

Australian Standard[®]

Domestic gas cooking appliances



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The following are represented on Committee AG-001:

- Appliance and Component Testing
 - Australian Gas Association
 - Australian Greenhouse Office, Department of the Environment and Water Resources
 - Consumers' Federation of Australia
 - Energy Networks Association
 - Gas Appliance Manufacturers Association of Australia
 - Gas Association of New Zealand
 - Gas Technical Regulators Committee
 - Gas Utilisation Institute
 - LPG Australia
 - Master Plumbers, Gasfitters and Drainlayers New Zealand
 - Ministry of Economic Development (New Zealand)
 - New Zealand Employers and Manufacturers Association
-

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Australian Standard[®]

Domestic gas cooking appliances

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PREFACE

This Standard was prepared by the Standards Australia Committee AG-001, Gas Appliances to supersede AS 4551—2000 (AG 101—2000), Domestic gas cooking appliances.

This Standard incorporates Amendment No. 1 (December 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 gas cooking appliances.

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

In its preparation, consideration has been given to—

- (a) the 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.

AS 5601 provides essential requirements and basic standards for gas installations.

The principal differences between this edition and AS 4551—2000 (AG 101—2000), are marked by a line in the margin. These differences may be a new or revised definition, Clause, Figure or Method of Test (M.O.T.).

The following have been deleted:

- (i) Definitions: AGA, ALPGA, Approved, Authority, Bypass screw, Direct fired oven, Flame blow off, Flame lift, Grill fret, Grill grid (smokeless), Indirect fired oven, Interrupter screw, Piezo electric ignition, Rotisserie, Semi-automatic ignition, Simmer gas consumption and Terminal.
- (ii) Clauses: 2.1.14, 2.3.2, 2.5.1, 2.7.4, 2.7.5, 2.7.6 (both Clauses are now incorporated into 2.10.8.3 (a) and (b)), 2.8.10, 2.11.2.7 (incorporated in Clause 2.11.3), 3.7.3 (now Clause 4.8), 5.7.4 and 5.7.6 (incorporated in Clause 2.2.5).
- (iii) Figures: 1, 2, 5 and 8 (replaced by dew plate).

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 gas cooking appliances

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

These requirements apply to domestic gas cooking appliances, including stovettes, hotplates and separate ovens intended for use with natural gas, town gas, liquefied petroleum gas and tempered liquefied petroleum gas.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard.

AS	
1074	Steel tubes and tubulars for ordinary service
1375	Industrial fuel-fired appliances
1432	Copper tubes for plumbing, gasfitting and drainage applications
1450	Steel tubes for mechanical purposes
1722	Pipe threads of Whitworth form
1722.1	Part 1: Sealing pipe threads
1751	Copper brazed steel tubes
1769	Welded stainless steel tubes for plumbing applications
1832	Malleable cast iron
1881:1986	Zinc Alloys—Casting ingots and castings—Quality requirements
2129	Flanges for pipes, valves and fittings
3688	Water supply—Metallic fittings and end connectors
4567	Twin wall metal flues—Gas appliances
4617	Manual shut off gas valves
4620	Thermoelectric flame safeguards
4625	Electronic flame safeguards and flame detectors
4629	Automatic shut off valves and vent valves
4646	Gas appliance standards—Definitions and calculations
5601	Gas installations
D26	Tube fittings with Dryseal American standard taper pipe and unified threads for automotive and industrial use
AS/NZS	
1167	Welding and brazing-filler metals
1167.1:2005	Part 1: Filler metal for brazing and braze welding

AS/NZS	
1869	Hose and hose assemblies for liquefied petroleum gases
3000	Electrical installations
3100	Approval and test specification—General requirements for electrical equipment
3350	Safety of household and similar electrical appliances
3350.1	Part 1: General requirements (IEC 60335-1, MOD)
3500	Plumbing and drainage
3500.0	Part 0: Glossary of terms
ISO	
6976	Natural gas—Calculation of calorific values, density, relative density and Wobbe index from composition
BS	
3193	Specification for thermally toughened glass panels for use in domestic appliances
EN	
298	Automatic Gas Burner Control Systems for Gas Burners and Gas Burning Appliances With or Without Fans

OTHER DOCUMENTS

DEAN, John A, *Lange's Handbook of Chemistry*, 15th Ed., McGraw-Hill Professional, 1998.

1.3 DEFINITIONS

For the purposes of this Standard, the following definitions apply:

1.3.1 Appliance flueway

A port or passage conveying flue gases within the appliance.

1.3.2 Appliance flueway terminal

A protective device fitted to the exit of an appliance flueway of a flueless appliance.

1.3.3 Appliance regulator

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

1.3.4 Authority having jurisdiction

The authority having statutory (legal) control.

1.3.5 Automatic ignition

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

1.3.6 Automatic operation

The use of a sequence of operations which, once initiated, does not require any intermediate manual operation.

1.3.7 Automatic shut off valve

An automatic valve used to shut off gas supply to an appliance.

1.3.8 Available gas (line gas)

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

1.3.9 Bain marie

An appliance that keeps cooked food hot, using water or air.

1.3.9.1 *Wet bain marie*

A wet bain marie may be either:

1.3.9.1.1 *Open well type*

Food containers are placed on a perforated metal plate. The water level in the bain marie just covers the metal plate and the appliance is operated entirely without covers.

1.3.9.1.2 *Fitted container type*

Fitted food containers with lids are recessed in the top surface of the appliance. The containers are heated by water or air that is saturated with water vapour.

1.3.9.2 *Dry bain marie*

A dry bain marie may be either:

1.3.9.2.1 *Hotpress type*

The food containers are placed in a heated cupboard or on a heated top.

1.3.9.2.2 *Fitted container type*

Fitted food containers with lids are recessed in the top surface of the appliance. The containers are heated by dry air.

1.3.10 Burner port

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

1.3.11 Bypass

An integral part of a gas control that enables a preset volume of gas to bypass the control.

1.3.12 Calibration

The determination of the relationship between the measured or indicated value of a parameter and its true value.

1.3.13 Caravan

A structure that is or was designed or adapted to be moved from one place to another, whether towed or transported, which is intended for human habitation or use as a workplace, and includes a self-propelled recreational vehicle or mobile home. Included is any associated annex and the like, whether permanently or temporarily attached to, or adjoining, the main portion of the structure.

NOTE: A large structure assembled in a factory and transported to a permanent location is not considered a caravan, e.g., portable school classrooms or transportable homes.

1.3.14 Certified/Certification

Assessed by a Certifying Body and having a certificate number to demonstrate compliance with a Standard.

1.3.15 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.

1.3.16 CO/CO₂ ratio

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

1.3.17 Combustible materials

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

1.3.18 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.

1.3.19 Compression fitting

Compression fittings and components as defined in AS/NZS 3500.0.

1.3.19.1 *Type 1 (non-manipulative) compression fitting*

A fitting for a compression joint that does not require any working of the tube other than cutting square. The joint is made tight by means of a loose compression ring that grips the outside wall of the tube when the coupling nut is tightened.

1.3.19.2 *Type 2 (manipulative) compression fitting*

A fitting in which the joint is made by flaring, croxing, capping or beading the end of the tube which is then compressed by the coupling nut against the shaped end of the corresponding section in the fitting.

1.3.20 Continuous cleaning surface

An oven interior finish which, in the course of ordinary use, does not accumulate stains or deposits.

1.3.21 Determined gas consumption

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

1.3.22 Direct ignition device

A device which provides ignition of a burner without the use of another flame.

1.3.23 Draught diverter

A device, without moving parts, fitted in the flue of an appliance for isolating the combustion system from the effects of pressure changes in the secondary flue.

1.3.24 Electronic flame safeguard

A flame safeguard utilising electronic components to perform its function.

1.3.25 Enclosed burner

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

1.3.26 Excess air

Air in excess of that required for complete combustion which is mixed unchanged with the combustion products in the combustion chamber.

1.3.27 Flame abnormality

A flame condition which results in appreciable yellow tipping and carbon deposition (except in the case of appliances specifically designed for a luminous effect), lifting, floating, lighting back or objectionable odour.

NOTES:

- 1 If the length of the yellow tipping is less than 20% of the total length of the flame on visual inspection it is not considered to be appreciable yellow tipping
- 2 In appliances designed specifically for a luminous effect, yellow tipping or limited carbon deposition within the appliance are not considered abnormal.

1.3.28 Flame detector

A device that is sensitive to flame properties and initiates a signal when flame is detected.

1.3.29 Flame establishment period

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.

1.3.30 Flame failure response time

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

1.3.31 Flame proving period

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

1.3.32 Flame safeguard

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

1.3.33 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.

1.3.34 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.

1.3.35 Flue

The passage through which flue gases are conveyed from an appliance to a discharge point (i.e. flue terminal) excluding draught diverter, barometric device, fan or similar part.

1.3.36 Flue connection

A device incorporated in an appliance for the connection of a flue system.

NOTE: Where the draught diverter, barometric device, fan or similar component is an integral part of the appliance, the discharge point of the integral part shall be deemed to be the flue connection.

