 4627.

2.4.8 Gas hose assemblies and limited flexibility connectors

Gas hose assemblies shall be certified to AS/NZS 1869. Limited flexibility connectors shall be certified to AS 4631.

2.5 MAINTENANCE REQUIREMENTS

2.5.1 Accessibility for adjustment

Components and integral parts that may require adjustment shall be accessible for such adjustment. In particular, the following shall be readily and easily adjusted without risk of injury while the appliance is operating:

- (a) Regulator adjustments.
- (b) Ignition devices.
- (c) Aeration controls.

NOTE: It is acceptable for the adjustment to be finalized with the burner removed, provided the setting will not be disturbed during replacement.

- (d) Gas consumption adjusters.

2.5.2 Accessibility for replacement

The following components that require to be removed for service shall be so made and attached to the appliance that they can be removed and replaced without undue risk of injury:

- (a) Regulator diaphragms and valves (body exempt).
- (b) Gas valve plugs.
- (c) Injector nipples.
- (d) Filters (gas).
- (e) Pilot head assemblies, pilot jets.
- (f) Burners.
- (g) Ignition devices.

- (h) Safety shut off systems.
- (i) Drip trays.
- (j) Radiant elements and surfaces.

2.5.3 Screwed connections

Components and assemblies of components with screwed connections shall be provided with flats for spanners unless accessible unions are provided on inlet and outlet connections.

2.5.4 Inaccessible nuts or bolts

Nuts or bolts in inaccessible positions that secure parts requiring to be removed for service shall be captive.

2.5.5 Insertion and removal of gas injectors

Screw-in gas injectors shall be made so that they can be inserted and removed without damage.

2.5.6 Dismantling, replacement and reassembly by the user

Any dismantling, replacement and reassembly, specified by the manufacturer and required to be carried out by the user, shall be easily carried out without tools or undue force. Incorrect reassembly shall be either impossible or completely obvious.

2.6 PRESSURE REGULATORS

2.6.1 Provision of pressure regulators

A certified gas pressure regulator shall be provided with each appliance. The regulator outlet pressure nominated by the appliance manufacturer shall not exceed:

- (a) Town gas, TLP: 0.63 kPa.
- (b) Natural gas: 1.00 kPa.
- (c) LPG: 2.75 kPa.

2.6.2 Provision of hose assembly

Where an appliance, including solid fuel-to-gas conversion kits, is intended for use with an LPG cylinder, a certified and compatible flexible hose assembly complying with Clause 2.4 shall be provided.

2.6.3 Positioning of regulators

Regulators shall be so placed that breather holes cannot easily be blocked, and overheating and the possibility of ignition of gas that may leak from the breather holes is minimized.

2.7 GAS CONTROLS

2.7.1 Accessibility by the user

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

2.7.2 Design of valve handles, movable dials and pointers

Valve handles, movable dials and pointers shall—

- (a) be so designed that they are not capable of being incorrectly assembled;
- (b) be securely attached to their spindles;
- (c) not contain loose parts that may become detached when the handles are removed; and
- (d) be designed or located to avoid accidental change of setting in use.

2.7.3 Indication of function

The off position of all gas valves shall be clearly indicated. Gas valves serving more than one function shall have the position of each function, including any specific lighting position, clearly indicated.

A2

2.7.4 Burner controls

Where it is intended that a user select individual burners, it shall be obvious which control is applicable to each burner.

Where controls and working parts are intended to be operated by the user, they shall be designed such that—

- (a) they are accessible and easily operated;
- (b) the movement of one does not cause inadvertent movement of another control; and
- (c) control knobs cannot be fitted in the wrong position or move by themselves.

2.7.5 Self-latching gas valves

Self-latching gas valves shall be fitted unless—

- (a) the valve handles are concealed; or
- (b) a flame safeguard is fitted; or
- (c) automatic ignition is provided (see Clause 1.2.5); or
- (d) the valve is spring loaded to return positively to the off position.

