

AS 4563:2022



STANDARDS
Australia



Commercial catering gas equipment



AS 4563:2022

This Australian Standard ® was prepared by AG-001, Gas Appliances. It was approved on behalf of the Council of Standards Australia on 04 February 2022.

This Standard was published on 4 March 2022.

The following are represented on Committee AG-001:

- Association of Accredited Certification Bodies
- Australian Gas Association
- Australian Industry Group
- Better Regulation Division (Fair Trading, Safework NSW, TestSafe)
- Consumer Electronics Suppliers Association
- Department of Mines, Industry Regulation and Safety — Building and Energy WA
- Energy Networks Australia
- Gas Appliance Manufacturers Association of Australia
- Gas Energy Australia
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This Standard was issued in draft form for comment as DR AS 4563:2021.

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ISBN 978 1 76113 678 8

Commercial catering gas equipment

Originated as AS 4563—2003 (AG 300).
Previous edition AS 4563—2004.
Third edition AS 4563:2022.

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Preface

This Standard was prepared by the Australian members of Joint Standards Australia/New Zealand Committee AG-001, Gas Appliances to supersede AS 4563—2004, *Commercial catering gas equipment*.

The objective of this document is to provide manufacturers, designers, regulatory authorities, testing laboratories and similar organizations with uniform minimum requirements for the safety, performance and use of commercial cooking and catering gas appliances.

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

In its preparation, consideration has been given to—

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

The principal differences between this edition and AS 4563—2004 are the addition of—

- (i) specific requirements for high temperature appliances ([Section 17](#));
- (ii) specific requirements for mobile serving appliances ([Section 18](#));
- (iii) updated test methods for burner systems; and
- (iv) temperature limits for adjacent surfaces when the appliance is installed with zero clearance from side and rear walls.

The AS/NZS 5601 series of Standards provides essential requirements and means of conformance for gas installations. Any reference to AS/NZS 5601 in AS 4563 should be considered as reference to the appropriate part of the AS/NZS 5601 series of Standards (i.e. AS/NZS 5601.1 or AS/NZS 5601.2).

The terms “normative” and “informative” are used in Standards to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

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Australian Standard[®]

Commercial catering gas equipment

Section 1 Scope and general

1.1 Scope and application

1.1.1 Scope

This document specifies general requirements and test methods for various types of commercial catering gas equipment. The fuel gases are natural gas (as described in AS 4564), town gas, liquefied petroleum gas (LP Gas, as described by AS 4670) and tempered liquefied petroleum gas.

NOTE Other statutory and regulatory requirements may be applicable to the product(s) that fall within the scope of this document. Manufacturers, importers or distributors have legal obligations to ensure that products conform to such requirements.

Figures referred to in this document are located in [Appendix A](#).

Equipment for controlling gas pressure and measuring gas volume is specified in [Appendix D](#).

1.1.2 Application

Appliances shall conform to the general requirements of [Sections 2, 3, 4](#) and [5](#), and to the requirements in each of following Sections that are applicable to the nature of the appliance.

[Section 6](#): Boiling tables — Open and closed top, Chinese cooking tables

[Section 7](#): Salamanders, grillers and toasters

[Section 8](#): Solid grill plates and griddles

[Section 9](#): Barbecues

[Section 10](#): Ovens

[Section 11](#): Boiling water units

[Section 12](#): Atmospheric steamers

[Section 13](#): Stockpots and brat pans

[Section 14](#): Fryers

[Section 15](#): Food warmers including bains marie

[Section 16](#): Pasta cookers and rethermalizers

[Section 17](#): High temperature cookers

[Section 18](#): Mobile serving appliances

AS 3645 specifies essential requirements for gas equipment that require regulatory approval before sale. This document is intended to provide a means of demonstrating conformance to AS 3645.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 1722.2, *Pipe threads of Whitworth form, Part 2: Fastening pipe threads*

AS 1530.1, *Methods for fire tests on building materials, components and structures, Part 1: Combustibility test for materials*

AS 4343, *Pressure equipment—Hazard levels*

AS 4617, *Manual shut off valves*

AS 4620, *Thermoelectric flame safeguards*

AS 4621, *Regulator for use with liquid petroleum—Vapour phase*

AS 4625, *Electronic flame safeguards and flame detectors*

AS 4627, *Quick-connect devices for gas*

AS 4629, *Automatic shut-off valves and vent valves*

AS ISO 7.1, *Pipe threads where pressure-tight joints are made on the threads — Dimensions, tolerances and designation*

AS/NZS 1530.3, *Methods for fire tests on building materials, components and structures, Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release*

AS/NZS 1869, *Hose and hose assemblies for liquid petroleum gas (LP Gas), natural gas and town gas*

ISO 6976, *Natural gas — Calculation of calorific values, density, relative density and Wobbe indices from composition*

EN 298, *Automatic gas burner control systems for gas burners and gas burning appliances with or without fans*

1.3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

1.3.1

ambient temperature

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

1.3.2

appliance connection

point of connection on the appliance to consumer piping or to any hose assembly supplied with the appliance

Note 1 to entry: This may be the same as the gas inlet connection.

1.3.3

appliance regulator

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

1.3.4

atmospheric burner

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

1.3.5

atmospheric steamer

appliance in which the cooking medium is steam at atmospheric pressure

1.3.6**automatic ignition**

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

1.3.7**automatic shut off valve**

valve that operates automatically to shut off the 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**

appliance that keeps cooked food hot for serving

Note 1 to entry: A bain marie may include: fitted food containers with or without lids recessed in the top surface of the appliance; heated cabinet (hotpress); or open wells where food containers are placed on a heated surface.

1.3.9.1**dry bain marie**

appliance that keeps cooked food hot with heated air

1.3.9.2**wet bain marie**

appliance that keeps cooked food hot using heated water

1.3.10**barbecue****char grill****broiler**

cooking appliance with an open grate cooking surface heated from beneath

Note 1 to entry: A barbecue may include media for radiant effect. The food is cooked by a combination of radiant and convected heat and may be assisted by flame or flared fat.

Note 2 to entry: A barbecue may incorporate a section with a solid cooking surface.

1.3.11**bleed line**

small diameter pipe or tube that conveys gas to a safe place from a diaphragm valve

1.3.12**boiling table**

appliance intended for the heating of cooking vessels from beneath

1.3.12.1**closed top boiling table****target top****targa top****even-heat top**

boiling table which supports and heats on a smooth metal heating surface

1.3.12.2**open top boiling table**

boiling table with open burners and pan supports

1.3.13**brat pan**

pan intended for braising, stewing, boiling and also for shallow or medium frying

Note 1 to entry: A brat pan may be tilting or non-tilting.

1.3.14**burner**

device that positions a flame in the desired location by delivering gas and air in such a manner that sustained combustion is accomplished

1.3.15**burner port**

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

1.3.16**calibrate**

determine the relationship between the measured or indicated value of a parameter and its true or a known value

1.3.17**Chinese cooking table**

open top boiling table suitable for rounded base cooking vessels including woks

1.3.18**CO/CO₂ ratio**

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

Note 1 to entry: This is a measurement indicative of appliance combustion performance.

1.3.19**combustible material**

material that will ignite and burn

Note 1 to entry: This includes material that has been flame-proofed, so long as it will ignite and burn.