1.3.37 Flue cowl

A fitting placed at the flue terminal of an open flued appliance, designed to prevent the entry of rain or the disturbing effect of wind while not interfering with the discharge of flue gases.

1.3.38 Flue gases

Combustion products plus all diluents and contaminants intermixed with the combustion products. These include, where applicable, excess air, dilution air, process air, and waste products from the process.

1.3.39 Flue system

The passage through which flue products are conveyed from an appliance to a discharge point (i.e. flue terminal) including draught diverter, barometric device, fan or similar part.

1.3.40 Flue terminal

- (a) In the case of a flueless appliance, the point at which the flue products discharge from the appliance.
- (b) In the case of a flued appliance, the point at which the flue products discharge from the flue into the atmosphere or into a flue cowl, if fitted.

1.3.41 Forced convection oven

An oven in which the internal atmosphere is circulated by a fan.

1.3.41A Freestanding cooking appliance

A cooking appliance, comprising an oven or ovens, a number of open burners and, usually, a grill, which is designed to be installed on a floor.

1.3.42 Gas

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

1.3.42.1 Natural gas (NG)

A hydrocarbon consisting mainly of methane.

1.3.42.2 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.

1.3.42.3 Town gas (TG)

A gas manufactured from coal or petroleum feedstocks.

1.3.42.4 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.

1.3.42.5 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 and butene (butylene).

1.3.43 Gas consumption

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

1.3.44 Glass ceramic

An inorganic fusion product with added nucleating agents which, upon cooling, initially solidifies to glass, but crystallises out in various phases owing to subsequent thermally controlled treatment. A characteristic of the product is a near zero coefficient of linear thermal expansion.

1.3.45 Griddle

A solid plate heated from below which is used to cook food directly on its surface. Also known as a dry-fry plate, hamburger plate or grill plate.

1.3.46 Grill dish or grill tray

A dish or tray that catches any drips from the grill operation, and contains the grill grid.

1.3.47 Grill grid

The wire work grid or perforated plate on which is placed the food to be cooked by a griller.

1.3.48 Griller

An appliance for cooking food by radiant heat.

1.3.49 Gross oven volume

The total volume of the oven between side walls, top and floor, inner door face and oven back panel.

1.3.50 Heating value, gross (at constant pressure)

The number of megajoules (MJ) 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 is based upon ISO 6976 as referenced in AS 4646.

1.3.51 Hose assembly

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

1.3.52 Hotplate

A hotplate contains one or more burners which heat from underneath, by direct flame contact, the bases of vessels placed over them.

1.3.53 Indoor flueless appliance

An indoor appliance designed to discharge its combustion products into the same room or space in which it is installed.

1.3.54 Injector

A device which 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.

1.3.55 Intermittent pilot

A pilot which is automatically ignited each time the burner is started and which is automatically extinguished with the main burner.

1.3.56 Interrupted pilot

A pilot which is automatically ignited each time the burner is started and which is automatically extinguished at the end of the main flame establishment period.

1.3.57 Lift (flame)

Separation of a flame from a burner port, whilst it continues to burn with its base some distance from the port.

1.3.58 Light back

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

1.3.59 LPG

See Clause 1.3.42—Gas.

1.3.60 Manual ignition

1.3.60.1 Direct manual ignition

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

1.3.60.2 Remote manual ignition

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

1.3.61 Mixing tube

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

1.3.62 Natural gas

See Clause 1.3.42—Gas.

1.3.63 Net oven volume

The useable volume of an oven, calculated from the height, width and depth as set out below.

1.3.63.1 Height

This is measured from the lowest portion of the oven on which a food container can be placed (usually the oven floor) to the lowest portion of any thermostat or other projection that can interfere with the insertion of food, or to the top of the door opening, whichever is lowest.

1.3.63.2 Width

This is measured between the shelf supports.

1.3.63.3 Depth

This is measured from the leading edge of the grid to the unrestricted depth to which the tray may be introduced.

1.3.64 Nominal gas consumption

The appliance gas consumption, in megajoules (MJ/h) 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.

1.3.65 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.

1.3.66 Normal test gas pressure

0.75 kPa for TG and TLP, 1.13 kPa for NG and SNG, 2.75 kPa for LPG.

1.3.67 Open flued appliance

An indoor appliance designed to be connected to an open flue system, its combustion air being drawn from the room or space in which it is installed.

1.3.68 Overload gas consumption

120% of nominal gas consumption for all gases other than LPG. For LPG, it is the gas consumption that results when gas at a pressure of 3.5 kPa is supplied to the appliance inlet.

1.3.69 Permanent pilot

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

1.3.70 Pilot

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

1.3.71 Primary aeration control

An adjustable device for controlling primary air in an atmospheric burner.

1.3.72 Primary air

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

1.3.73 Primary air ports

The openings in an aerated burner for primary air.

1.3.74 Primary flue

That portion of the flue system conveying flue products from an appliance to the draught diverter, barometric device, fan or similar part when fitted.

1.3.75 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.

1.3.76 Programmed ignition

A multi-stage system of automatic ignition where each stage takes place automatically in a pre-determined sequence.

1.3.77 Programming flame safeguard

A flame safeguard which automatically sequences at least two burner functions such as ignition spark, gas valve, etc.

1.3.78 Protected pilot

A pilot which is fitted with a flame safeguard.

1.3.79 Reference gas

The gas corresponding to an average of the gases most currently distributed, and for which the appliance has been specifically designed. See Clause 1.3.95—Test gases.

1.3.80 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 is based upon ISO 6976 as referenced in AS 4646.

1.3.81 Safety shutdown

The action of shutting off all gas and ignition energy by means of a safety control such that restart cannot be accomplished without a full start cycle.

1.3.82 Safety shut off system

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

1.3.83 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.

1.3.84 Secondary air

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

1.3.85 Secondary flue

That portion of the flue system conveying flue products from the draught diverter, barometric device, fan or similar part to the flue terminal.

1.3.86 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.

1.3.87 Simulated natural gas (SNG)

See Clause 1.3.42—Gas.

1.3.88 Specific gravity

See Clause 1.3.80—Relative density.

1.3.89 Spillage

A condition in which the combustion products are not cleared by the flue but escape from the appliance or the draught diverter relief openings.

1.3.90 Standard test vessels

As set out in Table 1.1.

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

NOTES:

- 1 For fish burners use special purpose pots as recommended in the manufacturer's operating instructions.
- 2 For a standard 230 mm aluminium saucepan, see Figure A10.
- 3 For determination of CO/CO₂ ratio and NO₂ emission rate of hotplate burners use a 230 mm diameter vessel for all nominal gas consumptions greater than 9 MJ/h.

1.3.91 Stovette

A small gas cooking appliance, carrying one or more top boiling burners and having a gross oven volume not greater than 0.04 m³.

1.3.92 Surface combustion burner

A burner where combustion takes place on the surface of a perforated or porous material or gauze.

1.3.93 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).

1.3.94 Tempered liquefied petroleum gas (TLP)

See Clause 1.3.42—Gas.

1.3.95 Test gases

The test gases used in these requirements are defined in Table 1.2, 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.

1.3.96 Thermostat

A temperature control device which automatically maintains a pre-determined temperature in an appliance or component.

1.3.97 Thermostat bypass

An integral part of a thermostat control which enables a preset volume of gas to bypass the thermostat valve.

1.3.98 Town gas

See Clause 1.3.42—Gas.

1.3.99 Trivet

Grid located over the hotplate to support vessel being heated.

1.3.100 Turndown gas consumption**1.3.100.1** *Burners under thermostatic control*

Bypass gas consumption.

1.3.100.2 *Burners not under thermostatic control*

Gas consumption at the marked or limited turndown setting.

1.3.101 Useable shelf area

The area calculated from the overall dimensions of the oven shelf less 5 cm clearance at the front and 5 cm clearance each side.

1.3.102 Wobbe index (Wobbe number)

The Wobbe index of a gas is—

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

1.3.103 Wok

A hemispherical vessel used for cooking Chinese food.

TABLE 1.2
TEST GAS

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
Na		—	86	14	—	—	—	—	45.7	0.692	55.0
Nb		13	87	—	—	—	—	—	34.4	0.492	49.1
Nc		—	90	—	—	—	10	—	34.0	0.596	44.0
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
Ta		—	—	29	—	—	—	71	27.3	1.153	25.5
Tb		—	—	25	—	—	—	75	23.6	1.131	22.1
A	TG	50	—	18	—	—	32	—	23.0	0.619	29.2
B		65	—	7	—	—	28	—	14.5	0.423	22.2
C		28	—	18	—	—	54	—	20.3	0.817	22.5
D		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 its installation and operation, sufficient for testing, have been received and studied. The appliance shall not be dismantled for 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 shall satisfy the design, construction and other 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, no time will be spent in testing until the manufacturer has made the necessary adjustments.

2.1.3 Certification of safety components

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

NOTE: This includes, for example, automatic ignition systems, flame safeguards 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 gas valves

Manual shut off valves fitted to an appliance shall be approved as Type 1 or Type 2 in accordance with the classification specified in AS 4617.

2.1.6 Minimum classification of safety shut off valves

| Safety shut off valves for atmospheric burners shall comply with AS 4620 or AS 4629, Class 3.