A2

2.7.6 Safety devices and interlocks

Safety devices, interlocks and their associated parts shall be adequately protected and shall not be capable of being inadvertently overridden. Safety shut off valve(s) shall not be bypassed. The operation of safety devices shall not be overridden by any other devices.

2.8 IGNITION, PILOTS AND MAIN BURNERS

2.8.1 Burner supports

Burner supports shall be such that the burners cannot be easily displaced in normal use.

2.8.2 Gas manifolds

Gas manifolds shall be firmly fixed to prevent displacement during handling or installation.

2.8.3 Proving ignition

It shall be possible, without removing parts, to readily observe that a burner or pilot is alight when the appliance is in operation.

2.8.4 Location of burner mixing tubes

Burner mixing tubes shall be positively located in relation to gas injectors. Where a mixing tube locates on an injector, provision shall be made to prevent the mixing tube from interfering with the operation of the injector.

2.8.5 Protection of ports and injectors

A2

For enclosed burners and pilots, either—

- (a) the burner shall be protected by a flame safeguard; or
- (b) any ports and injectors that may be exposed in their normal operation to falling particles, grease drippings, accidental spills or boilover shall be protected against blockage.

2.8.6 Side burner support shelf

The burner support shelf for any side burner shall be fixed in position and its removal shall require the use of a tool.

2.8.7 Removable burner caps

Removable burner caps, when in position, shall be secure and designed so that they cannot be disturbed in normal usage.

2.8.8 Holes for screws, pins, etc.

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

2.9 MARKINGS

2.9.1 Gas type indication

Where a colour code only is used to indicate the type of gas, it shall comply with the following:

- (a) Natural gas: Black.
- (b) Town gas: Dark blue.
- (c) Universal LPG: Signal red.
- (d) Propane only: Orange.
- (e) Butane only: Grass green.
- (f) Tempered LPG: Pink.
- (g) All gases: Primrose.

2.9.2 Packaging

The packing case of every appliance shall display clear markings—

- (a) indicating the maximum packaged weight in kilograms;
- (b) where the appliance is intended to be permanently connected to a reticulated supply of gas, showing the wording—
‘TO BE INSTALLED ONLY BY AN AUTHORIZED PERSON’; and
- (c) the text—
‘THE INSTRUCTIONS PACKAGED WITH THIS APPLIANCE CONTAIN IMPORTANT INFORMATION ABOUT INSTALLATION AND USE’.

NOTE: Where there is no packaging or the packaging is transparent, it is sufficient to place these markings on the appliance, provided they are visible.

2.9.3 Gas type

Appliances shall be provided with clear markings readily accessible and easy to read that provide the following information:

- (a) State the type of gas for which it has been manufactured and adjusted. The colour of the text shall be that appropriate to the gas specified as shown in the schedule in Clause 2.9.1.
- (b) For appliances intended for use with a flexible connection having a bayonet fitting, additional wording shall refer to the local gas authority for confirmation of the gas type, if any doubt exists.

2.9.4 Identification of injectors

Removable injectors shall be marked with numerals indicating the orifice size in millimetres or the standard drill size. In the case of pilot burner injectors a colour coding in accordance with Clause 2.9.1 is acceptable. Alternatively the injector size may be nominated on the data plate.

2.9.5 Permanent markings on appliances

Appliances shall be provided with clear and permanent markings readily accessible and easy to read and such markings shall include:

- (a) Manufacturer's trade name, or identifying logo, where the logo includes the maker's name.
- (b) Model designation.
- (c) Month and year of manufacture, or serial number where this is documented to show month and year of manufacture.
- (d) Gas or gases for which the appliance is intended to be used.
- (e) Nominal gas consumption in MJ/h and test point pressure in kPa for each gas nominated in (d) above. In the case of LPG appliances, the input may be stated alternatively in kg/h of the specified gas.

