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AG 105 – 2002
(Incorporating Amendment No. 1)

Australian Standard™

Domestic gas refrigerators



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The following interests are represented on AG/1:

ABA (Australian Barbecue Association)

ACA (Australian Consumer Association)

AGA (The Australian Gas Association)

ALPGA (Australian Liquefied Petroleum Gas Association Ltd)

Appliance and Component Testing Bodies

GAEC (Gas Appliance and Equipment Committee)

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AG 105 –2002
(Incorporating Amendment No. 1)

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Domestic gas refrigerators

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PREFACE

This Standard has been prepared by the Gas Appliance Standards Committee (AG/1) of The Australian Gas Association and updates AG 105 – 1998, *Approval Requirements for Domestic Gas Refrigerators*.

This Standard incorporates Amendment No. 1 (February 2011). 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 Standard is intended to provide uniform minimum requirements for the safe design, performance and rational use of energy of domestic gas refrigerators.

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

In its preparation, consideration has been given to:

- continuity of satisfactory operation of appliances and equipment;
- the prevention of fire hazards, and explosions;
- the prevention of injury to persons or property;
- rational use of energy;
- gas rules and regulations now in force; and
- relevant International Standards.

The contents of the Standard are subject to periodic review and suggestions for improvement are welcomed. These should be forwarded to:

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The Australian Gas Association does not accept responsibility for any inadequacies in this Standard. This Standard sets out acceptable standards for type testing of the appliance itself, and does not in any way remove the responsibility from any installation, commissioning or maintenance personnel for ensuring that the appliance remains in a safe condition after installation or maintenance work has been carried out. Acceptable standards for installation are set out in AS 5601 / AG 601 - *Gas installations*.

Matters relating to quality assurance systems, production testing and certificates of conformity, including those for auxiliary devices are not dealt with in this Standard.

Matters of an advisory nature are indicated by the word 'NOTE' followed by a statement.

The Definitions section contains the definitions of terms or words as they apply to this Standard.

This Standard has no legal authority in its own right, but may acquire legal standing in one or more of the following circumstances:

- adoption by a government or other authority having jurisdiction over relevant appliances;
- adoption by a purchaser as the required standard when placing a contract for relevant appliances; or
- adoption where a contractor states that an appliance is in accordance with the Standard.

Chief Executive
The Australian Gas Association
April 2002

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SECTION 1 SCOPE AND DEFINITIONS

1.1 SCOPE

These requirements apply to domestic gas refrigerators with natural draught combustion systems intended for use with natural gas, town gas, liquefied petroleum gas (LPG) and tempered liquefied petroleum gas (TLP) with gas consumptions not exceeding 50 MJ/h.

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

1.2 DEFINITIONS

1.2.1 AGA

The Australian Gas Association.

1.2.2 Appliance regulator

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

1.2.3 Atmospheric burner

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

1.2.4 Authority

Means the authority having jurisdiction or such authority as delegated. (Technical Regulator).

1.2.5 Automatic ignition

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

1.2.6 Available gas (Line gas)

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

1.2.7 Burner port

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

1.2.8 By-pass screw

An adjusting screw for setting the flow through a by-pass.

1.2.9 Calibration

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

1.2.10 Certified

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

1.2.11 Certifying Body

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

1.2.12 CO/CO₂ ratio

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

1.2.13 Combustion products

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

1.2.14 Determined gas consumption

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

NOTE: The derivation of the formula used for calculating the determined gas consumption is given in Appendix 3 of AG 701 - Glossary of Terms used in the AGA Codes.

1.2.15 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.

1.2.16 Flame abnormality

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

1.2.17 Flame failure response time

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

1.2.18 Flame lift

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

1.2.19 Flame safeguard

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

1.2.20 Flash lighting tubes

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

1.2.21 Flexible hose assembly

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

1.2.22 Flue

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

1.2.23 Flue connection

A device incorporated in an appliance for the connection of a flue or draught diverter, barometric device, fan or similar part.

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.

1.2.24 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.

1.2.25 Flue system

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

1.2.26 Flue Terminal

The point at which flue products discharge from a flue. It is the point where a flue system discharges into a flue cowl (if fitted).