NOTE: Refer to Clause 2.7.5 for fitting of flame safeguard systems.

2.1.7 Compliance of electrical components

Electrical components and their installation in the appliance shall comply with the requirements of the appropriate electrical authority. Documentary evidence for suitability of electrical components shall be provided to the testing authority.

2.1.8 Power failure

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

2.1.9 Oven thermostats

An approved 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.

2.1.10 Prevention of inadvertent placement of oven utensils in a flame

Ovens shall be designed so as to prevent the accidental placement of oven shelves or cooking utensils in a position where they may be impinged upon or directly heated by a burner flame.

2.1.11 Provision of oven shelves

At least two shelves shall be provided with every oven with capacity greater than 0.04 m³ and one shelf for every other oven.

2.1.12 Prevention of accidental removal of oven shelves

Oven shelves shall not be capable of being accidentally removed but shall be capable of complete removal.

2.1.13 Stability of oven shelves

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

2.1.14 Oven door stability

Oven doors shall be so constructed that, when fully open, they will remain in that position.

2.1.15 Provision of explosion relief for ovens with door locks

Positive door locks shall not be used unless adequate provision for explosion relief is made.

2.1.16 Glass top hotplates and fold-down lids

The following requirements apply to glass top hotplates and fold-down lids:

- (a) Glass top hotplates and glass fold-down lids shall be so designed as to prevent scatter in the event of breakage.
- (b) If it is possible to operate the hotplate burners when the glass lid is in the fold-down position, the glass shall not scatter when subjected to impact after operating the largest hotplate burner at full rate for 15 min with the lid closed and after cooling for 30 min.
- (c) If the appliance gas system incorporates a means that prevents gas flow when the lid is closed, automatic re-establishment of gas flow shall not occur when the lid is lifted.

2.1.17 Provision of vessel support independent of glass hobs

Appliance hotplates incorporating glass hobs shall be so designed that vessels are adequately supported independent of the glass.

2.1.18 Heat input of hotplate burners

For appliances having three or more hotplate burners, at least one shall be a rapid burner (10.0 MJ/h up to 12.0 MJ/h for NG, TG or TLP or 8.0 MJ/h up to 12.0 MJ/h for LPG) or ultra-rapid burner (greater than 12.0 MJ/h) and at least one shall be a semi-rapid burner (4.0 MJ/h up to 8.0 MJ/h).

2.1.19 Support of vessels by trivets

Except for special purpose burners, e.g. wok or fish burners, all trivets shall give stable support for a 120 mm contact diameter utensil located both centrally and up to 25 mm off centre. At least one trivet shall also give stable support to 100 mm diameter utensils similarly located.

The design of the utensil shall be such that it is stable when placed empty on a flat surface and the use of a detachable mini-trivet is acceptable for the 100 mm contact diameter utensil stability.

2.1.20 Positive location of trivets

Positioning of trivets shall be positive and shall prevent any re-arrangement or displacement from the design position unless it can be demonstrated that the appliance complies with Clauses 4.3 and 5.13.1 in every reasonable alternative arrangement.

2.1.21 Location of utensil supports

Utensil supports shall not be displaced from their working position under conditions of normal use.

2.1.22 Provision for retention of or access to spills

Provision shall be made so that spill-over of 140 mL from hotplate or oven cooking can be easily cleaned.

2.1.23 Use of continuous cleaning surface finishes in ovens

When continuous cleaning surface finish is used on the base of an oven, provision shall be made for the collection of floor spillage. Such provision shall be easily removed for cleaning.

2.1.24 Provision of grill trays and grids

Appliances fitted with grillers are to be supplied with a grill tray and grid.

2.1.25 Prevention of accidental removal of grill trays

A grill tray with integral slides or a grill tray located in a rack which slides out of a cooker for access, shall be designed such that—

- (a) the tray cannot be accidentally removed;
- (b) the tray can be removed completely; and
- (c) the full tray surface shall be accessible with tongs having a minimum length of 200 mm.

2.1.26 Dimensions of grill trays and grids

The dimensions of grill grid and tray shall be:

- (a) 150 mm minimum width.
- (b) 225 mm minimum length.
- (c) 19 mm in one direction (maximum) bar spacing.
- (d) The grill grid in conjunction with the tray shall be capable of providing a clearance of at least 50 mm between the grid and the lowest projection above and in way of it.

2.1.27 Sharp edges

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

2.1.28 Handles and knobs

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

2.1.29 Griller controls

Any griller burner control shall have a discernible stop at the marked turndown setting.

2.1.30 Continuity of satisfactory operation

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

2.1.31 Insulation

Insulation shall be fitted in such a way that it is not rendered ineffective or objectionable, during the normal operation of the appliance, by—

- (a) settling;
- (b) dislodgement; or
- (c) spill-over and/or condensation.

2.1.32 Protection of vitreous enamel

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

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

2.1.33 Means of support

The appliance shall be provided with adequate means of support, which shall not allow the appliance to rock on a level surface or have sharp edges in contact with the floor.

2.1.34 Compliance in alternative forms

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

2.1.35 Protection of hose assemblies

Where an appliance may be installed with a hose assembly, the appliance shall be constructed so that when installed under normal operating conditions in accordance with the manufacturer's instructions, the hose assembly supplied or specified by the manufacturer shall—

- (a) not be exposed to temperatures exceeding that for which it is certified;
- (b) not be subject to abrasion, kinking or permanent deformation; and
- (c) be suitable for the connection method specified in Clause 2.4.2.

Where a hose assembly is not normally provided by the appliance manufacturer, a sample shall be made available for assessment.

2.1.36 Locking means for adjusting devices

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

2.1.37 Sealing of gas consumption adjustments

Gas consumption adjusting devices where provided shall be sealed against unauthorized alteration to setting.

2.1.38 Means for gas pressure measurement

Readily accessible means, designed to accept 6 mm bore flexible tubing, shall be provided to allow the gas pressure in the appliance to be measured while the appliance is in operation. Where a separate pressure test point is fitted, it shall contain a limiting orifice not exceeding 1.0 mm diameter or equivalent restriction.

2.2 MATERIALS

2.2.1 General

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 during a reasonable life and under normal conditions of installation and use.

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.

2.2.2 Materials containing asbestos

Materials containing asbestos are prohibited.

2.2.3 Materials in contact with gas

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

2.2.4 Material used in gas appliances

Materials used in gas appliances shall comply with the following Standards, or equivalent, where applicable.

- (a) Medium or higher grades of black steel pipe shall comply with AS 1074.
- (b) Copper-brazed double wall low carbon steel tubing (Bundyweld) shall comply with AS 1751. This shall be lead-tin coated or equivalent where corrosion protection is necessary.
- (c) Welded and cold drawn low carbon steel tubing shall comply with AS 1450 (S.A.E.-525B).
- (d) Copper pipe shall comply with AS 1432.
- (e) Stainless steel tubing shall comply with AS 1769.
- (f) Cast iron fittings shall comply with AS 1832; Threads shall comply with AS 1722.1.
- (g) Flanges in cast iron, carbon steel, steel alloy or copper alloy shall comply with AS 2129.
- (h) Steel fittings shall comply with AS D26.
- (i) Copper alloy fittings shall comply with AS D26.
- (j) Copper alloy fittings shall comply with AS 3688.
- (k) Copper capillary fittings shall comply with AS 3688, silver brazing rod shall comply with AS/NZS 1167.1, Table 2, alloy designation B2 or a comparable rod.

2.2.5 Zinc based alloys

Zinc based alloys shall not be used in contact with water. Where failure of a zinc based alloy may affect the safe operation of the appliance—

- (a) the alloy shall comply with AS 1881 – TYPE ZN AL 4;
- (b) the alloy shall not be exposed to a temperature exceeding 80°C during normal operation of the appliance; and
- (c) under the conditions of MOT 2.2.5 the alloy shall not swell, crumble or develop cracks.

2.2.6 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 steel shall be acceptable.

2.2.7 Materials used in electrical construction

Materials used in electrical construction shall be suitable for the application, in particular:

- (a) Electrical insulation shall be of a moisture resistant material.
- (b) High-tension wiring shall be temperature resistant.
- (c) Insulation shall have adequate mechanical and dielectric strength.

2.2.8 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.

2.2.9 Protection of aluminium tubing

Aluminium tubing in areas of restricted ventilation shall be provided with a protective barrier to prevent corrosion due to contact with condensation, oven cleaning materials, insulation and other materials of the appliance.

2.2.10 Thermal insulation

Thermal insulation shall not contaminate any food or water in the appliance, produce obnoxious odours or fumes or corrode materials with which it is in contact.

2.2.11 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.
- (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 2.2 to remake the fittings, the joints shall comply with the requirements of Clause 3.3.

TABLE 2.2
TORQUE VALUES

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

- (f) The component parts shall be made of materials with a melting point not less than 430°C.

2.2.12 Glass

Glass used for oven doors, hotplates and fold-down lids shall be thermally toughened glass complying with the performance requirements of BS 3193 or ceramic glass.