NOTE: Where a side burner (or other accessory burner(s)) is intended for sale with the appliance, the data plate shall state the total combined gas consumption.

- (f) For side burners attached to the appliance, the nominal gas consumption in MJ/h and test point pressure in kPa for each gas nominated in (d) above. In the case of LPG appliances, the input may be stated alternatively in kg/h of the specified gas.

NOTE: Where the side burner is intended for separate sale it shall carry its own permanent marking as required in Clause 2.9.5, with the exception of (j) and (k).

- (g) Electrical markings as required by the appropriate electricity authority.
- (h) Wiring diagrams except where electrical equipment is limited to one light globe.
- (i) The Certificate of Compliance number.
- (j) The appropriate warning label as shown in Figure A1, located on the outside of the appliance in a position where it is clearly visible to the user when operating the appliance in the installed/operating position.

The preferred layout for the label is as shown in Figure A1. 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 together as possible and the specification regarding text and symbol heights and colours shall be used.

- (k) Any required clearances from combustible materials.
- (l) The correct ignition procedure for all burners shall be located in a position where the operator can easily read it when the appliance is in the installed position.
- (m) Indication of those doors, covers and other components that shall be left open or removed during operation.
- (n) For covered appliances:
 - (i) A statement that the cover shall be in the open position prior to lighting and during operation unless the appliance is specifically designed to operate with the cover closed.
 - (ii) Clear marking indicating the manufacturer's recommendation for maximum cooking conditions with the hood closed.

- (o) For any side burner fitted with a fold-down lid:
 - (i) If the burner can be ignited with the lid closed, a marking that warns against igniting burners with the lid down.
 - (ii) If the burner can continue to operate after the lid is closed, a marking on the underside of the lid that warns against closing the lid with the burner operating.
- (p) For built-in appliances, any clearances which are necessary to ensure that the air inlet and combustion products outlet openings remain unobstructed.

A1

- (q) For appliances intended to be connected to a cylinder except for appliances where the hose assembly is connected with a quick connect device, the warning:
‘For storage and cylinder exchange, disconnect the cylinder only. Do not disconnect hose from the appliance.’

NOTE: The wording contained in this statement may be included in the label specified in Clause 2.9.5 (j).

A1

- (r) For appliances with storage compartments, the warning label shown in Figure A1A, in a position clearly visible to the consumer when looking inside the compartment.

2.9.6 Marking of flash lighting tubes

Flash lighting tubes that are used for the manual ignition of burners shall have the point of ignition suitably marked, unless this is obvious.

2.10 INSTRUCTIONS

2.10.1 Instructions to be supplied with all appliances

Each appliance shall be supplied with written and diagrammatic instructions that include at least:

- (a) Model or type of appliance.
- (b) Gas or gases for which the appliance is intended and data such as gas consumptions, pressures, etc. or reference to the appliance data plates.
- (c) Details of the removal of any transit protection.
- (d) Required surroundings of the appliance, clearance from combustible materials.
- (e) Special conditions that must be avoided, e.g. marine environment, and any conditions necessary to ensure optimum performance.
- (f) Where the appliance is supplied in kit form—
 - (i) step by step instructions for the assembly of the relevant components, with sufficient text and/or illustrations to ensure correct assembly;
 - (ii) a list of parts, including nuts, bolts, screws, washers, etc. with illustrated identification means; and
 - (iii) a list of tools necessary for the assembly.
- (g) Complete instructions for lighting the appliance, testing for leakage, etc.
- (h) Details of the necessary testing to be carried out, and instructions for minor adjustments.
- (i) Details of availability of service, parts etc.
- (j) The procedure to be adopted if the appliance cannot be adjusted to perform correctly.
- (k) A warning that the appliance shall not be used indoors.
- (l) The diagrams in Appendix F.

- (m) The following text:

‘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.’