1.3.20**combustion products****products of combustion**

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

1.3.21**compression fitting**

Note 1 to entry: Compression fittings and components are defined in AS/NZS 3500.0.

1.3.21.1**Type 1 compression fitting****non-manipulative compression fitting**

fitting for a compression joint that does not require any working of the tube other than cutting square

Note 1 to entry: The joint is made tight by means of a loose compression ring which grips the outside wall of the tube when the coupling nut is tightened.

1.3.21.2**Type 2 compression fitting****manipulative compression fitting**

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

1.3.22**control**

device designed to change the operation of the appliance or component

Note 1 to entry: Examples of controls include a valve and a thermostat.

1.3.23**cooking vessel**

container in which the cooking process is conducted

Note 1 to entry: A cooking vessel may form a part of an appliance or may be placed on an appliance for the cooking process.

1.3.24**cross lighting**

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

1.3.25**cylinder**

container that falls within the scope of AS 2030.1

1.3.26**cylinder compartment**

compartment partially or fully enclosed on at least three sides that is intended to contain an LP Gas cylinder or cylinders either for storage or for direct connection to an inlet

1.3.27**determined gas consumption**

gas consumption rate, using reference gas at specified test pressures and with ambient conditions corrected to metric standard conditions

Note 1 to entry: Determined gas consumption is usually expressed in megajoules per hour (MJ/h).

1.3.28**drain valve**

device used to hold and release liquid from an appliance

1.3.29**draught diverter**

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

1.3.30**excess air**

air in excess of that required for complete combustion that is mixed with the combustion products, in the combustion chamber

1.3.31**fan assisted combustion system**

system in which all or part of the combustion air is supplied and/or in which the products of combustion are evacuated by mechanical means that is an integral part of the appliance

1.3.32**flame abnormality**

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

Note 1 to entry: 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.

Note 2 to entry: In appliances designed specifically for a luminous effect, yellow tipping and limited lifting or floating flames or limited carbon deposition within the appliance are not considered abnormal.

1.3.33**flame detector**

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

1.3.34**flame establishment period**

period that begins when the fuel valve is first energized and ends when the flame supervision system is first required to supervise that flame

1.3.35**flame failure response time**

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

1.3.36**flame lifting**

separation of a flame from a burner port, whilst continuing to burn with its base some distance from the port

1.3.37**flame proving period**

supervised period following the flame establishment period and before any further operation other than shut down is permitted

1.3.38**flame safeguard**

safety device that automatically cuts off the gas supply if the actuating flame is not detected

1.3.39**flame safeguard system**

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

1.3.40**flame tracking****flame travel**

ignition of discharged gas or gas/air mixture from one burner port to an adjacent burner port

1.3.41**flue**

passage through which flue gases are conveyed away from an appliance, excluding draught diverter, barometric device, fan or similar part

Note 1 to entry: The terms “flue” and “exhaust duct” may be used interchangeably when related to gas appliances.

1.3.42**flue connection**

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

Note 1 to entry: Where the draught diverter, barometric device, fan or similar component is an integral part of the appliance, the discharge point of that integral part is deemed to be the flue connection.

1.3.43**flue gases****exhaust gases**

combustion products plus all diluents and contaminants

Note 1 to entry: Diluents and contaminants may include excess air, dilution air, process air, and waste products from the process.

1.3.44**flue system****exhaust system**

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

1.3.45**flue terminal**

<flueless appliance> point at which the flue gases discharge from the appliance

1.3.46**flue terminal**

<flued appliance> point at which the flue gases discharge from the flue system into the atmosphere, or into an external flue cowl where fitted

1.3.47**flued appliance**

appliance designed to discharge its flue gases through a flue system

1.3.48**flueless appliance**

appliance designed to discharge its flue gases directly into the space in which it is located

1.3.49**flueway**

port or passage conveying flue gases within the appliance

1.3.50**flueway terminal**

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

Note 1 to entry: Where a flue deflector is fitted, it is considered a part of the flueway terminal.

1.3.51**food warmer****holding cabinet**

appliance designed to keep food warm

1.3.52**forced draught**

having all or part of the air for combustion provided under positive pressure by mechanical means

1.3.53**fryer**

appliance for cooking food in hot oil

1.3.54**gas**

any of the fuels: NG, SNG, TG, TLP or LP Gas

1.3.54.1**liquefied petroleum gas****LP Gas**

commercial propane, commercial butane or any combination of them in the vapour phase

Note 1 to entry: Commercial propane and commercial butane are specified in AS 4670.

1.3.54.2**natural gas****NG**

hydrocarbon gas primarily consisting of methane

1.3.54.3**simulated natural gas****SNG**

mixture comprising approximately 55 % commercial propane and 45 % air

1.3.54.4**tempered liquefied petroleum gas****TLP**

mixture comprising approximately 27 % commercial propane and 73 % air

1.3.54.5**town gas****TG**

gas manufactured from coal or petroleum feedstocks

Note 1 to entry: Town gas usually contains high levels of carbon monoxide.

1.3.55**gas/air ratio control**

device that automatically varies the gas rate according to the combustion air rate or vice versa

1.3.56**gas consumption**

rate at which gas is consumed by an appliance under specified conditions

Note 1 to entry: Gas consumption is usually expressed in megajoules per hour (MJ/h).

1.3.57**gas inlet connection**

point of connection to consumer piping or to an LP Gas cylinder

Note 1 to entry: This may be the same as the appliance connection.

1.3.58**gas train****gas circuit**

pipework and components between the appliance gas inlet and the injector

1.3.59**granular media**

loose, non-combustible material used largely in decorative or radiant heating or cooking appliances

Note 1 to entry: Granular media usually takes the form of, vermiculite, crushed glass, pebbles, volcanic rocks or simulated coal.

1.3.60**griddle****solid top****flat top****grill plate****solid grill plate**

solid plate heated from below that is used to cook food directly on its surface

1.3.61**grill grid**

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

1.3.62**grill tray**

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

1.3.63**griller
toaster**

appliance for cooking food by radiant heat

1.3.64**heating value
gross heating value
higher heating value**

amount of energy released when a unit volume of dry gas, at metric standard conditions, is completely burnt in air with the products of combustion brought to metric standard conditions, with the water produced by combustion condensed to the liquid state

Note 1 to entry: For the purposes of this document, the term “heating value” refers to gross heating value.

Note 2 to entry: Heating value is expressed in megajoules per cubic metre (MJ/m³).

Note 3 to entry: Calculation of heating value is in accordance with ISO 6976.

1.3.65**high temperature cooker**

appliance for the cooking of food which is suspended above the heat source

Note 1 to entry: Duck cookers and pig cookers are examples of high temperature cookers.

1.3.66**hose assembly**

flexible hose including end fittings connecting the gas supply to the appliance connection

Note 1 to entry: Hose assemblies in accordance with AS/NZS 1869 may include other components (e.g. a regulator).

1.3.67**hotpress**

appliance in the form of a cupboard with or without a heated top, in which cooked food may be stored

1.3.68**ignition cycle**

sequence of events including the release of gas, the provision of ignition energy and the attempt to detect flame

1.3.69**ignition safety time**

time that elapses between the order to open the gas supply to the burner and the gas supply being shut off in the event of the presence of flame not being detected

1.3.70**induced draught**

having all or part of the air for combustion provided under negative pressure or suction in the combustion chamber by mechanical means

1.3.71**injector**

component which causes air to mix with a stream of gas

Note 1 to entry: In the case of an aerated burner the injector incorporates an orifice discharging gas into the mixing throat or tube of the burner.