1.2.27 Flueway

A port or passage conveying flue gases within the appliance.

1.2.28 Flueway terminal

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

1.2.29 Gas

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

1.2.29.1 Natural gas (NG)

A hydrocarbon gas consisting mainly of methane.

1.2.29.2 Simulated natural gas (SNG)

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

1.2.29.3 Town gas (TG)

A gas manufactured from coal or petroleum feedstocks.

1.2.29.4 Tempered liquefied petroleum gas (TLP)

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

1.2.29.5 Liquefied petroleum gas (LPG)

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

1.2.30 Gas consumption

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

1.2.31 Heating value, gross (At constant pressure)

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

NOTE: Calculation of Heating Value is based upon International Standard ISO 6976 as given in Appendix 1 of AG 701 - Glossary of Terms used in the AGA Standards.

1.2.32 Indoor flueless appliance

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

1.2.33 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.

1.2.34 Jointing compound

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

1.2.35 Jointing material

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

1.2.36 Light back

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

1.2.37 LPG

See Gas.

1.2.38 Manual ignition**1.2.38.1 Direct Manual Ignition**

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

1.2.38.2 Remote Manual Ignition

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

1.2.39 Mixing tube

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

1.2.40 Natural draught burner

See Atmospheric burner.

1.2.41 Natural gas

See Gas .

1.2.42 Nominal gas consumption

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

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

1.2.43 Nominal test point pressure

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

1.2.44 Normal test gas pressure

0.75 kPa for Town gas and TLP gas, 1.13 kPa for Natural gas and SNG, 2.75 kPa for LPG.

1.2.45 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.

1.2.46 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.

1.2.47 Permanent pilot

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

1.2.48 Pilot

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

1.2.49 Primary air control

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

1.2.50 Primary air

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

1.2.51 Primary air ports

The openings in an aerated burner for primary air.

1.2.52 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.

1.2.53 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:
 - Sensors and/or other input devices
 - Data links and/or other communication paths
 - 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:
 - Microprocessors
 - Programmable Controllers (PCs)
 - Programmable Logic Controllers (PLCs)
 - Programmable State Controllers
 - Other computer based devices
- 4 A PES can include a microprocessor-based temperature, pressure, air/fuel ratio, or level controller or monitor.

1.2.54 Reference gas

The gas corresponding to an average of the gases most currently distributed, and for which the appliance has been specifically designed. See also TEST GASES.

1.2.55 Refrigerators, capacity of

The gross cubic content is the total volume between side walls, top and floor, inner door face and inner back panel of the cabinet.

The net storage space is the gross cubic content, minus the volume of the cooling unit (measured over its extremities), plus the volume of ice freezing and food storage compartments contained in the cooling unit. Space above, at either side, or at front and rear

of the cooling unit shall be also subtracted unless there is a clear usable space of 100 mm or more, specifically arranged for food storage.

1.2.56 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 International Standard ISO 6976 as given in Appendix 2 of AG 701 - Glossary of Terms used in the AGA Standards.

1.2.57 Safety shut-off valve

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

1.2.58 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.

1.2.59 Self-latching gas valve (cock)

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

1.2.60 Simulated natural gas (SNG)

See Gas.

1.2.61 Specific gravity

See Relative density.

1.2.62 Tempered liquefied petroleum gas (TLP)

See GAS.

1.2.63 Terminal

See Flue terminal.

1.2.64 Test gases

The test gases used in these requirements are defined in the Test Gas Table (Table 1.2.64) that is based on pure components. Actual test gases are made up using constituent test gases of the purities listed below to the respective Wobbe Index $\pm 2\%$. Purities of the constituent gases are to be not less than:

- (a) 99% for Hydrogen and Nitrogen
- (b) 95% for Methane ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$)
- (c) 95% for Propane ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$)
- (d) 95% for Propylene ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$)
- (e) 95% for Butane ($H_2 + CO + O_2 < 1\%$, $N_2 + CO_2 < 2\%$)

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

1.2.65 Thermostat

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

1.2.66 Thermostat by-pass

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

1.2.67 Town gas

See Gas.