- (n) The following text:

‘Any enclosure in which the appliance is used shall comply with one of the following:
An enclosure with walls on all sides, but at least one permanent opening at ground level and no overhead cover.

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

Within a partial enclosure that includes an overhead cover and more than two walls, the following shall apply—

- (i) at least 25% of the total wall area is completely open; and
- (ii) at least 30% of the remaining wall area is open and unrestricted.

In the case of balconies, at least 20% of the total of the side, back and front wall areas shall be and remain open and unrestricted.’

- (o) For post-mounted appliances, a warning that aluminium tubing used within the post shall terminate not less than 150 mm above the intended ground level.

A1

- (p) Details of the thread type of connections that are normally intended to be made by the consumer or the installer in the process of assembling the appliance or conducting maintenance. Details shall include thread type and size and method of obtaining the gas seal.

2.10.2 Additional instructions to be supplied with appliances designed for fixed installation

Each appliance designed for fixed installation shall be supplied with the following additional written and diagrammatic instructions that include at least:

- (a) The requirements of AS 5601/AG 601, local authority, gas, electricity, and any other relevant statutory regulations.
- (b) Overall dimensions of the appliance and location by measurement of connecting points of gas, flues, etc.
- (c) The alternative types of installations that may be made.
- (d) Details of the methods of connection and alternatives.
- (e) Special conditions of installation that may be required as the result of the Certification Test.
- (f) A reference to AS 5601/AG 601 for pipe sizing details.
- (g) Details for other trades, when method of installation affects other trades, e.g. details for a bricklayer. Also where electrical connections are required, details should be given for an electrician.
- (h) Details of any assembly work required to be done by the installer.
- (i) Details of the location of combustion air openings.
- (j) Definite instructions to test the operation of the appliance and instruct the user before leaving.
- (k) The procedure to be adopted if the appliance cannot be adjusted to perform correctly.

- (l) Details of the diameter, length and class of any flexible hose to be used where not supplied with the appliance.

2.10.3 Operating

2.10.3.1 *Operating instructions supplied with appliance*

Operating instructions shall be supplied with each appliance, covering each separate function of the appliance, the minimum LPG cylinder capacity, and such dismantling, cleaning and assembly as is necessary for the user.

2.10.3.2 *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 a reference as to where service and any necessary replacement parts may be obtained; and
- (d) include details for the removal, cleaning, and replacement of any devices (such as ‘spider guards’) fitted over primary air openings.

2.10.3.3 *Hazardous condition resulting from incorrect lighting and shutdown procedures*

Where incorrect lighting and shutdown procedures can result in a hazardous condition, appliances shall be provided with clearly defined and complete instructions to warn the user of the potential consequences of improper lighting procedures. Where necessary, lighting instructions shall require a safe delay before the appliance is re-lit.

SECTION 3 PRELIMINARY TESTS FOR LINE GASES

3.1 GENERAL REQUIREMENTS

Before commencing testing in this Section refer to Clause 2.1.1.

3.1.1 Nominal gas consumption

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.

3.1.2 Test gases

Tests in all parts of this Standard shall be carried out using the following test gases:

NOTE: See Table 1.2 for characteristics.

- (a) Appliances intended for use with natural gas shall be tested using available natural gas but in the case of dispute or borderline results test gas 'N' shall be used.
- (b) Appliances intended for use with town gas shall be tested using available town gas but in the case of dispute or borderline results test gas 'D' shall be used.
- (c) Appliances intended for use with propane only shall be tested with test gas 'X'.
- (d) Appliances intended for use with butane only shall be tested with test gas 'Y'.
- (e) Universal LPG appliances are intended for use with propane, butane or any mixture of propane and butane and shall be tested with test gas 'X' for all performance tests except for Clauses 5.1, and 5.2, where test gas 'Y' shall be used.

Nominal gas consumption shall be rated on test gas 'X' and this is the figure to be stated on the appliance data plate.