2.2.13 Hose assemblies

Hose assemblies for use with cooking appliances shall be certified as conforming to AS/NZS 1869 and be Class B or Class D.

2.3 ELECTRICAL SYSTEMS

2.3.1 Connection to the mains electrical supply

Appliances intended for connection to the mains electrical supply shall be designed for 240 volt single phase or 415 volt three phase, 50 Hz a.c.

2.3.2 Access to electrical system

Access shall be provided to adequately service the electrical wiring and components in the appliance.

2.3.3 Servicing accessibility

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

2.3.4 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.

2.3.5 Plug and socket connections

Plug and socket connections of electrical components within the appliance shall be either—

- (a) non-interchangeable;
- (b) colour coded; or
- (c) appropriately identified.

2.3.6 Protection against accidental contact

Electrical parts other than extra low voltage terminals shall be enclosed to provide protection against accidental contact. Checking shall be carried out in accordance with AS 3350.1.

2.3.7 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 carried out in accordance with AS/NZS 3100.

2.3.8 Protection of light globes

Electric light globes shall be protected from damage.

2.3.9 Motor bearings suitability

Details and specifications shall be supplied by the manufacturer showing that bearings of motors, blowers or fans are of a type suitable for the temperatures to which they are subjected in normal operation.

Normal operation shall mean operating at nominal gas consumption with the fan operating at all fan speeds (including the 'OFF' position if the heater will function in that condition).

2.4 INSTALLATION REQUIREMENTS

2.4.1 Supply of hose assemblies

Where the use of a hose assembly is the only option for connecting the appliance to consumer piping, a hose assembly shall be supplied with the appliance by the manufacturer. For an inbuilt oven that may be installed with a hose assembly, the hose assembly shall be specified or supplied by the manufacturer.

2.4.2 Suitability for installation with a hose assembly

Where an appliance may be installed with a hose assembly supplied or specified by the manufacturer, this hose assembly shall be suitable for connection to a fixed consumer piping outlet located as follows (see Figure A18):

- (a) Inbuilt ovens at a point 350 mm to 400 mm above floor level and in the region of the width of the appliance plus 250 mm either side. Where an in-built oven is installed in an under-bench position, the connection point shall not be behind the appliance.
- (b) Hotplates at a point 800 mm to 850 mm above the floor and in the region outside the width of the appliance to a distance of 250 mm.
- (c) Elevated appliances at a point 350 mm to 400 mm above floor level and within the width of the appliance.
- (d) Upright appliances (rear connection)—
 - (i) 450 mm to 550 mm from the floor and 200 mm to 300 mm from the left-hand side of the appliance as viewed from the front;
 - (ii) the hose connection on the appliance shall face downwards;
 - (iii) an anchor point shall be provided on the appliance so that a restraining device can be fitted to restrict the appliance movement to no more than 80% of the hose length; and
 - (iv) if the hose assembly is supplied with the appliance it shall be between 1 m and 1.2 m in length.

2.4.3 Fixing of gas inlet connection

The gas inlet connection shall be firmly fixed. The regulator shall be anchored to prevent rotation while making the connection. This requirement shall be deemed to be met if the regulator can be held in position by means of a spanner while making the connection in accordance with the manufacturer's installation instructions.

2.4.4 Gas inlet connection thread

The gas inlet connection:

- (a) shall have a thread in accordance with the appropriate part of AS 1722;
- (b) shall have a certified quick-connect device; or
- (c) for appliances intended for marine craft or caravans, may be SAE Flare.

2.4.5 Access to connections

The gas inlet connection shall be located so that sufficient free space is available for the union connection to be made or disconnected using normal tools.

2.4.6 Provision of means of preventing tilting

Means shall be provided to prevent an upright cooker from tilting when a horizontal force of 250N is applied at the height of the hob in any direction. This means shall be so designed to prevent accidental dislodgement.

2.4.7 Provision of braking mechanism and hose assembly for appliances fitted with wheels

Appliances fitted with wheels or castors shall incorporate a brake or other means to prevent movement when in the installed position.

The appliance shall be designed to meet the requirements of Clause 2.4.2 and it shall be supplied with a hose assembly.

2.5 MAINTENANCE REQUIREMENTS

2.5.1 Dismantling and replacement by the user

Any dismantling required by the user shall be easily carried out without tools or undue force. Any replacement shall not require undue force and incorrect replacement shall be either impossible or completely obvious.

2.5.2 Insertion and removal of gas injectors

Removable gas injectors shall be made so that they can be inserted and removed without damage.

2.5.3 Assembly and attachment of handles, dials and pointers

Valve handles, movable dials and pointers shall be so designed that they are not capable of being incorrectly assembled, shall be securely attached to their spindles and shall not contain loose parts which may become detached when the handles are removed.

2.5.4 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 installed and operating:

- (a) Aeration controls. (It is acceptable for the adjustment to be finalized with the burner removed, provided the setting will not be disturbed during removal.)
- (b) Pilots.
- (c) Thermostat bypasses where provided.
- (d) Thermostat calibration.
- (e) Regulator adjustments.
- (f) Ignition devices.
- (g) Safety devices.
- (h) Gas consumption adjusters.

2.5.5 Accessibility for replacement

Components that require removal for service work shall be made and attached to the appliance so that they can be removed and replaced. In particular, except in the case of appliances readily disconnected and easily handled by one person, the following components shall be readily removed from and replaced in the appliance without undue risk of injury and without moving the appliance from the installed position:

- (a) Regulator diaphragms and valves (body exempt).
- (b) Gas valve plugs.
- (c) Injector nipples.
- (d) Complete thermostats including sensing elements. Thermostat valve plug and bypass adjuster to be separately removable.

- (e) Filters (gas).
- (f) Pilot head assemblies and pilot jets.
- (g) Clocks and timers.
- (h) Door springs or other door control mechanisms.
- (i) Burners.
- (j) Ignition devices.
- (k) Radiant elements.
- (l) Drip trays.
- (m) Automatic control equipment.
- (n) Safety shut off systems.
- (o) Electric light globes.
- (p) Fans, electric motors and drives.

2.5.6 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.

2.5.7 Inaccessible nuts or bolts

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

2.6 PRESSURE REGULATORS

2.6.1 Provision of a pressure regulating device

An approved gas pressure regulator shall be provided with each appliance intended for operation on NG, TG and TLP. Where practicable the regulator should be fitted within the perimeter of the appliance.

Regulator outlet pressures nominated by the appliance manufacturer shall not exceed:

TG, TLP:	0.63 kPa.
NG:	1.00 kPa.

2.6.2 Positioning of pressure regulators

Regulators shall be so placed that—

- (a) breather holes cannot easily be blocked; and
- (b) overheating and the risk of ignition of any gas leaking from the breather holes is minimized.

2.7 GAS CONTROLS AND SAFETY SHUT OFF SYSTEMS

2.7.1 General

The operation of safety devices shall not be overridden by any other devices.

2.7.2 Accessibility by the user

Where controls are required to be operated by the user, they shall be accessible and easily operated.

2.7.3 Accidental change of settings of valves, dials and pointers

Gas valves, movable dials and pointers shall be designed or located to avoid accidental change of setting in use.

2.7.4 Fitting of self-latching valves

Self-latching valves other than pilot valves shall be fitted unless—

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

2.7.5 Provision of flame safeguard to ovens

A flame safeguard system shall be fitted to all ovens so that in the event of flame failure at the point of supervision all gas to the oven burner(s) is shut off.

2.7.6 Bypass of power operated gas valves

If gas appliances fitted with power operated gas valves are provided with alternative means of supplying gas to the burners, such means shall not bypass any safety functions in the event of a power failure.

2.7.7 Provision of bypass to thermostatically controlled burners

Appliances incorporating thermostatically controlled burners shall include a bypass or other means to ensure automatic reignition of the burner. However, safety shut off valve(s) before such burners shall not be bypassed.

2.7.8 Rotation of manual valves

Valves intended for the manual control of turndown by throttling shall rotate not less than 30° from the point of initial gas flow to 90% of full flow rate.

2.8 IGNITION, PILOTS AND MAIN BURNERS

2.8.1 Burners with remote manual ignition

The remote manual ignition of a burner, including pilots, shall be visible or visibly indicated to the user while operating the ignition devices and the appropriate gas controls.

2.8.2 Burners with direct manual ignition

The direct manual ignition of a burner, including pilots, shall be accessible and visible while operating the appropriate gas controls.

2.8.3 Prevention of injury at 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.

2.8.4 Manually operated burners in an enclosed compartment

Where manually operated burners are enclosed in a compartment in which an explosive accumulation of gas can occur, it shall be necessary to open the compartment to light the burner unless an adequate interlock purge is provided.

2.8.5 Burners interconnected by flues or passages

When two or more burners are enclosed in the same compartment or compartments that are interconnected by flues or other passages, the gas system shall be so designed that unburnt gas cannot be discharged from one burner while the other is alight except in the case of initial lighting of a burner fitted with a safety shut off system.

2.8.6 Means for turning off pilot burner gas supply

Means shall be provided for turning off the gas supply to a pilot burner.

2.8.7 Viewing of flames

It shall be possible to view burner flames either directly or by use of a mirror. It is acceptable if this is achieved by removing a part of the appliance.