1.2.68 Turndown gas consumption

- (a) If the turndown is limited, the lowest turn-down to which the burner control can be set, or
- (b) 25% of nominal gas consumption for infinite turndown gas controls except:
where a burner is under thermostatic control, the by-pass rate is the turndown position
where no by-pass is provided, the marked turndown setting will apply.

1.2.69 Wobbe index (wobbe number)

The Wobbe Index of a gas is:

$$\frac{\text{Heating Value}}{\sqrt{\text{Relative Density}}}$$

TABLE 1.2.64
TEST GAS TABLE

Test Gas	Application	Composition Percent						* Characteristics			
		Hydrogen	Methane	Propane	Propylene	Butane	Nitrogen	Air	Heating Value MJ/m³	Relative Density	Wobbe Index MJ/m³
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 or purity are not available suitably blended gases of the same Wobbe Index and other combustion characteristics may be used. In case of dispute gases strictly shown in the table shall be used.

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

SECTION 2 DESIGN AND CONSTRUCTION

2.1 GENERAL

2.1.1 Preliminary specification

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

2.1.2 Physical inspection

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

2.1.3 Certification of safety components

All components relating to the safety of the gas burning operation shall be separately 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

Where a Programmable Electronic System (PES) is employed for safety related functions of burner management systems, the PES shall:

- (a) conform to the relevant requirements of AG 210 and EN 298 (or equivalent)
- or
- (b) be certified by a body recognised by the Certification Body to the requirements of EN 298 (or equivalent).

2.1.5 Manual shut-off 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 AG 201 - Approval Requirements for Manual Shut-off Valves.

2.1.6 Power failure

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

2.1.7 Sharp edges

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

2.1.8 Continuation of satisfactory operation

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

2.1.9 Compliance in alternative forms

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

2.1.10 Classification of safety shut-off valves

Where a safety shut-off system is required, the minimum classification of the safety shut-off valve fitted shall be selected in accordance with Table 2.1.10.

Table 2.1.10

Safety shut-off valve(s) selection and classification	
Burner Type	Standard and Classification
Atmospheric	AG 204 or AG 214, Class 3

NOTE: Refer to Clause 2.7.6 for fitting of safety shut-off systems.

2.1.11 Locking means for adjusting devices

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

2.1.12 Means for gas pressure measurement

Means shall be provided to allow the gas pressure in the appliance to be measured while it is in operation. Pressure test points shall be designed to suit 6 mm bore flexible tubing and shall contain a limiting orifice not exceeding 0.7 mm or equivalent restriction.

2.1.13 Protection of vitreous enamel

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

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

2.1.14 Thermostat, ice tray, drip tray, racks to limit volume

A domestic gas refrigerator shall incorporate:

- A certified thermostat.
- Ice trays.
- Drip tray and/or defrosting tray.
- Removable racks and shelves except for fixed racks and/or shelves as required in item (e).
- L.P. refrigerators designed for use in Caravans and Marine Craft shall be provided with fixed racks and/or shelves to limit the maximum “free” volume within the refrigerator to less than 42 litres (0.042 m³).

2.1.15 Defrosting tray

The drip and/or defrosting tray shall:

- catch and retain any normal dripping from the evaporator, and
- be capable of being readily emptied without spilling.

2.1.16 Racks and ice trays

Racks and ice trays shall:

- not bind,
- lie flat when in position,
- be fitted so that they cannot be readily displaced (without taking positive action),
- be constructed of, or coated with, a non-toxic material.

2.1.17 Surfaces in contact with foodstuffs

All surfaces that are intended to come into contact with foodstuffs:

- (a) shall not be adversely affected by foodstuffs
- (b) shall not contaminate foodstuffs.

2.1.18 Interior of cabinet

The interior of the cabinet shall be smooth and free from crevices.

2.1.19 Doors

Doors when closed shall fit closely and tightly around the entire perimeter. Tightness will be deemed acceptable if, at all points around the gasket, resistance is offered to the withdrawal of a strip of paper 50 mm wide and 0.075 mm thick, when the door is closed on it in a normal manner.

2.1.20 Door catches

Appliance door catches shall be so designed that the door can be opened from within by manual pressure, except that LP appliances which comply with Item (e) of Clause 2.1.14 shall have means to prevent the door from opening while the conveyance is in motion.