1.3.72**injector orifice**

precise aperture in an injector that functions as a metering device to control the gas consumption of a burner

Note 1 to entry: An injector orifice is also a directional guide for the gas injected into the throat of an aerated burner.

1.3.73**interlock**

device or function that ensures the operation of items of equipment is dependent upon the fulfilment of predetermined conditions by other items of equipment

1.3.74**intermittent pilot**

pilot that is automatically ignited each time the burner is started, and is automatically extinguished with the main burner

1.3.75**interrupted pilot**

pilot that is automatically ignited each time the burner is started, and is automatically extinguished at the end of the main flame establishment period

1.3.76**jacket**

annular space between the inner and outer casing of an indirectly heated vessel

1.3.77**jacketed stockpot****jacketed kettle****boiling pan**

stockpot fitted with an outer jacket

Note 1 to entry: The annular space contains hot water, steam or oil from which heat is transferred to the food being cooked.

1.3.78**jointing compound**

manufactured liquid, paste-like or semi-solid material used to assist in sealing joints

1.3.79**jointing material**

manufactured solid material used to assist in sealing joints

Note 1 to entry: Jointing material may be in the form of a tape, cord or sheet.

1.3.80**light back**

transfer of the flame from the burner tip or port back into the body of the burner or back to the injector

1.3.81**lockout****1.3.81.1****non-volatile lockout**

safety shut down condition of the control system which can only be reset by a manual operation

1.3.81.2**volatile lockout**

safety shut down condition of the control system which can be reset by a manual operation or by the loss and subsequent restoration of the electricity supply

1.3.82**limit gas**

test gas, which is representative of an extreme variation in the characteristics of the gas for which the appliance has been designed

1.3.83**lower explosive limit****LEL**

lowest percentage of gas in air at which combustion can be self-sustaining

Note 1 to entry: Lower explosive limit is usually determined at metric standard conditions.

1.3.84**manual ignition****1.3.84.1****direct manual ignition**

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

1.3.84.2**remote manual ignition**

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

1.3.85**metric standard conditions**

absolute temperature of 288.15 K (15 °C) and an absolute pressure of 101.325 kPa

1.3.86**mixing tube**

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

1.3.87**mobile serving appliance**

appliance, with wheels, incorporating an integral LP Gas supply designed to be easily moved by one person for hot food service in areas outside of the commercial kitchen area

1.3.88**natural draught**

upward flow produced by the tendency of warmed gases to rise

1.3.89**nominal gas consumption**

appliance gas consumption, as stated in manufacturer's specifications, instructions, general communications and on the appliance

Note 1 to entry: This is the fundamental quantity on which all methods of test are based and is the starting point for all performance requirements.

Note 2 to entry: Nominal gas consumption is usually expressed in megajoules per hour (MJ/h).

1.3.90**nominal test point pressure**

gas pressure specified by the manufacturer, at which the burner is designed to operate, and measured at a test point after any regulator or other valve in the gas train to the burner

1.3.91**normal test gas pressure**

minimum gas supply pressure, measured at the gas inlet connection

1.3.92**open burner****hotplate burner**

burner that heats the base of a cooking vessel by direct flame

1.3.93**open flued appliance**

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

1.3.94**oven**

enclosed and insulated cabinet in which food is cooked

1.3.95**over-temperature cut-out device**

manual reset or non-resetting device that functions to shut off the gas supply to a burner or burners to prevent temperature exceeding a pre-determined level

1.3.96**pan support****trivet**

means designed to maintain the vertical position of a vessel to be heated relative to the burner

1.3.97**permanent pilot**

pilot that is permanently alight while the appliance is in service and that is controlled independent to the main burner

1.3.98**piezo ignition**

form of ignition with which a high voltage spark is produced as the result of pressure or impact upon specially treated ceramic material

1.3.99**pilot**

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

1.3.100**pre-ignition purge**

introduction of air into the combustion chamber and appliance flueway so as to either displace any gas/air mixture to a safe place or to dilute the gas/air mixture to a non-combustible level

1.3.101**primary air**

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

Note 1 to entry: Air admitted to the combustion zone after primary air combustion, and required to complete the combustion process, is known as secondary air.

1.3.102**primary air ports**

openings in the burner through which the primary air is drawn in by the gas issuing from the injector orifice into the mixing tube

1.3.103**primary flue**

passage conveying flue gases from the combustion chamber of an appliance to the draught diverter, barometric device, fan or similar part when fitted

1.3.104**primary guard**

guard supplied integral with an appliance and intended to prevent direct contact with, or close approach to a heat source(s)

Note 1 to entry: A primary guard is principally intended to reduce risk of accidental ignition of flammable materials; however, if personal contact occurs, it does not necessarily prevent accidental burning.

1.3.105**programmable electronic system****PES**

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

Note 1 to entry: 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.

Note 2 to entry: The term PES includes system software such as executive, users and communication, etc. which is configured to operate a process.

Note 3 to entry: 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; and
- (e) other computer based devices.

Note 4 to entry: A PES can include a microprocessor-based temperature, pressure, air/fuel ratio, or level controller or monitor.

1.3.106**programmed ignition**

multistage system of automatic ignition where each stage takes place in a pre-determined sequence

1.3.107**purge**

<pipework and fittings> displacement of contents with air or another gas

1.3.108**purge**

<appliance combustion circuit> forced or induced introduction of air through the combustion chamber and primary flue to displace any fuel/air mixture and/or products of combustion

1.3.109**purge volume**

volume of the combustion chamber and all areas where combustion products and combustible vapours, dusts or gases may accumulate in the appliance

1.3.110**quick-connect device**

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

1.3.111**rated**

maximum value for which a component is designed to operate without deterioration or failure, as specified by the manufacturer

1.3.112**rated voltage**

voltage assigned to the appliance by the manufacturer

[SOURCE: AS/NZS 60335.1:2020, 3.1.1, modified, Note 1 to entry has been added.]

Note 1 to entry: The rated voltage may be a range of values, defined by a lower limit and an upper limit.

1.3.113**reference gas**

gas corresponding to an average of the gases most currently distributed, and for which the appliance has been specifically designed

Note 1 to entry: See also “test gas”.

1.3.114**regulator**

device that automatically regulates the outlet pressure or the outlet volume of gas passing through it to a predetermined value

Note 1 to entry: Regulators may be adjustable (usually spring-loaded) or non-adjustable (usually weight-loaded).

1.3.115**relative density****specific gravity**

ratio of the mass of a volume of gas to the mass of the same volume of dry air under metric standard conditions

Note 1 to entry: Calculation of relative density is in accordance with ISO 6976.

1.3.116**relief device**

safety device designed to forestall the development of a dangerous condition by preventing pressure, temperature or vacuum build-up

1.3.117**removable component**

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

1.3.118**safety shut down**

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

1.3.119**safety shut off system**

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

1.3.120**safety shut off valve**

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

1.3.121
salamander
stand-alone griller

Note 1 to entry: Grillers are commonly incorporated into an appliance with other cooking functions. An appliance that is a dedicated griller is known as a salamander.