- (f) Appliances intended for use with tempered LPG shall be tested with test gas 'T'.

NOTE: Where an appliance is being tested for multi-gas certification, provided that the actual gas consumptions are not lower than for other gases, performance results for one gas may be deemed to apply for other gases for tests in Clauses 5.1—Temperature hazards and 5.2—Heat resistance.

3.1.3 Side burners and other accessory burners

Side burners and other accessory burners (such as rotisserie burners) attached to appliances shall be assessed independently for gas consumption, gas leakage, ignition and safety shut off systems to Clauses 3.3, 3.4 and 3.6.

3.2 PREPARATION FOR TESTING

3.2.1 Electrical safety requirements

The appliance shall comply with the following electrical safety requirements:

- (a) When the appliance is disconnected from the power supply the measured resistance between the earth pin of the plug and any exposed metal on the appliance shall not exceed 1 ohm for rotating parts and 0.1 ohm for all other parts.
- (b) When the appliance is disconnected from the power supply the measured insulation resistance between the current carrying conductors and any exposed metal shall not be less than 1 megohm. The resistance for double insulated equipment shall not be less than 10 megohms. All appliance switches shall be in the 'ON' position.

3.2.2 Setting up appliance for testing

The appliance shall be set up in accordance with the manufacturer's instructions unless otherwise specified in these approval test requirements, and checked to ensure that gas consumption, aeration, temperature settings and other adjustments have been made in accordance with the manufacturer's recommendations. Adjustments shall be made with the test gas which is applicable (see Clause 3.1.2) with the inlet pressure set at normal test gas pressure (see Clause 1.2.44).

3.2.3 Appliance regulator not to be removed during testing

Appliance regulators are to be considered an integral part of the appliance and shall not be removed during tests, unless specifically instructed otherwise.

3.2.4 Protection from accidental draughts

The appliance under test shall be protected from accidental draughts.

3.2.5 Gas pressure and gas volume test equipment

The following equipment shall be used for the control of testing pressures and the measurement of gas volume:

- (a) A wet test gas meter, which shall be calibrated before use. A graph should be provided showing the error or correction factor of the meter over as wide a range as possible.

The following also applies to the test gas meter:

- (i) A saturator shall be used with a wet test gas meter to ensure saturation of the gas.
 - (ii) It is permitted to use a calibrated dry gas meter or a calibrated flow meter for test purposes, but in case of dispute, the wet meter shall be the reference standard.
- (b) An adjustable regulator of adequate capacity fitted to the meter inlet.
- (c) Pressure gauges connected to meter inlet, appliance inlet and pressure test point, to read to the nearest 10 Pa.
- (d) A thermometer, graduated to at least 0.5°C installed to measure the gas temperature. The meter water temperature gives a sufficiently accurate figure.
- (e) A barometer, to measure atmospheric pressure in the laboratory correct to 30 Pa.
- (f) A means of determining within 1% the heating value of the gas being used.
- (g) A means of determining within 2% the relative density of the gas being used.

3.3 GAS LEAKAGE

3.3.1 Gas tightness

The fully assembled appliance shall be gas tight when subjected to an inlet gas pressure of 14.0 kPa.

3.3.2 Gas tightness after testing

The appliance shall be gas tight (as in Clause 3.3.1) at the conclusion of all certification tests.

3.4 GAS CONSUMPTION

3.4.1 Tolerance on determined gas consumption

The determined gas consumption in MJ/h of each burner shall be within 5% of nominal gas consumption.

A1

A1 3.4.2 Tolerance on determined gas consumption of multiple burners

The total determined gas consumption of all burners other than pilots, operating together in accordance with manufacturer's instructions, shall be within 20% of the sum of the nominal gas consumption of each operated burner.