2.8.8 Proving of burner or pilot ignition

It shall be possible to prove that a burner or pilot is alight when the appliance is in operation in the installed position.

2.8.9 Positive location of flash lighting tubes

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

2.8.10 Support of pilots, igniters and flame sensing devices

Pilot burners, igniters and flame sensing devices shall be supported in such a manner that their position relative to each other and the main burner(s) shall remain fixed.

2.8.11 Location of burner mixing tubes

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

2.8.12 Burner supports

Burner supports and/or caps shall be such that the burners cannot be easily displaced in normal usage.

2.8.13 Location of burner caps

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

2.8.14 Fixing of gas manifolds

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

2.8.15 Protection of ports and injectors

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.

2.8.16 Use of gauze at primary aeration

Gauze shall not be fitted over primary air ports of burners other than pilot burners.

2.8.17 Pilot gas filters

Gas filters shall be provided for continuously burning pilots of 0.5 MJ/h or less capacity (optional for LPG).

2.8.18 Aeration adjustment for universal LPG appliances

For universal LPG appliances, primary burner aeration shall be non-adjustable.

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2.9 FLUEING REQUIREMENTS

2.9.1 Design of air entry and combustion product discharge

Appliances shall be so designed that flueway terminals, draught diverter relief openings and openings for the entry of air for combustion are part of the appliance structure and are unlikely to be obstructed by cabinets, walls or partitions on or in which the appliance is installed. In the case of appliances specifically designed to be built-in, any clearance necessary for the safe and effective operation of the appliance shall be ensured by means of permanently attached spacers.

2.9.2 Provision of means of preventing blockage in flue connections

The flue connection shall provide means to prevent partial or complete blockage of flueways caused by the fitting of a flue pipe.

2.9.3 Design of flue connections

Flue connections, both vertical and horizontal, for an appliance shall be designed to accommodate both single wall and twin wall circular or rectangular metal flue pipe. The use of an adaptor to achieve this purpose will be considered satisfactory.

Flue connections or adaptors designed for twin wall metal flue pipe shall comply with the requirements of AS 4567.

Flue connections or adaptors designed for single wall metal flue pipe shall conform to the dimensions given in the Tables 2.3 and 2.4.

TABLE 2.3
CIRCULAR FLUE CONNECTION

Nominal pipe diameter mm	Diameter of flue connection mm	
	Internal dimension of socket	External dimension of spigot
75	78 ⁺³ ₋₀	73 ⁺⁰ ₋₃
100	104 ⁺³ ₋₀	98 ⁺⁰ ₋₃
125	129 ⁺³ ₋₀	123 ⁺⁰ ₋₃
150	153 ⁺³ ₋₀	148 ⁺⁰ ₋₃

TABLE 2.4
RECTANGULAR FLUE CONNECTION (SPIGOT)

Nominal size mm	Dimensions of flue connection mm	
	Width	Depth
250 × 50	247 ⁺⁰ ₋₅	45 ⁺⁰ ₋₅
300 × 65	295 ⁺⁰ ₋₅	60 ⁺⁰ ₋₅

In all cases, the minimum length of engagement shall not be less than 13 mm for vertical flue connection and 25 mm for horizontal flue connection.

2.9.4 Flueway terminal and draught diverter construction

Flueway terminals and draught diverters shall be constructed so that they can only be installed in the correct position.

2.9.5 Draught diverter relief openings

The relief openings of any draught diverter shall be connected only to the space from which the air for combustion is drawn.

2.10 MARKINGS

2.10.1 Markings on packaging or appliance

In all cases, the packaging (or the appliance where there is no packaging) shall be marked in a prominent position with—

- (a) the text 'TO BE INSTALLED ONLY BY AN AUTHORIZED PERSON';
- (b) the maximum packaged weight in kilograms;
- (c) the text 'THE INSTRUCTIONS PACKAGED WITH THIS APPLIANCE CONTAIN IMPORTANT INFORMATION ABOUT INSTALLATION AND USE'; and
- (d) the text 'NOT FOR USE IN MARINE CRAFT, CARAVANS OR MOBILE HOMES', unless each burner is fitted with a flame safeguard.

2.10.2 Gas type label

A label shall be firmly attached in a prominent position on each appliance stating the type of gas for which it has been manufactured and adjusted. Its colour shall be that appropriate to the gas specified, as shown in the schedule in Clause 2.10.5.

2.10.3 Appliances for use with a flexible connection

For appliances which may be installed with a hose assembly, the gas type label shall—

- (a) be fixed as close as possible to the point of connection; and
- (b) carry additional wording referring the installer to the network operator or gas supplier for confirmation of the gas type, if in doubt.

2.10.4 Labelling of gas connections

Appliances not certified for installation with a hose assembly shall be permanently marked to this effect at the point of connection.

2.10.5 Gas type colour code

Where a colour code is used to indicate the type of gas for which an appliance or component is to be used, 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) TLP Pink
- (g) All gases Primrose

2.10.6 Identification of injectors

Removable injectors shall carry an identifying cipher. The cipher shall be in the form of numerals indicating the orifice size in millimetres or the BS number. In the case of pilot injectors, a colour coding in accordance with Clause 2.10.5 is acceptable. Alternatively the injector size may be marked on the appliance.

2.10.7 Marking of fans

The direction of rotation of fans shall be clearly and permanently marked where incorrect fitting of a fan is possible.

2.10.8 Provision and categorisation of markings on appliances

Appliances shall be provided with clear permanent markings that are readily accessible and easy to read when the appliance is in the installed position. Marking categories are designated as follows:

- (a) Category 'A' Information (see Clause 2.10.8.2)
- (b) Category 'B' Safety (see Clause 2.10.8.3)
- (c) Category 'C' Operational (see Clause 2.10.8.4)

2.10.8.2 Category A markings

For Category 'A' the 'readily accessible' intent may be met by the use of duplicate data plates or labels; one being attached to the appliance and the other being suitable either for attachment to an adjacent surface, such as a cupboard door, or for attachment to the appliance by means of a chain.

Category 'A' markings shall include:

- (a) Manufacturer's trade name or identifying symbol.
- (b) Certificate holder's trade name or identifying symbol.
- (c) Model designation.
- (d) Month and year of manufacture or serial number where this is documented to show month and year of manufacture.
- (e) Gas or gases for which the appliance is intended to be used.
- (f) Total nominal gas consumption in MJ/h, and test point pressures in kPa for each gas nominated in (d) above.
- (g) For main burners with an adjustable bypass and which are ignited by a pilot, the main burner test point pressure in kPa at the bypass rate for each gas nominated in (d) above.
- (h) Electrical markings as required by the appropriate electricity authority.
- (i) Wiring diagrams except where electrical equipment is limited to one electric lamp.
- (j) The certification number.
- (k) Any additional information called for in other sections of this Standard.

2.10.8.3 Category B markings

Category 'B' markings, as indicated below, shall be on the appliance at the point of use:

- (a) Those doors, covers and other components which must be left open, closed or removed during operation shall be indicated with a permanent marking.

When an appliance is fitted with a fold-down lid—

- (i) if the burner(s) can be ignited with the lid closed, there shall be a permanent marking on the top of the lid which warns against igniting burners with the lid down; and
- (ii) if the burner(s) can continue to operate after the lid is closed, there shall be a permanent marking on the underside of the lid which warns against closing the lid with the burner operating.

- (b) Access panels that must be left in position during operation shall be indicated by a permanent marking.
- (c) Flash lighting tubes that are used for the manual ignition of burners shall have the point of ignition suitably marked unless this is obvious.
- (d) Where symbols are used to convey the following information only those shown in Figure A1 are acceptable:
 - (i) Symbol 1 - Do not place anything, e.g. flame tamer, asbestos mat, between pan and pan support as serious damage to the appliance may result.
 - (ii) Symbol 2 - Do not remove the pan support and enclose the burner with a wok stand as this will concentrate and deflect the heat onto the hotplate.
 - (iii) Symbol 3 - Do not use large pots or heavy weights which can bend the pan support or deflect flame onto the hotplate.
 - (iv) Symbol 4 - Locate pan centrally over the burner so that it is stable and does not overhang the appliance.
 - (v) Symbol 5 - Use only a wok support supplied or recommended by the manufacturer of the appliance.
- (e) For thermally toughened glass hotplates, symbols numbered 1, 2 and 3 above shall be clearly visible. Where the symbols are on an exposed glass surface, they shall be an integral part of the glass.
- (f) Hotplates which may be installed using a hose assembly shall carry a permanent label on the base of the appliance warning the installer to ensure that the hose assembly is restrained from accidental contact with the flue outlet of an under bench oven.
- (g) Instructions as required in Clause 2.11.3 (e) and (f) shall be supplied.
- (h) Where 'low voltage power' or above is connected an appropriate warning notice shall be fitted with the wording suggested below.
'WARNING, 240 VOLTS. DISCONNECT POWER BEFORE SERVICING UNIT.'
- (i) Storage drawers shall have a permanent label warning against storage of flammable materials in the drawer.
- (j) If the removal of any part of any appliance could cause interference with flueing or the entry of combustion air, suitable temporary warning stickers shall be attached to the appliance.