1.3.122
secondary flue
portion of the flue system conveying flue gases from the draught diverter, barometric device, fan or similar part to the flue terminal

1.3.123
standard test vessel
vessel with specified dimensions and properties for testing purposes

Note 1 to entry: See [Table A.8](#) for specifications of standard test vessels.

1.3.124
start flame establishment period
period during which the start gas safety shut off system is permitted to be open before the flame safeguard is required to supervise the start gas flame (see [Appendix E](#))

1.3.125
start gas
gas flowing at a pilot or, when no pilot is fitted, at a main burner during the flame establishment period for initial ignition

1.3.126
start gas rate
restricted gas flow rate admitted either to a separate pilot or to the main burner during the start flame establishment period

1.3.127
steamer
appliance that heats food by exposure to steam

Note 1 to entry: The steam in a steamer may be either at atmospheric pressure or higher pressure.

1.3.128
stockpot
appliance that heats a large vessel from below designed for the bulk cooking of liquid foodstuffs

Note 1 to entry: Liquid foodstuffs typically include soup, stock and porridge.

1.3.129
surface combustion burner
burner where combustion takes place on the surface of a perforated or porous material or gauze

1.3.130
test gas
gas intended for the verification of the operational characteristics of appliances

Note 1 to entry: Test gases consist of reference gases and limit gases.

1.3.131
thermostat
device that automatically maintains a pre-determined temperature

1.3.132
thermostat bypass
integral part of a thermostat control that enables a pre-set volume of gas to bypass the thermostat valve

1.3.133**Universal LP Gas appliance**

appliance intended for use with propane, butane or any mixture of propane and butane

1.3.134**unsafe condition**

condition which may lead to the following:

- (a) injury to persons or animals;
- (b) damage to the appliance; or
- (c) damage to the surroundings

1.3.135**valve**

device for the purpose of controlling or shutting off flow

1.3.136**Wobbe index****Wobbe number**

gas property which measures the amount of heat released by a gas burner with a constant orifice

Note 1 to entry: Wobbe index is an indicator of the interchangeability of fuel gases, such as natural gas, liquefied petroleum gas, and town gas, and is used to compare the combustion energy output of a burner.

Note 2 to entry: Wobbe index is expressed in megajoules per cubic metre (MJ/m³) and is calculated as—

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

1.3.137**working parts**

components intended to be handled by the user while operating the appliance

Note 1 to entry: This may include controls, door handles, and buttons to operate piezo ignition systems.

1.3.138**working surfaces**

surfaces through which heat passes as part of the primary function of the appliance

1.3.139**wok**

rounded bottom cooking vessel

1.4 Test methods

The test methods listed below are located in [Appendix B](#).

- B.1 Gas leakage test
- B.2 Gas consumption
- B.3 Gas pressure regulator test
- B.4 Burner ignition — Pilot light back and blocked aeration
- B.5 Ignition at reduced pilot rate test
- B.6 Holding time of thermoelectric flame safeguard test

- B.7 Flame tracking at ignition test
- B.8 Shut off time for safety shut off system test
- B.9 Ignition gas flow rate (delayed ignition) test
- B.10 Ignition cycles — Prior to lockout/after flame failure test
- B.11 Determination of CO/CO₂ ratio for any independent burner — Overload
- B.12 Determination of CO/CO₂ ratio for permanent pilots — Overload
- B.13 Determination of CO/CO₂ ratio and O₂ levels for any independent burner
- B.14 Determination of CO/CO₂ ratio for independent surface combustion burners — Underload test
- B.15 Flame characteristics at maximum and minimum limiting conditions
- B.16 Burner ignition at maximum and minimum limiting conditions
- B.17 Delayed ignition at maximum and minimum limiting conditions
- B.18 Unburnt gas release from burner system
- B.19 Combustion air supply test
- B.20 Spillage of combustion products test
- B.21 Performance with updraught, downdraught and blocked flue tests
- B.22 Burner stability to draught test
- B.23 Pilot stability to draught test
- B.24 Effect of appliance door operation on flame stability test
- B.25 Blocked condensate drain test
- B.26 Temperature hazards test
- B.27 Temperature hazards — Zero clearance test
- B.28 Heat resistance
- B.29 Heat resistance — Light back condition
- B.30 Electrical supply variation test
- B.31 Zinc based alloy test
- B.32 Permanent markings test
- B.33 Strength of boiling tables
- B.34 Effect of spillover on ignition systems test
- B.35 Strength test — Shelves — Salamanders and grillers
- B.36 Strength of ovens

- B.37 Strength test — Shelves — Ovens
- B.38 Strength test — Drop down doors — Ovens
- B.39 Strength test — Side hinged doors — Ovens
- B.40 Strength of atmospheric steamers
- B.41 Temperature of surfaces and cooking oil
- B.42 Operation of low water level safety device
- B.43 Strength of stockpots
- B.44 Automatic control — Fryers
- B.45 Over-temperature cut-out device — Fryers
- B.46 Strength of fryers, pasta cooker and rethermalizers
- B.47 Temperature control and maintenance — Wet bains marie
- B.48 Automatic temperature control — Food warmers and bains marie
- B.49 Temperature maintenance — Dry bain marie
- B.50 Heating time — Hotpress
- B.51 Temperature maintenance and variation — Food warmers
- B.52 Strength test — Shelves, food warmers and bains marie
- B.53 Stability and strength test — High temperature ovens
- B.54 Determination of CO/CO₂ ratio for independent burners — Mobile serving appliance
- B.55 Containment of hot liquids — Mobile serving appliance
- B.56 Strength test — Mobile serving appliance
- B.57 Stability test — Mobile serving appliance

Section 2 Design and construction

2.1 General

2.1.1 Controls and safety components

All components relating to the safe operation of the appliance shall conform to the requirements of the relevant component Standard(s) as far as they reasonably apply.

NOTE This includes, but is not limited to, automatic ignition systems, flame safeguards, flue cowls, gas valves, regulators, pressure switches and transducers, whether or not these carry gas.

2.1.2 Manual shut off valves

Manual shut off valves fitted to an appliance shall conform to AS 4617 and be classified as a Type 1 or Type 2.

2.1.3 Classification of safety shut off valves

Where a safety shut off system is required, the minimum classification of the valve shall be selected in accordance with [Table 2.1.3](#).

Table 2.1.3 — Safety shut off valve selection and classification

Burner type	Standard and classification
Atmospheric	AS 4620 or AS 4629, Class 3
Induced draught	AS 4629, Class 3
Forced draught with air pressure not exceeding 3 kPa	AS 4629, Class 2
Forced draught with air pressure exceeding 3 kPa	AS 4629, Class 1

2.1.4 Safety devices and interlocks

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

2.1.5 Over-temperature cut-out device

If an over-temperature cut-out device is incorporated, the device shall—

- (a) be of the fail safe type; and
- (b) cause a non-volatile lockout.

2.1.6 Main burner automatic shut off valves

For appliances with automatic ignition all gas to the main burner shall pass through at least two automatic shut off valves in series that may be in a single control body.

2.1.7 Suitability of bearings

Bearings for motors, blowers or fans shall be suitable for the temperatures to which they are subjected in normal operation.