NOTE: The hasp and staple device shall be considered to comply with this requirement.

2.1.21 Doorknobs and handles

Doorknobs and handles shall not be attached by means of rivets.

2.1.22 Flue outlets

Flue outlets shall be designed so that objects placed on or around the appliance cannot close them off.

2.1.23 Flue baffles

Flue baffles, if fitted shall be designed and located in the flueway in such a manner as to avoid displacement which would affect the operation and combustion of the appliance.

2.1.24 Flueways

Flueways shall be readily accessible for cleaning.

2.1.25 Design to avoid obstruction of air inlets, flueway terminals and draught diverter relief openings.

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 to the safe and effective operation of the appliance shall be ensured by means of permanently attached spacers.

2.1.26 Flueway terminals and draught diverters

Flueway terminals and draught diverters shall be constructed so that they cannot be installed in other than the correct position.

2.1.27 Gas consumption adjusting devices

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

2.1.28 Electric light bulbs

Electric light bulbs shall be protected from damage.

2.2 MATERIALS AND STANDARDS

2.2.1 Suitability of materials and finishes

Materials and finishes, including dressings and lubricants used in the construction of an appliance shall be suitable for the conditions of use (eg. corrosion, temperature, handling, etc.).

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 Materials used in 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 to AS 1074.
- (b) Copper-Brazed Double Wall Low Carbon Steel Tubing (Bundyweld) to AS 1751. This shall be lead-tin coated or equivalent where corrosion protection is necessary.
- (c) Welded and Cold Drawn Low Carbon Steel Tubing to AS 1450 (S.A.E.-525B).
- (d) Copper Pipe to AS 1432.
- (e) Stainless Steel Tubing to AS 1769 ie. grade 304 to AS 1449.
- (f) Cast Iron Fittings to AS 1832. Threads to AS 1722 Pt 1, Taper External and Parallel Internal.
- (g) Flanges in cast iron, carbon steel, steel alloy or copper alloy to AS 2129, Section 3.
- (h) Steel fittings to AS D26.
- (i) Copper alloy fittings to AS D26.
- (j) Copper alloy fittings to AS 3688.
- (k) Copper capillary fittings to AS 3688 with silver brazing rod to AS 1167, Part 1, Table 2, alloy classification B2 - canary colour - (minimum silver content 1.8%) 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, and
- (b) the temperature shall not exceed 80°C.
- (c) Zinc based alloys shall not swell, crumble or develop cracks when exposed to saturated water vapour at 97°C for 10 days

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 / SUS 416 steel shall be acceptable.

2.2.7 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.

2.2.8 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 the Table 2.2.8 to remake the fittings, the joints shall comply with the requirements of Section 3.
- (f) The component parts shall be made of materials with a melting point not less than 430°C.

TABLE 2.2.8
TORQUE VALUES

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

2.2.9 Thermal insulation

Thermal insulation shall:

- (a) not contaminate any food or water in an appliance, produce obnoxious odours or fumes or corrode materials with which it is in contact
- (b) be fitted in such a way that it is protected against rodents and that it is not rendered ineffective or objectionable by:
 - (i) settling,
 - (ii) dislodgment,
 - (iii) condensation
 during the normal operation of the appliance.

2.3 ELECTRICAL SYSTEMS

2.3.1 Requirements for electrical components and their installation

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

2.3.2 Accessibility to electrical components

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

2.3.3 Connection of electrical components

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

2.3.4 Plug and socket connections

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

2.3.5 Protection against accidental contact

Electrical parts other than extra low voltage terminals, shall be enclosed so as to provide protection against accidental contact. Checking shall be carried out in accordance with AS / NZS 3100, Clause 8.10.

2.3.6 Protection of low voltage electrical components and wiring

Low voltage electrical components and wiring, if required to be energised to permit servicing of gas components on the appliance, shall be adequately protected against accidental contact. Checking shall be in accordance with AS / NZS 3100, Clause 8.10.

2.4 INSTALLATION REQUIREMENTS

2.4.1 Outdoor installation

Appliances for outdoor installation shall have all controls and electrical wiring adequately protected from climatic conditions to ensure safe and reliable operation.