2.10.8.4 Category C markings

Category 'C' markings shall include the following as appropriate:

- (a) Each valve, including pilot valves, shall be identified with the burner it controls.
- (b) 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 special lighting position, clearly indicated. Where the indication is on an exposed glass surface, it shall be an integral part of the glass and shall be clearly visible.
- (c) The dials for both oven and contact thermostats shall be marked in numbers or degrees Celsius at intervals of not more than 50°C with intermediate plain marks to represent a change of not more than 10°C. The dial shall be easy to read. In addition, a manufacturer may, at its discretion, incorporate any approved system of marking, such as numbers or coloured zones.
- (d) The markings on the dial of an oven thermostat shall cover a range of at least 120°C to 260°C and shall be clearly and durably marked.

The markings on the dial of a contact thermostat shall cover the range 60°C to 200°C, and shall be clearly and durably marked.

- (e) The turndown setting for hotplate and griller burners shall be clearly marked.

2.11 INSTRUCTIONS

2.11.1 Documents remaining with user

Any document referencing servicing instructions that is supplied with the appliance and remains with the consumer, shall contain a warning that servicing shall be carried out only by authorized personnel and that the appliance shall not be modified.

2.11.2 Installation Instructions

Each appliance shall be supplied with installation instructions that include reference to:

- (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) The requirements of the local authority—gas, electricity, etc.
- (d) Overall dimensions of the appliance and location by measurement of connecting points of gas, electricity, flues, etc.
- (e) The alternative types of installations that may be made.
- (f) Details of the methods of connection and alternatives.
- (g) Adequate instructions for the safe use of hose assemblies or a statement that the appliance is not suitable for connection with a hose assembly.
- (h) The method to prevent tilting of an upright appliance (see Clause 2.4.6).
- (i) Required surroundings of the appliance, clearance from cupboards and fixings, walls, curtains, floors, or other combustible materials and maximum dimensions of overhanging projections.
- (j) Special conditions of installation that may be required as the result of the certification test.
- (k) Special conditions which must be avoided, e.g. marine environment, and any conditions necessary to ensure optimum performance.
- (l) Details of any assembly work required to be done by the installer.
- (m) Definite instructions to test the operation of the appliance before leaving. These shall include the satisfactory operation of the ignition system on all burners both individually and combined.
- (n) Details of the necessary testing instructions for minor adjustments.
- (o) Instructions on the procedure to be adopted if the appliance cannot be adjusted to perform correctly.
- (p) For an appliance other than an upright appliance which may be connected with a hose assembly, the requirement that the supply connection point shall be accessible with the appliance installed.
- (q) Details for attaching duplicate data plates or labels to adjacent surfaces.
- (r) Unsuitability for use in marine craft, caravans or mobile homes, unless each burner is fitted with a flame safeguard.

- A2
- (s) Suitability for installation and operation with aftermarket lids or covers fitted.
 - (t) Clearances from combustible bench top lids or covers if the manufacturer's instructions allow such installations (see Clause 2.11.2(s)).

2.11.3 Operating instructions

Each appliance shall be supplied with operating instructions covering each separate function of the appliance and such dismantling, cleaning, and assembly as is necessary for the user, and that include reference to—

- (a) a clear explanation of programming and the effect of any power supply interruption for programmed appliances;
- (b) information to assist the user to recognise abnormal operation which requires service;
- (c) a recommended maintenance schedule for the life expectancy of the appliance;
- (d) where service and any necessary replacement parts may be obtained;
- (e) clear and complete instructions for lighting and/or shut down where incorrect procedures can result in a hazardous condition;
- (f) where necessary, a safe purge before the appliance is re-lit;
- (g) where symbols are used to indicate the functions of operating controls, the meanings of these symbols; and
- (h) the use of large utensils.

2.11.4 Use of symbols for glass hobs

Where any symbols shown in Figure A1 are marked on the appliance, the symbol, together with the accompanying explanation from Clause 2.10.8.2 (d), shall be included in the operating instructions.

2.11.5 Safety warnings

The instructions shall contain the statement:

‘DO NOT USE OR STORE FLAMMABLE MATERIALS IN THE APPLIANCE STORAGE DRAWER OR NEAR THIS APPLIANCE.

DO NOT SPRAY AEROSOLS IN THE VICINITY OF THIS APPLIANCE WHILE IT IS IN OPERATION.

DO NOT MODIFY THIS APPLIANCE.’

2.11.6 Inclusion of warning to prohibit use as a space heater

Operating instructions for LPG cooking appliances shall contain the following safety warning prominently featured:

‘WHERE THIS APPLIANCE IS INSTALLED IN MARINE CRAFT OR IN CARAVANS, IT SHALL NOT BE USED AS A SPACE HEATER.’

2.11.7 Servicing instructions

Servicing instructions shall be available and they shall include reference to—

- (a) removal of covers and other parts for access to all components;
- (b) removal of components for service—
 - (i) burner equipment;
 - (ii) pilot and flame safeguard;
 - (iii) ignition system;

- (iv) thermostat and capillary bulb;
- (v) gas control and manifold panel;
- (vi) splashback panel and timer;
- (vii) hotplate top;
- (viii) bottom and side panels;
- (ix) thermocouple;
- (c) parts replacement—
 - (i) fan;
 - (ii) glass panel;
 - (i) over-temperature cut-out device;
 - (ii) oven door glass;
 - (iii) oven door springs and hinges;
 - (iv) electronic ignition;
 - (v) electrical equipment and components;
- (d) adjustments—
 - (i) pilot;
 - (ii) aeration;
 - (iii) thermostat calibration, where applicable;
 - (iv) ignition (spark gap);
- (e) fault finding chart; and
- (f) wiring diagram.

Servicing instructions shall clearly state, 'DO NOT MODIFY THIS APPLIANCE'.

SECTION 3 PRELIMINARY TESTS FOR LINE GASES

3.1 GENERAL

The nominal gas consumption in MJ/h 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.

Before commencing testing in this Section refer to Clause 2.1.1.

3.1.1 Test Gases

Tests in all parts of this Standard (except Section 4 which requires the use of special gases in addition to those listed here) shall be carried out using the following test gases (see Table 1.2 for gas characteristics):

- (a) Appliances intended for use with NG shall be tested using available NG but in the case of dispute or borderline results test gas 'N' shall be used.
- (b) Appliances intended for use with TG shall be tested using available TG 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 in the conditions outlined in Sections 5.6 and 5.7 where test gas 'Y' shall be used, and Clause 5.13 where both test gases 'X' and 'Y' shall be used.

NOTE: 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 TLP 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 Sections 5.6 and 5.7.

3.2 PREPARATION FOR TESTING

3.2.1 Electrical safety requirements (earth leakage)

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 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.

NOTE: 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 certification test requirements) and checks made that gas consumption, aeration, temperature settings and other adjustments have been made in accordance with the manufacturer's recommendations. Adjustments should be made with the test gas which is applicable (see Clause 3.1.1) with the inlet pressure set at normal test gas pressure (see Clause 1.3).

3.2.3 Appliance regulators 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 Prevention of gas rate variation

Provision shall be made to prevent thermostats, or any other variable restriction in the gas line, from varying during tests except as necessitated by the requirements.

3.2.6 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.

NOTES:

- 1 A saturator shall be used with a wet test gas meter to ensure saturation of the gas.
 - 2 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 circuit soundness

The fully assembled appliance shall be gas tight when subjected to an inlet gas pressure of 14 kPa—

- (a) on initial set-up; and
- (b) at the conclusion of all certification tests.

3.3.2 Control of bleed line gas

Bleed lines from diaphragm type automatic valves shall terminate in a location such that—

- (a) ignition of the bleed gas by the main burner or pilot is assured; and
- (b) blockage of the bleed line tip is prevented.

3.3.3 Discharge of gas resulting from power loss

The temporary loss of power to an appliance shall not cause unburnt gas to be discharged for a period in excess of 90 s during the power failure or after the power is restored.

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.

3.4.2 Determined gas consumption of permanent pilots

The determined gas consumption of each continuously burning pilot shall not be more than 0.25 MJ/h except where heat is—

- (a) employed for operating a safety control in which case it shall not exceed 0.5 MJ/h (except as specified in (b) and (c) below);
- (b) usefully employed as part of the maintenance gas consumption or output of the appliance; and
- (c) employed in conjunction with a thermopile as a thermal generator, in which case it shall not exceed 1.0 MJ/h.

3.4.3 Tolerance on determined gas consumption of all main burners

Total determined gas consumption for all burners other than pilot burners, operating together, shall be within 20% of the sum of the nominal gas consumptions.

3.4.4 Provision of a simmer hotplate burner

At least one hotplate burner shall be capable of maintaining a temperature not exceeding 75°C when operated at 25% of nominal gas consumption, or at its lowest marked setting, when tested with a standard 200 mm diameter open vessel containing 1.2 kg of water.

NOTE: Only one semi-rapid burner need comply with this requirement.

3.4.5 Provision of turndown to hotplate burners

With the exception of fish burners and wok burners, hotplate burners shall have a turndown gas consumption not exceeding 25% of the nominal gas consumption.