NOTE Normal operation means operating at nominal gas consumption with the fan operating at all fan speeds (including the “OFF” position if the appliance will function in that condition).

2.1.8 Protection of bearings

Fan and motor bearings shall be protected from dust and lint. Where for this purpose, filters are fitted to the inlet air stream, they shall not interfere with the combustion air of the appliance.

2.1.9 Protection of vitreous enamel

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

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

2.1.10 Protection of electric lamps

Electric lamps shall be protected from damage.

2.1.11 Provision for removal of condensate

Where the appliance is specifically designed to operate under condensing conditions, adequate provision shall be made for the collection and removal of condensate.

2.1.12 Appliance base

The base of an appliance intended to stand on surfaces that may become wet shall be designed to resist corrosion of the base material.

2.1.13 Provision for moving appliances

Mobile appliances shall be provided with means to facilitate moving the appliance safely.

2.1.14 Adequacy of means of support

Appliances shall be provided with adequate means of support which shall allow the appliance to remain stable on the intended supporting surface and shall not have sharp edges in contact with the supporting surface.

2.1.15 Positioning of removable components

User accessible removable components shall be positioned positively. Reasonable rearrangement of such parts shall not be possible unless it can be demonstrated that the changes do not adversely affect combustion or appliance safety.

NOTE Removable components include, for example, pan supports, flame tamers and decorative coats.

2.1.16 Provision for an LP Gas cylinder

Appliances other than mobile serving appliances shall not incorporate provision for an LP Gas cylinder.

2.2 Features specially required

2.2.1 Provision of pressure regulators

A gas pressure regulator shall be provided with each appliance.

An appliance with an adjustable regulator shall have a nominal test point pressure not exceeding:

- (a) Town gas, TLP: 0.63 kPa.

- (b) Natural gas: 1.00 kPa.
- (c) LP Gas: 2.75 kPa.

An appliance with a non-adjustable regulator shall have a nominal test point pressure for validation purposes.

NOTE An appliance incorporating a zero pressure regulator or an gas/air ratio controller, pneumatic type (ISO 23551-2) satisfies this requirement and does not need a separate gas appliance regulator.

2.2.2 Positioning of regulators

Regulators shall be so placed that—

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

2.2.3 Means for gas pressure measurement

Readily accessible means that are 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.

When a dedicated pressure test point is fitted, it shall contain a limiting orifice not exceeding 1.0 mm or equivalent restriction.

2.2.4 Fitting of flame safeguards

Each burner system shall be protected by a flame safeguard system.

2.2.5 Bypass for thermostatically controlled burners

Thermostatically controlled burners shall include a thermostat bypass or other means to ensure automatic reignition of the burner.

2.2.6 Control of bleed lines

Where a bleed line exists, gas actuated controls shall be constructed so that there is no continuous bleed during the “off” period. The bleed line shall either re-enter the main gas line downstream from the control valve or be terminated with a suitable heat resistant tip and positioned such that ignition of the bleed gas by the main burner or pilot is ensured, and blockage of the bleed line tip is prevented.

2.2.7 Means to turn off gas supply to pilots

Accessible means shall be provided for turning off the gas supply to pilots without altering the setting of any pilot gas consumption adjusting device.

2.2.8 Programmable electronic systems

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.)

2.2.9 Combustion air supply

2.2.9.1 Combustion air supply and equipment

Any combustion air supply equipment shall be supplied with the appliance and shall be correctly sized and arranged to ensure an air flow adequate for all operating conditions specified by the manufacturer.

2.2.9.2 Combustion air flow proving

Any combustion air flow proving devices shall be interlocked to cause lockout or prevent an ignition attempt unless the devices are in the “no flow” condition prior to the start-up of their respective supply fans.

NOTE Fan speed sensors are not considered to be air flow proving devices.

2.2.9.3 Prevention of combustion air back-flow

Where air at pressure is pre-mixed with the fuel gas, effective means shall ensure air does not pass back into the gas line.

2.3 Burners and ignition systems

2.3.1 Aeration adjustment for Universal LP Gas appliances

For Universal LP Gas appliances, any means of primary burner aeration adjustment shall require the use of a tool.

2.3.2 Protection of ports and injectors

Any ports and injectors that may be exposed in their normal operation to falling particle, grease drippings, accidental spill or boilover shall be protected against blockage.

2.3.3 Restrictions on gauze over primary air ports

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

2.3.4 Positive location of flash ignition tubes

Flash ignition 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.

2.3.5 Support of pilots, ignitors and flame sensing devices

Pilots, ignitors 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.

2.3.6 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.

2.3.7 Burner supports

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

2.3.8 Securing of removable burner components

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

2.3.9 Fixing of gas manifolds

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

2.3.10 Tray type burner-turndown limits

Appliances using tray type burners with granular or other porous media through which gas passes before ignition shall be fitted with a device that limits turndown gas consumption to prevent flame abnormality at the turndown condition.

2.3.11 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 appropriate gas controls.

2.3.12 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.

2.3.13 Manually operated burners enclosed in a 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.

2.4 Materials

2.4.1 Suitability of materials and finishes

The quality and thickness of the materials and finishes, including dressings and lubricants used in the construction of an appliance 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.

When the appliance is installed in accordance with the manufacturer's instructions, all components shall withstand the mechanical, chemical and thermal conditions to which they may be subjected in the course of normal operation.

2.4.2 Resistance to corrosion

All materials shall be resistant to corrosion under normal conditions of installation and operation of the appliance.

2.4.3 Materials containing asbestos

Materials containing asbestos shall not be used.

2.4.4 Materials in contact with gas

Materials in contact with gas shall be suitable for all gases that the appliance is intended to use.

2.4.5 Components required to be placed in a flame

Pilots, 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 used, they shall not produce a catalytic cracking effect.

2.4.6 Zinc based alloys

Zinc based alloys shall not be used in contact with water or condensate. Brass is excluded from this requirement.

2.4.7 Jointing compounds and jointing materials

Jointing compounds and jointing materials shall be of a type demonstrated as suitable for the conditions of use. Refer to AS 4623 for information on jointing compounds and materials.

2.4.8 Thermal insulation

Thermal insulation shall—

- (a) not contaminate food or water in the appliance, nor produce obnoxious odours, fumes, nor corrode materials with which it is in contact;
- (b) be fitted in such a way that it is not rendered ineffective or objectionable by—
 - (i) settling;
 - (ii) dislodgment; or
 - (iii) condensation during the normal operation of the appliance; and
- (c) be protected against rodents.

2.4.9 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, insulation and other materials of the appliance.

2.5 Design for assembly and installation

NOTE Refer to AS/NZS 5601 (series) for further requirements on the installation of catering gas equipment.

2.5.1 Conformance in alternative forms

If appliances are so designed that certain components may be fitted or omitted, e.g. legs or trolleys, the appliances shall conform to all requirements in their alternative forms.

2.5.2 Fixing of gas connections

The gas inlet connection and appliance connection shall be fixed to prevent rotation.

This requirement is met if the connection can be held in position by means of a spanner while making or breaking the connection in accordance with the manufacturer's instructions.

NOTE The gas inlet connection and the appliance connection may be the same.

2.5.3 Gas inlet connection

Where the appliance is to be connected to consumer piping, the gas inlet connection shall—

- (a) have a thread in accordance with AS ISO 7.1 or AS 1722.2; or

NOTE Refer to AS 3688 for guidance on the appropriate class of thread for various types of connection.