2.4.2 Gas inlet connection

The gas inlet connection shall have a thread in accordance with AS 1722, Part 1 or flare fitting to AS D26, and shall be firmly fixed.

2.4.3 Anchoring of gas regulator

The regulator shall be anchored to prevent rotation while making the inlet connection.

NOTE: 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 Access to gas inlet connection

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

2.5 MAINTENANCE REQUIREMENTS

2.5.1 Accessibility for adjustment

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

- (a) Aeration controls. (It is acceptable for the adjustment to be finalised with the burner removed, provided the setting will not be disturbed during replacement).
- (b) Pilots.
- (c) Thermostat by-passes where provided.

- (d) Thermostat calibration.
- (e) Regulator adjustments.
- (f) Gas consumption adjusters.
- (g) Ignition devices.
- (h) Safety devices.

2.5.2 Accessibility for replacement

Components that require to be removed for service work shall be so made and attached to the appliance that they can be removed and replaced. In particular, except in the case of the 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 cock plugs.
- (c) Injector nipples.
- (d) Filters.
- (e) Pilot head assemblies, pilot jets.
- (f) Door springs or other door control mechanisms.
- (g) Burners.
- (h) Ignition devices.
- (i) Drip trays.
- (j) Flue baffles when flue cleaning is necessary.
- (k) Automatic control equipment.
- (l) Flame safeguards.
- (m) Electric light globes.

2.5.3 Screwed connections

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

2.5.4 Inaccessible nuts or bolts

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

2.5.5 Insertion and removal of gas injectors

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

2.5.6 Security of attachment of knobs and dials

Gas control knobs, movable dials and pointers:

- (a) shall be so designed that they are not capable of being incorrectly assembled
- (b) shall be securely attached to their spindles;
- (c) shall not contain loose parts which may become detached when the handles are removed.

2.5.7 Dismantling and replacement by 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.

2.6 PRESSURE REGULATORS

2.6.1 Provision of pressure regulators

An approved gas pressure regulator shall be provided with each appliance intended for operation on Natural gas, Town gas, and Tempered LPG. Where practicable, the regulator should be fitted within the perimeter of the appliance.

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

Town gas, TLP: 0.63 kPa

Natural gas: 1.00 kPa.

LPG: 2.75 kPa

2.6.2 Positioning of regulators

Regulators shall be so placed that breather holes cannot easily be blocked, and overheating and the possibility of ignition of gas leaking from the breather holes are minimised.

2.7 GAS CONTROLS AND FLAME SAFEGUARDS

2.7.1 Accessibility by the user

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

2.7.2 Accidental changes of settings

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

2.7.3 Indication of function

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

2.7.4 Identification of gas valves

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

2.7.5 Self latching gas valves

Self-latching gas valves other than pilot valves shall be fitted unless:

- (a) The valve handles are concealed, or
- (b) A flame safeguard is fitted, or
- (c) Automatic ignition is provided, or
- (d) The valve is spring loaded to return positively to the off position.

2.7.6 Fitting of flame safeguards

A flame safeguard system shall be fitted to every appliance intended for automatic operation to shut off all gas to the appliance in the event of flame failure at the point of supervision.

2.7.7 Reignition of thermostatically controlled burners

Appliances incorporating thermostatically controlled burners shall include a by-pass or other means to ensure automatic reignition of the burner, except that safety shut-off devices before such burners shall not be by-passed.

2.7.8 Manually ignited burners

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.

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

2.7.9 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.

2.8 IGNITION, PILOTS AND MAIN BURNERS

2.8.1 Burner supports

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

2.8.2 Gas manifolds

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

2.8.3 Proving ignition

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

2.8.4 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.

2.8.5 Protection of ports and injectors

Any ports and injectors of main and pilot burners that are exposed in their normal operation to falling particles shall be protected against blockage.

2.8.6 Restriction on gauze over primary air ports

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

2.8.7 Pilot burner shut-off

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

2.8.8 Pilot gas filter

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

2.8.9 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.

2.8.10 Aeration adjustment for universal LPG appliances

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

2.8.11 Viewing of burner flames

It shall be possible to view burner flames either directly, or by use of a mirror with doors closed and a panel or part removed.