3.4.6 Provision of turndown to griller burners

Griller burners shall have a turndown gas consumption not exceeding 80% of the nominal gas consumption.

3.5 GAS PRESSURE REGULATORS

Except for LPG operated appliances, 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 NG appliances and 0.75 kPa up to 3.0 kPa for TG and TLP appliances. The regulator performance shall be checked with the smallest burner operating at the turndown gas consumption and then with all burners operating at full gas rate.

3.6 IGNITION AND SAFETY SHUT OFF SYSTEMS

3.6.1 General

Ignition and safety shut off systems shall comply with the following:

- (a) Aerated pilots when lit back shall either ignite the main burner promptly and without undue noise or cause a shut off valve to close.
- (b) Aerated pilots, when the 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.
- (c) 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.

- (d) For any means of ignition other than a permanent pilot, when the voltage supplied to the appliance is lowered to any point where the main gas valves will still actuate, the main burner, operating at any rate at which its control will permit, shall light safely and reliably from that means of ignition, or the ignition system shall shut down safely.
- (e) Multi-port pilots shall comply with (a), (b) and (c) with all ports blocked other than the one activating the flame safeguard sensor.
- (f) 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.
- (g) Burner systems ignited by automatically or remotely controlled ignition systems shall be supervised by a certified flame safeguard system.
- (h) Flames shall travel freely to all ports on a burner when any individual port is ignited and at any gas consumption in the operating range of the burner. In the case of special purpose hotplate burners (such as wok and fish burners) this requirement is assessed with the test vessel listed in Table 1.1 placed centrally over the burner. In the case of any other hotplate burner this requirement is assessed with the test vessel listed in the Table 1.1 placed centrally over the burner and also with no vessel.
- (i) The ignition spark or other means of ignition shall cease at the end of the start flame establishment period except where an interrupted pilot is used and then it may continue until the main flame is established, provided that after the pilot flame establishment period is completed, the electric spark shall not be able to activate the pilot flame detector.
- (j) Where a pre-ignition purge period is included, the means of ignition shall commence immediately after the purge period is completed.
- (k) 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.
- (l) Safety shut off systems shall incorporate a self-check of integral circuitry to prove that the system is not in the flame proved condition prior to start-up. Manually-operated thermoelectric flame safeguards are exempt from this requirement.
- (m) Flame failure of the supervised burners shall result in lockout in accordance with Clause 2.7.5 (see Clauses 3.6.2.1.1 and 3.6.2.1.2 for reignition attempt conditions for automatic atmospheric burners).
- (n) Where an interrupted or intermittent pilot is used, the main flame establishment period shall not exceed 5 s.
- (o) 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.

3.6.2 Automatic burner ignition systems—additional requirements

3.6.2.1 Atmospheric burners

3.6.2.1.1 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.

NOTE: Systems based on permanent pilots are exempted from the Clause.

3.6.2.1.2 Ignition gas flow rate

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 m^3 and T is the start flame establishment period in s;

- (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.

NOTE: Systems based on permanent pilots are exempted from the Clause.

3.7 FLAME STABILITY

3.7.1 Stability of flames under draught conditions

When a burner is operated at turndown or bypass setting and the appliance is subjected to a 5 km/h horizontal draught directed at the appliance from any angle within 90° of front on to the appliance, the burner shall shut down safely or the burner shall completely re-light when the draught is removed, without the aid of any automatic ignition system other than direct ignition from a permanent or intermittent pilot. In the case of hotplate burners the test vessel listed in Table 1.1 is placed centrally over the burner during the test.

3.7.2 Noise of extinction

Noise of extinction shall not be excessive when the burner is turned off in a normal manner from any setting in the operating range of the burner.

3.7.3 Effect of opening and closing doors at turndown condition

The normal opening and closing of appliance doors and other doors associated with the installation shall not extinguish any burner operated at turndown or bypass setting, unless the burner completely re-lights when the door operation ceases by means of an ignition system that incorporates a flame safeguard.

Pilot burners are set according to manufacturer's instructions. Appliances designed for installation into a benchtop cut-out are tested in a standard cupboard as shown in Figure A7 with the benchtop cutout specified by the manufacturer. In all other cases the appliance is installed according to the manufacturer's instructions. In the case of special purpose hotplate burners (such as wok and fish burners) this requirement is assessed with a test vessel, the dimensions of which are listed in Table 1.1, placed centrally over the burner. In the case of any other hotplate burner this is assessed with a standard 200 mm test vessel placed centrally over the burner and also with no vessel.

SECTION 4 TESTS USING LIMIT CONDITIONS

4.1 GENERAL

Appliances shall comply with the requirements listed below when supplied with the appropriate limit gases from the following list and under the limiting conditions specified in each M.O.T—

- | | | |
|-----|---------------------------|--|
| (a) | natural gas appliances: | limit gases Na, Nb and Nc, with an additional test for compatibility with gas S; |
| (b) | propane appliances: | limit gases X and Z; |
| (c) | butane appliances: | limit gas Y; |
| (d) | universal LPG appliances: | limit gases X, Y and Z; |
| (e) | TLP appliances: | limit gases Ta, Tb and T; |
| (f) | town gas appliances: | limit gases A, B and C. |

For natural gas appliances all tests on limit gases shall be performed with the aeration adjustment (if provided) set on Nc gas. If results are satisfactory on Na, Nb, and Nc but not on S gas, the aeration may be reset on S gas for a repeat test on this gas only. If results are satisfactory a note shall be made in the test report that aeration has been reset.

For town gas appliances, aeration may be reset for each limit gas.

For TLP gas the aeration shall be set on T gas.

Before commencing testing in this Section refer to Clause 2.1.1.

4.2 CO/CO₂ RATIO LIMITS FOR ANY INDEPENDENT SURFACE COMBUSTION BURNER

The CO/CO₂ ratio of the combustion products of an independent surface combustion burner of an appliance operating at the test conditions specified below, shall not exceed:

- (a) 0.02 after 5 min for a flueless appliance.
- (b) 0.02 after 10 min for any other type of appliance.

When tested on available gas the maximum limiting condition shall be as given in Table B3.

When tested on available gas the minimum limiting condition as given in Table B5 shall be applied after preheating the burner for 5 min at the full-on setting:

In addition to the above, pilots fitted to surface combustion burners shall be tested using the appliance inlet pressures given in Table B4.

4.3 CO/CO₂ RATIO LIMITS FOR ANY INDEPENDENT BURNER OTHER THAN SURFACE COMBUSTION BURNERS

The CO/CO₂ ratio of the combustion products of an independent burner (other than a surface combustion burner) of an appliance operating at the test conditions specified below shall not exceed:

- (a) 0.02 after 5 min for a flueless appliance.
- (b) 0.02 after 10 min for any other type of appliance.

The limiting condition shall be as given in Table B6.

4.4 CO/CO₂ RATIO LIMITS FOR PERMANENT PILOT BURNERS

The CO/CO₂ ratio of the combustion products of a permanent pilot (other than a pilot fitted to a surface combustion burner) of an appliance operating at the test conditions specified below, shall not exceed:

- (a) 0.02 after 5 min for a flueless appliance.
- (b) 0.02 after 10 min for any other type of appliance.

Pilots shall be tested using the appliance inlet pressures given in Table B7.

4.5 FLAME CHARACTERISTICS AT MAXIMUM AND MINIMUM LIMITING CONDITIONS

A burner shall exhibit no flame abnormality (see Clause 1.2.26) at maximum and minimum limiting conditions, whether the appliance is hot or cold.

A hotplate burner shall be tested with and without a vessel in place.

An open flued appliance shall comply in the following conditions:

- (a) When a flue outlet of an appliance is closed.
- (b) When a downdraught having a velocity head of 7.5 Pa is applied to the flue outlet for 1 min.
- (c) When an updraught having a velocity head of 7.5 Pa is applied to the flue outlet for 1 min.

The limiting conditions shall be as given in Table B8.

4.6 BURNER IGNITION AT MAXIMUM AND MINIMUM LIMITING CONDITIONS

On carrying out the normal lighting procedure at full and minimum turn down gas rate, a burner (other than a permanent pilot) shall ignite completely and quietly from any one port to all other ports, within 5 s for all gases, at maximum and minimum limiting conditions when the appliance is hot and cold. The time shall be measured from the first flow of gas. A hotplate burner shall be tested with and without a vessel in place. In the case of mains ignition systems a voltage equivalent to both 85% and 110% of the nominal supply voltage shall be applied to the appliance. In the case of battery-operated ignition systems a voltage equivalent to 80% of the nominal voltage for each battery shall be applied. Five successive ignition tests shall be applied. Satisfactory ignition must occur in all five tests.

The limiting conditions shall be as given in Table B9.

4.7 DELAYED IGNITION AT MAXIMUM AND MINIMUM LIMITING CONDITIONS

When the ignition of a manually ignited burner has been delayed for 10 s, or for 5 s in the case of a burner fitted with a safety shut off system, the burner shall at both maximum and minimum limiting conditions:

- (a) ignite completely;
- (b) remain alight;
- (c) not light back;
- (d) not burn outside the appliance;
- (e) not extinguish any other burner at any setting; and
- (f) not damage the appliance.