- (b) have a quick-connect device in accordance with AS 4627 Type 1 or 2.

Where the appliance is to be directly connected to an LP Gas cylinder, the inlet connection to the hose and regulator shall conform to AS 4627, Type 27.

2.5.4 Access to connection

The gas inlet and water connections shall have sufficient free space to enable connection and disconnection.

2.5.5 Appliance connection for appliances connecting directly to an LP Gas cylinder

Where the appliance is intended to be directly connected to an LP Gas cylinder, the appliance connection between the hose assembly and the appliance shall be—

- (a) a threaded connection using threads in accordance with AS ISO 7.1 or AS 1722.2;
- (b) a Type 2 quick-connect device in accordance with AS 4627; or
- (c) a 3/8" SAE Flare connection with 5/8-18 UNF threads.

2.5.6 Gas hose assemblies

Gas hose assemblies shall conform to AS/NZS 1869 and be Class B or Class D.

2.5.7 Protection of hose assembly

An appliance that may be installed with a hose assembly, shall be constructed so that when installed in accordance with the manufacturer's instructions with a hose assembly supplied or specified by the manufacturer and operated under normal conditions, the hose assembly shall not be—

- (a) exposed to temperatures exceeding that for which it is designed or tested; nor
- (b) subject to tension, abrasion, kinking or permanent deformation.

2.5.8 Restraint where a hose assembly is used

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

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

2.5.9 Compression fittings

Compression fittings on gas lines shall conform to the following conditions:

- (a) They shall be made to an acceptable standard and the mating surfaces shall be compatible.
- (b) Any olives shall be designed to prevent incorrect assembly.

NOTE Loose olives that are symmetrical or obviously asymmetrical will satisfy this requirement. Shear olives may be asymmetrical.

- (c) After making and breaking the fittings 10 times, applying the torque value as listed in [Table 2.5.9](#) to remake the fittings, the joints shall conform to the requirements of [Clause 3.3](#).
- (d) The component parts shall be made of materials with a melting point not less than 430 °C.

Table 2.5.9 — Torque values

Nominal size mm	Torque Nm
6	15
8	20
10	35
15	50
20	75
25	125
32	160
40	200
50	250

2.5.10 Design of air entry and combustion product discharge

Appliances shall be so designed that openings for the entry of combustion air and the egress of combustion products are part of the appliance structure and are unlikely to be obstructed when the appliance is installed. This includes flueway terminals and draught diverter relief openings.

In the case of appliances specifically designed to be built-in, any clearance necessary to the safe and effective operation of the appliance shall be ensured by means of permanently attached spacers.

2.5.11 Flue terminal and draught diverter construction

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

2.5.12 Design to prevent flueway blockage

Flueways and terminals shall be designed such that they are:

- (a) not easily blocked under normal use;
- (b) readily cleanable; and
- (c) unsuitable for the placement of vessels over the flueway terminals.

2.5.13 Adequacy of means of support

Appliances having more than two wheels shall be provided with means to prevent movement of the appliance when in use.

2.5.14 Means to level appliance

Appliances intended for stationary installations shall be fitted with means for levelling.

2.6 Design for maintenance**2.6.1 Accessibility for adjustment**

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

- (a) Aeration controls.

- (b) Pilots.
- (c) Thermostat bypasses where provided.
- (d) Thermostat adjustments.
- (e) Regulator adjustments.
- (f) Gas consumption adjusters.
- (g) Ignition devices.
- (h) Safety devices.
- (i) Pressure control devices.
- (j) Vacuum control devices.
- (k) Belt tension adjusters.
- (l) Water flow rate controls.

It is acceptable for adjustments to be finalized with some components removed, provided no settings will be disturbed during replacement of those components.

2.6.2 Accessibility for replacement

Components that require removal for service work shall be accessible for replacement without undue risk of injury.

For appliances that cannot be easily disconnected and handled by one person, the following components shall be accessible for replacement without moving the appliance from the installed position:

- (a) Regulator diaphragms and valves (body exempt).
- (b) Gas valve plugs.
- (c) Injectors.
- (d) Thermostats (complete including sensing elements). Thermostat valve plug and bypass adjuster to be separately removable.
- (e) Filters (gas and water).
- (f) Pilot head assemblies, pilot injectors.
- (g) Clocks and timers.
- (h) Door springs or other door control mechanisms.
- (i) Burners.
- (j) Ignition devices.
- (k) Drip trays.
- (l) Automatic control equipment.
- (m) Safety shut off systems.
- (n) Electric lamps.
- (o) Fans, electric motors and drives.

- (p) Belts.
- (q) Pressure control devices.
- (r) Vacuum control devices.
- (s) Flame safeguards.
- (t) Radiant elements.
- (u) Flue dampers.
- (v) Water flow controls.
- (w) Printed circuit boards

2.6.3 Screwed connections

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

2.6.4 Inaccessible nuts or bolts

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

2.6.5 Insertion and removal of gas injectors

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

2.6.6 Plug and socket connections

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

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

2.7 Design for use

2.7.1 Accessibility by the user

Controls and working parts shall be safely accessible to the user.

2.7.2 Design of valve handles, movable dials and pointers

Valve handles, movable dials and pointers shall—

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

2.7.3 Protection of control knobs

Control knobs on the front of an appliance and within 1 m of the floor shall be protected against damage by recessing, or by fitting of a guard rail or equivalent appliance protrusions beyond the control knob and within 1 m of the floor.

2.7.4 Locking means for adjusting devices

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

2.7.5 Prevention of injury at ignition

The method of ignition shall be such that it is not necessary for the operator to be exposed to any hazard.

2.7.6 Proving ignition

It shall be possible to determine that the burner or pilot is alight when the appliance is in the installed position and operating under normal conditions.

2.7.7 Dismantling and replacement by the user

Any dismantling required by the user shall be easily carried out without tools, other than those supplied with the appliance, or undue force. Any replacement shall not require undue force and incorrect replacement shall be either impossible or completely obvious.

2.7.8 Sharp edges

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

2.7.9 Design to minimize contact with hot surfaces

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

2.7.10 Provision for the collection of grease and food particles

Provision shall be made for the safe collection and easy cleaning of spills, grease and food particles.

2.7.11 Accessibility of water feed and drainage systems

Water feed and drainage systems shall be readily accessible and capable of being easily cleaned.

2.7.12 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.

2.8 Markings

2.8.1 Language

Markings required by this document shall be in English. Where markings are also provided in languages other than English, the contents in all languages shall be consistent with the requirements of this document.

2.8.2 Permanent markings on appliances

NOTE Other marking requirements (e.g. wiring diagrams, identification of certification body and certificate number) may be applicable to a product that falls within the scope of this document. It is the responsibility of the manufacturer, importer or distributor (as appropriate) to check other marking requirements.