2.8.12 Support of pilot burners, 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.

2.8.13 Flash lighting tubes

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

2.9 MARKINGS**2.9.1 Markings on packaging**

The packing case of every appliance shall display clear markings:

- (a) indicating the maximum packaged weight in kilograms
- (b) where the appliance is intended to be permanently connected to a reticulated supply of gas, showing the wording:

“TO BE INSTALLED ONLY BY AN AUTHORISED PERSON”.

2.9.2 Temporary markings on appliances**2.9.2.1 Gas type**

Appliances shall be provided with clear markings readily accessible and easy to read, stating the type of gas for which it has been manufactured and adjusted. The colour of the text shall be that appropriate to the gas specified as shown in the schedule in Clause 2.9.2.2.

For an appliance intended for use with a flexible connection having a bayonet fitting, additional wording shall refer to the local gas authority for confirmation of the gas type, if any doubt exists.

2.9.2.2 Gas type indication

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) Tempered LPG: Pink
- (g) All gases: Primrose

2.9.3 Permanent markings on appliances

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

- (a) Manufacturer's trade name.
- (b) Model designation.

- (c) Month and year of manufacture or serial number where this is documented to show month and year of manufacture.
- (d) Gas or gases for which the appliance is intended to be used.
- (e) Total nominal gas consumptions in MJ/h, and test point pressures in kPa for each gas nominated in (d) above.
- (f) 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.
- (g) Electrical markings as required by the appropriate electricity authority.
- (h) Wiring diagrams except where electrical equipment is limited to one electric lamp.
- (i) The Certificate of Compliance number.
- (j) Instructions as required in Clause 2.10.2.3.
- (k) The warning label as shown in Figure 4. This label shall be located on the outside of the appliance in a position where it can be easily read by the operator when the appliance is in the installed position.

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- (l) The danger label for portable refrigerators as shown in Figure 5A or 5B as appropriate.
- (m) Any additional information called for in other sections of this Standard.

2.9.4 Marking of flash lighting tubes

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

2.9.5 Identification of injectors

Removable injectors shall be marked with numerals indicating the orifice size in millimetres or the standard drill size. In the case of pilot burner injectors a colour coding in accordance with Clause 2.9.2.2 is acceptable. Alternatively the injector size may be nominated on the data plate.

2.9.6 Marking of parts that may interfere with flueing

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 INSTRUCTIONS

2.10.1 Installation

2.10.1.1 Instructions to be supplied with the appliance

Each appliance shall be supplied with written and diagrammatic installation instructions attached to the appliance in such a manner to ensure that they will reach the installer/user, and that include reference to at least:

- (a) Model or type of appliance.
- (b) Gas or gases for which the appliance is intended and data such as gas consumptions, pressures, etc., or reference to the appliance data plates.
- (c) The requirements of the local authority such as gas, electricity, etc., and AS 5601 / AG 601.
- (d) Overall dimensions of the appliance and location by measurement of connecting points of gas, water, electricity, flues, etc.

- (e) The alternative types of installation that may be made.
- (f) Details of the methods of connection and alternatives.
- (g) Details of the removal of any transit protection.
- (h) Required surroundings of the appliance, clearance from cupboards and fixings, walls, curtains, floors, or other combustible materials.
- (i) Special conditions of installation that may be required as the result of the Certification Test.
- (j) Special conditions that must be avoided, eg. marine environment, and any conditions necessary to ensure optimum performance.
- (k) When method of installation affects other trades, details should be given for other trades, where electrical connections are required, details should be given for electrician.
- (l) Flueing of appliance; provide details of:
 - (i) Size,
 - (ii) Position of flue outlet,
 - (iii) Materials and methods that may be used and respective locations, and termination of all types of flueing recommended
- (m) Ventilation; provide details of:
 - (i) Size and location of combustion air openings.
 - (ii) Size and location of openings for any downdraught diverter dilution.
- (n) Where an appliance can be installed in a cupboard or housing or is designed to be installed in a cupboard or housing, diagrams are required showing method of installation, ventilation requirements, clearances and minimum dimensions of cupboard or housing.
- (o) Details of any assembly work required to be done by the installer.
- (p) Definite instructions to test the operation of the appliance, before leaving.
- (q) Details of the necessary testing and instructions for minor adjustments.
- (r) Instructions on the procedure to be adopted if the appliance cannot be adjusted to perform correctly.