3.5 GAS PRESSURE REGULATORS

3.5.1 Pressure regulator performance

The regulator outlet pressure shall not vary by more than $\pm 20\%$ from the nominal outlet pressure when the appliance inlet pressure is varied from 1.13 kPa up to 5.0 kPa for natural gas appliances and 0.75 kPa up to 3.0 kPa for town gas and TLP appliances.

3.6 IGNITION AND SAFETY SHUT OFF SYSTEMS

3.6.1 Requirements applicable to all ignition and flame safeguard systems

3.6.1.1 *Aerated pilots*

The following shall apply:

- (a) Aerated pilots when lit back, shall either ignite the main burner promptly and without undue noise or cause a safety shut off valve to close.
- (b) Aerated pilots, when their primary air opening is closed, shall either ignite the main burner promptly and without undue noise or cause the safety shut off valve to close.

3.6.1.2 *Ignition at reduced pilot rate*

When the pilot flame is turned down to the point where it will just actuate the flame safeguard system, the main burner, operating at any rate at which its control will permit, shall light safely and reliably from that pilot flame.

3.6.1.3 *Multi-port pilots*

Multi-port pilots shall conform to Clauses 3.6.1.1 and 3.6.1.2 with all ports blocked other than the one activating the flame safeguard sensor.

3.6.1.4 *Holding time for thermoelectric flame safeguard*

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 1 min of igniting the operating flame.

3.6.1.5 *Flame travel at ignition*

Flames shall travel freely to all ports on a burner when gas is ignited on any one port.

3.6.1.6 *Flame failure shut off time*

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 90 s where atmospheric type main burners are used and the total gas consumption is up to and including 50 MJ/h per supervised burner(s).

3.6.1.7 *Manual ignition by match*

An appliance designed for manual ignition shall be readily lit by means of a 40 mm match. In the case of multiple burner appliances, ignition by match of one burner shall be acceptable provided that cross-ignition means ensure safe and effective ignition of part of or the complete burner system.

The provision of a permanently attached device to facilitate the use of a match is acceptable.

3.6.1.8 *Cross-ignition*

When operated in accordance with the manufacturers instructions safe cross lighting from the first ignited burner to all other burners shall be possible.

NOTE: This test does not apply if the burners are designed for independent burner ignition, e.g. each burner with its own igniter and/or flame safeguard.

3.6.1.9 *Commencement of ignition after purge period*

Where a pre-ignition purge period is included, the means of ignition shall commence immediately after the purge period is completed.

3.6.1.10 *Proving of start flame*

Gas shall not flow beyond the start flame establishment period unless the start flame has been proven. Where the start rate is less than the maximum rate the start flame shall be proven before the gas rate increases beyond the start flame rate.

3.6.1.11 *Flame establishment period—intermittent pilot*

Where an interrupted or intermittent pilot is used, the main flame establishment period shall not exceed 5 s.

3.6.2 **Additional requirements for automatic burner ignition systems**

NOTE: Systems based on permanent pilots are exempted from this Section.

3.6.2.1 *Atmospheric burners*

3.6.2.2 *Start flame establishment period*

The start flame establishment period shall not exceed 5 s except—

- (a) for start gas rates up to 50 MJ/h – 15 s;
- (b) for start gas rates up to 4 MJ/h – 90 s.

3.6.2.3 *Gas flow rate at ignition*

The gas flow rate at the time of ignition shall meet one of the following criteria—

- (a) the gas flow rate in MJ/h shall not exceed $200 \frac{V}{T}$

where

V is the volume of the combustion chamber in m³ and

T is the start flame establishment period in seconds

or

- (b) the energy released during the start flame establishment period shall not exceed 0.1 MJ

or

- (c) the energy released during the start flame establishment period shall satisfactorily meet delayed ignition tests up to twice the flame establishment period.

NOTE: As this is a safety test under abnormal operation, explosive noise and flame roll-out may be acceptable provided—

- (a) there is no damage to the appliance;
- (b) the burner does not light back; and
- (c) there is no danger to persons or adjacent property.