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

- (a) Name, trade mark or identification mark of the manufacturer or responsible vendor.
- (b) Model designation.
- (c) Serial number or month and year of manufacture.
- (d) Gas or gases for which the appliance is intended to be used.
- (e) For main burners with an adjustable thermostat bypass and which are ignited at low rate, the main burner test point pressure in kPa at the thermostat bypass rate for each gas nominated in (d) above.
- (f) Total nominal gas consumption, in MJ/h, and the test point pressure in kPa for each gas nominated in Item (d).
- (g) Normal working liquid level (where applicable).
- (h) Where manufacturer's instructions require an appliance to be installed on a non-combustible floor, the marking:
NOT TO BE INSTALLED ON A COMBUSTIBLE BASE
- (i) Where manufacturer's instructions require an appliance to be installed on fire resistant material, the marking:
TO BE INSTALLED ON FIRE RESISTANT MATERIAL

2.8.3 Marking of doors and covers

Those doors, covers and other components that shall be left open, closed or removed during operation shall be indicated with a permanent marking.

2.8.4 Marking of flash ignition tubes

Flash ignition tubes that are used for the manual ignition of burners shall have the point of ignition suitably marked.

2.8.5 Indication of function

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

2.8.6 Identification of gas valves

Each gas valve, including pilot valves, shall be identified with the burner it controls.

2.8.7 Gas type marking

A marking stating the type of gas for which the appliance has been manufactured and adjusted shall be located in a prominent position near the gas connection.

For appliances intended for use with a flexible connection to a fixed gas supply system, additional wording shall refer to the local gas supplier for confirmation of the gas type, if in doubt.

2.8.8 Gas type colour code

Where a colour code only is used to indicate the type of gas for which an appliance or component is to be used, it shall conform to [Table 2.8.8](#).

Table 2.8.8 — Gas type colour codes

Gas type	Colour code (refer to AS 2700)	PMS colour code	RAL colour code
Natural gas	Black	419	9005
Propane	Signal orange	1595	2010
Butane	Grass green	363	6010
Universal LP Gas	Signal red	1805	3001
TLP	Light pink	1895	3015
TG	Ultramarine blue	2747	5002
All gases	Primrose	121	1018
NOTE The RAL Classic Colour System Series and Pantone Matching System (PMS) colour codes are indicative only.			

2.8.9 Markings on packaging

The packaging shall be marked in a prominent position with—

- (a) Except for mobile appliances, the following:
TO BE INSTALLED ONLY BY AN AUTHORIZED PERSON
- (b) The maximum packaged weight in kilograms.
- (c) The gas type.
- (d) For mobile appliances, the following:
THE INSTRUCTIONS PACKAGED WITH THIS APPLIANCE CONTAIN IMPORTANT INFORMATION ABOUT ITS SET UP AND USE

2.8.10 Marking of thermostat dials

Variable setting thermostats and temperature controls shall clearly indicate the action required to raise or lower the temperature.

2.8.11 Interference with combustion air

Where it is possible to remove any part of an appliance without the use of tools and this removal could cause interference with flueing or the entry of combustion air, the appliance shall be marked with a suitable warning.

2.8.12 Identification of injectors

Injectors shall carry an identifying cipher. The cipher shall be in the form of numerals indicating the injector orifice size in millimetres or the drill size number. In the case of pilot injectors, a colour coding in accordance with [Table 2.8.8](#) is acceptable. Alternatively, the injector size shall be marked on the appliance.

2.9 Instructions

2.9.1 Language

All instructions required by this document shall be in English. Where instructions are also provided in languages other than English, the contents in all languages shall be consistent with the requirements of this document.

2.9.2 Installation

2.9.2.1 Instructions supplied with the appliance

Each appliance shall be supplied with installation instructions that include the following:

- (a) Model or type of appliance.
- (b) The gas for which the model or type of appliance is intended, and data such as gas consumptions, pressures, etc, or reference to where this information is marked on the appliance.
- (c) The requirements of AS/NZS 5601 (series), local authority, gas, electricity and any other relevant statutory regulations.
- (d) Overall dimensions of the appliance and location by measurement of connecting points of gas, water, electricity, flues.
- (e) The alternative types of installations which may be made.
- (f) Details of removal of any transit protection.
- (g) Details of the methods of connection and alternatives.
- (h) Required surroundings of the appliance, clearance from cupboards and fixings, walls, curtains, floors, or other combustible materials.
- (i) Details of methods of installation that affect other trades, e.g. details of built-in flues. Where electrical connections are required, details for the electrician.
- (j) Special conditions that shall be avoided, e.g. marine environment, and any conditions necessary to ensure optimum performance.
- (k) Details of any assembly work required to be done by the installer.
- (l) Explicit instructions to the installer to test the operation of the appliance after installation.
- (m) Details of the necessary testing and instructions for minor adjustments.
- (n) Instructions on the procedure to be adopted if the appliance cannot be adjusted to perform correctly.
- (o) Fitting of temperature and pressure relief valve(s) where applicable.
- (p) For open flued appliances, details of the necessary ventilation requirements including the size of any openings in accordance with AS/NZS 5601 (series).
- (q) A wiring diagram with the connection terminals, including those for external controls.
- (r) An indication of the external controls that can be used with the appliance.
- (s) Method of connection to other services e.g. water, electricity, drainage, etc.
- (t) The removal of any part of an appliance that could cause interference with the entry of combustion air.

- (u) The injector size(s).
- (v) The maximum dimensions of overhanging projections.
- (w) For appliances with fan assisted combustion systems, conditions when a barometric device is required in the flue system and the method of its installation.
- (x) Details of the commissioning requirements, including instruments required.
- (y) For appliances using granular media, specification for the granular media including—
 - (i) clear definition of the type of material;
 - (ii) size and size distribution; and
 - (iii) maximum and minimum depth of bed.

2.9.2.2 Built-in appliances

Appliances designed as “built in” units shall be provided with clearly defined and prominent instructions for their installation. These instructions shall specify the uses of non-combustible materials for the immediate surrounds of the appliance, unless combustible materials are suitable.

2.9.3 Operation

2.9.3.1 General

Operating instructions shall be supplied with each appliance covering each separate function of the appliance and such dismantling, cleaning and assembly as is necessary for the user and that include the following:

- (a) For programmed appliances, a clear explanation of programming and the effect of any power supply interruption.
- (b) Information to assist the user to recognize 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.
- (h) Where an integral LP Gas supply is incorporated, the specific size and/or capacity of the cylinder to be used.
- (i) The use of large utensils.
- (j) For high temperature cookers, the manufacturer’s recommended load.
- (k) For Universal LP Gas appliances, a statement that the primary aeration adjustment must not be altered from the position specified by the manufacturer.