2.10.2 Operating

2.10.2.1 *Operating instructions to be supplied with the appliance*

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.

2.10.2.2 *Abnormal operation, maintenance schedule, service and replacement parts*

The instructions shall:

- (a) assist the user to recognise abnormal operation which requires service
- (b) recommend a maintenance schedule for the life expectancy of the appliance
- (c) include a reference as to where service and any necessary replacement parts may be obtained.

Drafts of these instructions shall be submitted with the appliance for test.

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

Where incorrect lighting and shutdown procedures can result in a hazardous condition, appliances shall be provided with clearly defined and complete instructions. Where necessary, lighting instructions shall require a safe purge before the appliance is re-lit.

2.11 SERVICING

2.11.1 Servicing instructions and maintenance schedule

Servicing instructions and maintenance schedule shall be available at least in draft form prior to the issue of a Certificate of Compliance. These instructions shall include reference to the items listed in Appendix D where applicable. Servicing instructions remaining with the consumer shall contain a warning that servicing shall be carried out only by authorised personnel.

SECTION 3 PRELIMINARY TESTS – LINE G A S E S

NOTE: Before commencing testing in this Section refer to Clause 2.1.1.

3.1 GENERAL REQUIREMENTS

3.1.1 Nominal gas consumption

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

3.1.2 Test gases

Tests in all parts of this Standard (except Section 4 that requires the use of some special gases in addition to those listed here) shall be carried out using the following test gases:

(See Test Gas Table 1.2.64 for characteristics)

- (a) Appliances intended for use with Natural gas shall be tested using available Natural gas but in the case of dispute or borderline results test gas “N” shall be used.
- (b) Appliances intended for use with Town gas shall be tested using available Town gas but in the case of dispute or borderline results test gas “D” shall be used.
- (c) Appliances intended for use with Propane only shall be tested with test gas “X”.
- (d) Appliances intended for use with Butane only shall be tested with test gas “Y”.
- (e) Universal LPG appliances are intended for use with Propane, Butane or any mixture of Propane and Butane and shall be tested with test gas “X” for all performance tests except for Sections 5.1 - Temperature Hazards and 5.2 - Heat Resistance where test gas “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 Tempered LPG shall be tested with test gas “T”.

Where an appliance being tested for multi-gas certification, provided that the gas consumptions are not lower than for other gases, at the discretion of the testing officer it may be assumed that performance results for one gas will be equally applicable for other gases for tests in Sections 5.1 - Temperature Hazards, and 5.2 - Heat Resistance.

3.2 PREPARATION FOR TESTING

3.2.1 Electrical safety requirements

The appliance shall comply with the following electrical safety requirements:

- (a) When the appliance is disconnected from the power supply the measured resistance between the earth pin of the plug and any exposed metal on the appliance shall not exceed 1 ohm for rotating parts and 0.1 ohm for all other parts.
- (b) When the appliance is disconnected from the power supply the measured insulation resistance between 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 this Australian Standard and checked 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 that is applicable (see Clause 3.1.2) with the inlet pressure set at normal test gas pressure (see 1.2.44).

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 test except as necessitated by the requirements.

3.2.6 Gas pressure and gas volume test equipment

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

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

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 tightness

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

3.3.2 Gas tightness after testing

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

3.3.3 Control of bleed lines

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 the pilot is assured,

and

- (b) blockage of the bleed line tip is prevented.

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.

3.5 GAS PRESSURE REGULATORS

3.5.1 Gas pressure regulator performance

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 Natural gas appliances and 0.75 kPa up to 3.0 kPa for Town gas and TLP appliances.

3.6 IGNITION AND FLAME SAFEGUARD SYSTEMS

Requirements Applicable to All Ignition and Flame Safeguard Systems

3.6.1 Aerated pilots

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

3.6.2 Ignition at reduced pilot rate

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

3.6.3 Multi-port pilots

Multi-port pilots shall conform to Clauses 3.6.1 and 3.6.2 with all ports blocked other than the one activating the flame safeguard sensor.