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;
- (c) there is no danger to persons or adjacent property.

The limiting conditions shall be as given in Table B10.

4.8 BURNER STABILITY WHEN CHANGING SETTING

Burners which have a fixed turndown or bypass setting shall not light back or be extinguished when turned normally from maximum to turndown or bypass, or from turndown or bypass to maximum. The test gases given in Table 4.1 shall be used with the appliance adjusted to nominal test point pressure.

TABLE 4.1
TEST GASES

	Test gas
NG	Nb, S
Propane	Z
Butane	Y
Universal LPG	Y, Z
TLP	Tb
TG	B

4.9 PILOT IGNITION AND STABILITY AT MAXIMUM AND MINIMUM LIMITING CONDITIONS

When a permanent pilot is set to the manufacturer's specifications, it shall light satisfactorily when the manufacturer's instructions are followed and the flames shall not be extinguished when:

- (a) The appliance is subjected to a 5 km/h draught.
- (b) The gas to the main burner is turned off and on in a normal manner.

The minimum limiting conditions shall be as in Table B11 and the maximum limiting conditions shall be as in Table B12.

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.

The limiting conditions shall be as given in Table B13.

4.11 BURNER INTERFERENCE AT IGNITION OR DURING COMBUSTION

Where there is a possibility that the operation of any burner may interfere with the ignition or combustion of any other burner, including pilot burners, the tests required in Section 4 shall be repeated with such interference conditions operating.

4.12 BLOCKED FLUEWAY TERMINAL

Where a flueway terminal is likely to be blocked, the burner shall exhibit no flame abnormality when the flueway terminal is blocked. The limiting conditions in Table B14 shall apply.

4.13 CASE PRESSURE TEST

Appliances that are intended to be built into cavities in walls or partitions, cupboard recesses, or areas which communicate with other rooms or spaces shall not exhibit flame abnormality and the CO/CO₂ ratio of the combustion products shall not exceed 0.02 when the cavity is subjected to any pressure between 25 Pa positive and 25 Pa negative providing the air flow required to produce such pressures does not exceed 250 L/sec.

When tested on available gas the maximum limiting condition shall be as given in Table B15.

When tested on available gas the minimum limiting condition given in Table B16 shall be applied after preheating the burner for 5 min at the full-on setting.

4.14 OVEN BURNER FLAME STABILITY DURING COLD START

Oven burners shall exhibit no flame abnormality when started from cold in an ambient temperature of 5°C.

The limiting conditions in Table B17 shall apply.

SECTION 5 PERFORMANCE TESTS

5.1 GENERAL

Before commencing testing in this Section refer to Clause 2.1.1.

5.2 FLUE OPERATION

5.2.1 Diversion of combustion products

The flueway terminal of a flueless appliance shall divert combustion products away from any wall or other surface so that gases impinging on the wall or surface do not contain more than 1% CO₂.

5.2.2 Leakage or spillage of flue gas

There shall be no leakage or spillage of flue gas from flued appliances, their flue systems, or draught diverters with 0.6 m of flue attached, 5 min after ignition when the appliance is operated at nominal gas consumption.

5.2.3 Location of flue terminal

The location of the flue terminal of any appliance having an enclosed combustion chamber shall be so designed that unburnt gas discharged from the flue cannot be ignited by any other burner of the appliance.

5.2.4 CO/CO₂ ratio of the combustion products of an open flued appliance

The ratio of the concentration of carbon monoxide to that of carbon dioxide in the products of combustion of an appliance shall not exceed 0.02 when the appliance is operated at nominal gas consumption using reference gas and connected to an external flue under the following conditions:

- (a) When the flue connection of the appliance is closed.
- (b) When a downdraught having a velocity head of 7.5 Pa is applied to the flue connection for 1 min.
- (c) When an updraught having a velocity head of 7.5 Pa is applied to the flue connection for 1 min.

Where no draught diverter or similar device is fitted, the flue terminal is progressively blocked until lockout occurs. Lockout shall not occur at back-pressures less than the manufacturer's recommendation but in any case not less than 140 Pa.

5.3 THERMAL EFFICIENCY

5.3.1 Thermal efficiency of hotplate burners

The thermal efficiency of every hotplate burner, except for wok burners that are not suitable for flat-bottomed vessels and fish burners, shall not be less than 40% for TG, TLP and NG, and 45% for LPG.

5.3.2 Griller heat-flux

When all griller operating controls are set to the positions which give slowest cooking the hourly thermal input absorbed by the heat-flux meter (see Figure A12) shall not exceed 4.9 kJ/cm² of meter surface.

5.3.3 Grill toasting performance

The griller shall toast evenly on one side within 90 s an area of bread equivalent to 50% of the grill grid.

5.3.4 Grill toasting efficiency

The gas consumption during the toasting test shall not exceed 0.8 kJ/cm^2 of toasted area for TG appliances or 1.1 kJ/cm^2 for TLP, LPG and NG appliances.

For a stovette or hotplate having less than three hotplate burners these rates are increased to 1.1 kJ/cm^2 and 1.5 kJ/cm^2 respectively.

5.3.5 Oven heat loss

The gas consumption required to maintain the temperature of the temperature sensor (see Figures A13 and A14) at 195°C above ambient, when located at the centre of the centre oven shelf, shall not exceed $3 + 50 V \text{ MJ/h}$ in the case of natural draught ovens, and $4.5 + 75 V \text{ MJ/h}$ in the case of fan forced ovens, where V is the gross volume of the oven in m^3 .

5.4 NOISE OF OPERATION

There shall be no excessive chattering or other objectionable noise from the unit or its components while the appliance is in operation.

5.5 CONDENSATION

5.5.1 Control of flue gas condensate

Appliances shall be designed so that under normal operating conditions, no condensate shall escape from the appliance. This shall particularly apply to initial condensation.

5.5.2 Condensate—interference with combustion

Condensation, where present, shall not interfere with combustion.

5.6 TEMPERATURE HAZARDS

5.6.1 Test conditions

An appliance shall comply with the requirements listed below when it has been operated under the following conditions:

The appliance shall be installed 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 installed with only the clearances specified in AS 5601 or zero clearances where none are specified in AS5601, and without these special conditions.

A2 Where a cooking appliance is intended to be installed in a caravan or boat, the appliance shall be tested with clearances as specified in the manufacturer's instructions. This shall include clearances from combustible lids, if the manufacturer's instructions allow such installations.

The oven burner is lit with the thermostat set at 200°C .

A2 All hotplate burners are lit and a standard test vessel (see Clause 1.3.90) containing water is placed on the centre of each burner such that a distance of at least 10 mm shall be provided between the side surfaces of each vessel. No vessel shall overlap the edges of the hotplate. Select vessels starting with the burner having the smallest gas consumption and where it is impossible to comply with the above arrangement select the next smallest vessel from Table 1.1 that allows this arrangement to be fulfilled. When boiling, burners are turned down to just maintain boil. The water shall be maintained at a depth of $60 \pm 10 \text{ mm}$ for the duration of the test.

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

The griller burner is lit 1¼ h after the hotplate and the griller dish is filled ¼ full with water and placed in position under the griller.

Where the griller is in the oven and cannot be operated simultaneously with the oven burner, a separate test is conducted. The oven is turned off after 1¼ h of operation; the grill burner is lit and operated for 15 min. Temperatures are measured continuously from 10 min before turning off the oven burner and turning on the grill burner, to 15 min after griller light-up.

Where the manufacturer recommends that the oven can be used at a higher setting for a specific purpose, e.g. oven cleaning, a further test is carried out with the oven alone in operation at this setting for the maximum period specified in the manufacturer's instructions.

Appliances intended for connection to the mains electricity supply shall comply when—

- (a) the electricity supply is connected; and
- (b) the electricity is disconnected.

5.6.2 Surrounding surfaces—Temperature limits

The temperatures of floor, wall, overhead and bench surfaces shall not exceed—

- (a) 65°C above ambient when installed in accordance with manufacturer's instructions, including all adjacent surfaces and overhangs; and
- (b) 75°C above ambient when installed in the absence of any special conditions including all adjacent surfaces and overhangs.

5.6.3 Personal safety—Temperature limits

The temperatures of surfaces intended to be handled, except those parts which 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; and
- (c) 60°C for plastics.

with all temperatures being above ambient.

NOTES:

- 1 Parts in this category include control knobs, tap handles, push buttons, switches and doorhandles (not oven shelves).
- 2 The temperatures for plastics refer to components that are substantially, if not entirely, manufactured from plastic material.

5.6.4 Surfaces likely to be accidentally touched

The temperatures of surfaces likely to be accidentally touched (excluding working surfaces) shall not exceed—

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

with all temperatures being above ambient.

NOTES:

- 1 Parts in this category include control panel fascia, exterior glass oven doors, exposed underneath surface of hotplates, griller doors, side panels, panels adjacent to door handles and edges of doors when opened.
- 2 Working surfaces include trivets or pan supports within 25 mm of flue outlets, griller covers, plate racks and oven shelves.