2.9.3.2 Warning statements

The instructions shall contain the following statements:

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

DO NOT USE OR STORE FLAMMABLE MATERIALS IN OR NEAR THIS APPLIANCE

DO NOT PLACE ARTICLES ON OR AGAINST THIS APPLIANCE

DO NOT MODIFY THIS APPLIANCE

2.9.4 Maintenance

2.9.4.1 Documents supplied with the appliance

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

2.9.4.2 Servicing instructions and maintenance schedule

Servicing instructions shall be available and they shall include reference to the following:

- (a) Removal of covers and other parts for access to all components.
- (b) Removal of components, where applicable, for service, including—
 - (i) burners;
 - (ii) pilot and flame safeguard;
 - (iii) ignition devices;
 - (iv) thermostat;
 - (v) combination control;
 - (vi) water controls;
 - (vii) injectors;
 - (viii) filters (gas and water);
 - (ix) baffles when flue cleaning is necessary;
 - (x) drip trays;
 - (xi) pressure and vacuum control devices; and
 - (xii) printed circuit boards.
- (c) Parts replacement, including—
 - (i) fan;
 - (ii) over-temperature cut-out device; and
 - (iii) heat exchanger or cylinder.
- (d) Adjustments to the following—
 - (i) pilot;
 - (ii) aeration controls;
 - (iii) thermostat;

- (iv) ignition devices (spark gap);
 - (v) gas rate adjuster;
 - (vi) regulator;
 - (vii) safety devices;
 - (viii) pressure control devices;
 - (ix) vacuum control devices;
 - (x) belt tension adjusters; and
 - (xii) water flow rate controls.
- (e) Fault finding chart.
- (f) Wiring diagram as specified in [Clause 2.9.2.1\(q\)](#).
- (g) For appliances using granular media, specification for the granular media including—
- (i) clear definition of the type of material;
 - (ii) size and size distribution; and
 - (iii) maximum and minimum depth of bed.

Section 3 Preliminary tests — Line gases

3.1 General

3.1.1 Gases for testing

Unless otherwise specified, tests in this document shall be carried out using the following gases (see [Table 3.1.1](#) for test 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 LP Gas appliances shall be tested with test gas “X” for all performance tests except for [Clauses 5.5](#) and [5.6](#) where test gas “Y” shall be used.

NOTE Nominal gas consumption is determined using test gas “X” and this is the figure marked on the appliance.

- (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, performance results for the gas type having the highest gas consumption may be deemed to apply to other gas types for the tests in [Clauses 5.4](#) and [5.5](#).

Table 3.1.1 — Test gas table

Test gas	Application	Composition %						Characteristics ^a				
		Hydrogen	Methane	Propane	Propylene	Butane	Nitrogen	Air	Specific energy MJ/kg	Heating value MJ/m ³	Relative density	Wobbe index MJ/m ³
N	Natural gas	—	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	LP Gas	—	—	100	—	—	—	—	50.4	95.8	1.553	76.9
Y		—	—	—	—	100	—	—	49.5	125.7	2.078	87.2
Z		—	—	—	100	—	—	—	—	88.5	1.476	72.9
T	TLP	—	—	27	—	—	—	73	—	25.4	1.142	23.8
D	TG	50	—	15	—	—	35	—	—	20.2	0.602	26.0

^a The reference conditions for the characteristics are 15 °C, 101.325 kPa, dry.

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

^a The reference conditions for the characteristics are 15 °C, 101.325 kPa, dry.

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

3.1.2 Test gas composition

Reference gases and limit gases used in this document are specified in the test gas table ([Table 3.1.1](#)) and are based on pure components. Actual test gases shall be made up to the respective Wobbe index within $\pm 2\%$ using constituent gases of purity 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 propene ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$); and
- (e) 95 % for butane ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$).

Where 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.

3.1.3 Test gas properties

The heating value and relative density of a test gas shall be determined from its measured composition, using the method of ISO 6976.

3.1.4 Test gas pressure

Normal test gas pressure shall be as follows:

- (a) When the appliance is supplied with vaporized LP Gas to the inlet at unregulated pressure from refillable containers, the pressure shall be as specified in [Table 3.1.4](#).
- (b) When the appliance is supplied with vaporized LP Gas to the inlet at unregulated pressure from non-refillable containers, the pressure shall be corresponding to the saturated vapour pressure of the fuel gas at a temperature of 15 °C.
- (c) For other appliances, the pressure shall be as follows:
 - (i) 0.75 kPa for TG and TLP.
 - (ii) 1.13 kPa for natural gas and SNG.
 - (iii) 2.75 kPa for LP Gas.

Table 3.1.4 — Normal test gas pressure

Appliance gas type	Gas	Pressure kPa
Propane	X (propane)	630
Butane	Y (butane)	110
Universal LP Gas	X (propane)	630
	Y (butane)	110

3.1.5 Burners with displaceable media

Where the displacement of any coals, logs or media may interfere with the ignition or combustion of any burner, including pilots, the tests required in this Section shall be repeated with the media in the displaced position, and in the case of granular media both in the displaced position and with the media partially removed.

3.2 Preparation for testing

3.2.1 Electrical safety requirements

The appliance shall conform to the following electrical safety requirements with all switches in the "ON" position:

- (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 Ω for rotating parts and 0.1 Ω 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 M Ω . The resistance for double insulated equipment shall not be less than 10 M Ω .

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 this document.

All services (e.g. gas, electricity, water etc.) shall be connected.

The appliance gas train and any gas meter shall be purged with the appropriate gas before commencing a test and when a test procedure calls for a change in the test gas.

The appliance shall be examined to ensure that it does not have any structural, mechanical or operational defects.

The gas consumption, aeration, temperature settings and other adjustments shall be checked to ensure they have been made in accordance with the manufacturer's recommendations. Adjustments shall be made with the test gas that is applicable with the inlet pressure set at normal test gas pressure.

All panels, covers and doors shall be in the fitted position during testing.

Appliances designed for use with proprietary flue components shall be tested for conformance to the requirements of this document with the components in place.

3.2.3 Appliance regulator not to be removed during testing

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

3.2.4 Protection from accidental draughts

The appliance under test shall be protected from accidental draughts.

3.2.5 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 unless otherwise specified in this document.

3.2.6 Turndown gas consumption

Where a test is required to be performed at turndown gas consumption, the appliance shall be tested as follows:

- (a) For non-thermostatic gas controls with limited turndown: at the lowest gas consumption to which the burner control can be set.
- (b) For non-thermostatic gas controls with unlimited turndown: at 25 % of the nominal gas consumption.
- (c) For thermostatic gas controls: at the rate determined by the bypass or where no bypass is provided, at the marked turndown setting.

3.3 Gas leakage

When tested in accordance with Test Method B.1, the leakage rate from the fully assembled gas train shall not exceed 1 mL/min when the appliance is subjected to an inlet gas pressure of 1.5 times the working pressure or 14.0 kPa, whichever is greater.

NOTE It is intended that this is the first test performed in any test program.

3.4 Gas consumption

3.4.1 Tolerance on determined gas consumption

The determined gas consumption in MJ/h of each burner other than a pilot, shall be within ± 5 % of nominal gas consumption when tested in accordance with Test Method B.2.

3.4.2 Total determined gas consumption — All burners operating

Total determined gas consumption for all burners operating together shall be within 20 % of the sum of the nominal gas consumptions when tested in accordance with Test Method B.2.

3.4.3 Determined gas consumption of permanent pilots

The determined gas consumption of each continuously burning pilot shall not be more than 1 MJ/h when tested in accordance with Test Method B.2.

3.5 Gas pressure regulators

When tested in accordance with Test Method B.3, the measured test point pressure shall not vary by more than ± 20 % from the nominal test point pressure when the appliance inlet pressure is varied between the limits shown in [Table 3.5](#).

For appliances incorporating zero pressure regulator, the measured test point pressure shall remain at or below atmospheric pressure.

Table 3.5 — Test pressures — Regulator performance

Gas type	Minimum pressure kPa	Maximum pressure kPa
Natural gas	1.13	5.0
Propane	2.75	7.0
Butane	2.75	7.0
Universal LP Gas	2.75	7.0
TLP/TG	0.75	3.0