3.6.4 Holding time for thermoelectric flame safeguard

On carrying out the normal lighting procedure on a manually ignited atmospheric burner protected by a thermoelectric flame safeguard, the flame safeguard shall hold open within one minute of igniting the operating flame.

3.6.5 Flame travel at ignition

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

3.6.6 Flame safeguard systems — self-check

Flame safeguard systems other than “thermoelectric” types shall incorporate a self-check of integral circuitry to prove that the system is not in the flame proved condition prior to start-up.

3.6.7 Flame failure

Flame failure of the supervised burners shall result in lockout in accordance with Clause 2.7.6.

3.6.8 Flame safeguard system —shut-off time

The combined time for the flame safeguard 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 one and a half minutes where atmospheric type main burners are used and the total gas consumption is up to and including 50 MJ/h.

SECTION 4 LIMIT GAS TESTS

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 clause:

- | | |
|-------------------------------|--|
| (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 BURNER - OVERLOAD

The CO/CO₂ ratio of the combustion products of any independent burner, after it has operated for the specified time at the test conditions specified below, shall not exceed 0.007 after 10 minutes

The limiting conditions shall be:

TABLE 4.2
LIMITING CONDITIONS INDEPENDENT BURNER

	Limit gas	Actual gas consumption (% of nominal gas consumption)
NG	Na	115%
Propane	X	113%
Butane	Y	113%
Universal LPG	Y	125%
TLP	Ta	113%
TG	A	115%

4.3 CO/CO₂ RATIO LIMITS FOR PERMANENT PILOTS-OVERLOAD

The CO/CO₂ ratio of the combustion products of a permanent pilot of appliance operating at the test conditions specified below, shall not exceed 0.007 after 10 minutes

Pilots shall be tested using the following appliance inlet pressures:

TABLE 4.3
LIMITING CONDITIONS PILOT BURNER

	Limit gas	Appliance inlet pressure
NG	Na	3.0 kPa
Propane	X	3.5 kPa
Butane	Y	3.5 kPa
Universal LPG	Y	3.5 kPa
TLP	Ta	2.5 kPa
TG	A	2.5 kPa

4.4 FLAME CHARACTERISTICS AT MAXIMUM AND MINIMUM LIMITING CONDITIONS

A burner shall exhibit no flame abnormality (see 1.2.16) at maximum and minimum limiting conditions whether the appliance is hot or cold. Open flued appliances shall comply in the following conditions:

- When a flue outlet of an appliance is closed.
- When a downdraught having a velocity head of 7.5 Pa is applied to the flue outlet for one minute.
- When an updraught having a velocity head of 7.5 Pa is applied to the flue outlet for one minute.

The limiting conditions shall be:

TABLE 4.4
LIMITING CONDITIONS FLAME ABNORMALITY

	Maximum condition		Minimum condition	
	Limit gas	Test point pressure	Limit gas	Test point pressure
NG	Na	$1.10 \times P_t$	Nb, Nc, S	$0.75 \times P_t$
Propane	X, Z	$1.25 \times P_t$	X, Z	$0.75 \times P_t$
Butane	Y	$1.25 \times P_t$	Y	$0.75 \times P_t$
Universal LPG	Y, Z	$1.25 \times P_t$	X, Z	$0.75 \times P_t$
TLP	Ta	$1.10 \times P_t$	Tb	$0.75 \times P_t$
TG	A	$1.10 \times P_t$	B, C	$0.75 \times P_t$

Where P_t = nominal test point pressure

4.5 BURNER IGNITION AT MAXIMUM AND MINIMUM LIMITING CONDITIONS

On carrying out the normal lighting procedure, a burner shall ignite completely and quietly within 5 seconds for all gases, irrespective of types of ignition, whether manual, battery or other forms at maximum and minimum limiting conditions when the appliance is hot and cold. The time shall be measured from the first flow of gas.

In the case of battery-operated ignition systems a voltage equivalent to 80% of the nominal voltage for each battery shall be applied to the supply contacts of the battery holder.