

Australian/New Zealand Standard™

Gas appliances

Part 1.2: Gas fired water heaters for hot water supply and/or central heating



AS/NZS 5263.1.2:2020

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- Gas Association of New Zealand
- Gas Energy Australia
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- Gas Utilisation Institute, New Zealand
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Australian/New Zealand Standard™

Gas appliances

Part 1.2: Gas fired water heaters for hot water supply and/or central heating

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee AG-001, Gas Appliances, to supersede AS/NZS 5263.1.2:2016, *Gas appliances — Part 1.2: Gas fired water heaters for hot water supply and/or central heating*.

This Standard provides particular requirements for gas fired water heaters for hot water supply and/or central heating that apply in addition to or in place of the general requirements for gas appliances set out in AS/NZS 5263.0, *Gas appliances, Part 0: General requirements*. The combination of AS/NZS 5263.1.2 (this Standard) and AS/NZS 5263.0 supersedes the combination of AS/NZS 5263.1.2:2016 and AS 5263.0—2013.

This Part 1.2 of AS/NZS 5263 supplements or modifies the corresponding clauses of Part 0. The numbering of clauses in this Part 1.2 is consistent with the numbering in Part 0 for related requirements.

Statements used in this Part 1.2 to explain the relationship of clauses in this Standard to the corresponding clauses in Part 0 are as follows:

- (a) “This Clause of AS/NZS 5263.0 applies”, in which case the corresponding clause of Part 0 and its subclauses are used without modification.
- (b) “This Clause of AS/NZS 5263.0 applies, except as modified below”, in which case the corresponding clause of Part 0 and its subclauses are used but with the modifications, as listed in this document.
- (c) “Not applicable”, in which case the corresponding clause of Part 0 is not used in this context.

Otherwise the text in this Standard replaces the corresponding clause of Part 0.

Any clauses in this Standard that are additional to the requirements of Part 0 are numbered beginning from 101 (except for additional definitions, which begin from 201). Additional appendices in this Part 1.2 are designated with letters starting from AA, and additional clauses in appendices are numbered beginning from 101 (e.g. ZA.101).

Where an appendix or part of an appendix (i.e. clause, figure or table) is cited in this Standard, reference should first be made to Part 0 for the content of the Appendix, which may be modified by this Part 1.2.

This Standard (AS/NZS 5263.1.2), together with the Standard AS/NZS 5263.0 (Part 0), constitute a means of conformance to AS 3645, *Essential requirements for gas equipment*, for gas fired water heaters for hot water supply and/or central heating.

The objective of this Standard is to provide manufacturers, designers, regulatory authorities, conformity assessment bodies and similar organizations with uniform minimum requirements for the safety, performance and use of gas appliances.

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

Consideration has been given to —

- (i) continuity of satisfactory operation;
- (ii) the prevention of fire hazards, and explosions;
- (iii) the prevention of injury to persons or property;
- (iv) gas rules and regulations now in force; and
- (v) relevant International Standards.

AS/NZS 5601 series of Standards provides essential requirements and means of conformance for gas installations. Any reference to AS/NZS 5601 in AS/NZS 5263 series Standards 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 appendix to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

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Australian/New Zealand Standard

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Part 1.2: Gas fired water heaters for hot water supply and/or central heating

Section 1 Scope and general

1.1 Scope and application

1.1.1 Scope

This Standard provides specific requirements and test methods for gas water heaters and central heating boilers, with an energy input not exceeding 500 MJ/h, and includes types intended for the supply of hot water at a maximum temperature of 99 °C for —

- (a) sanitary, potable and drinking purposes;
- (b) hydronic space heating; and
- (c) a combination of Item (a) and Item (b).

For Australia, the fuel gases are natural gas (as described by AS 4564), town gas, liquefied petroleum gas (LP Gas, as described by AS 4670), simulated natural gas (SNG) and tempered liquefied petroleum gas (TLP).

For New Zealand:

- (i) The fuel gases are natural gas (as specified in NZS 5442) and general product liquefied petroleum gas (NZLPG) (as specified in NZS 5435).
- (ii) The thermal efficiency requirements are informative only, except where they relate to safety.

NOTE Other statutory and regulatory requirements may be applicable to a product that falls within the scope of this Standard. It is the responsibility of the manufacturer, importer or distributor (as appropriate) to ensure that products conform to such requirements.

Test methods are set out in [Appendices ZA, ZB and ZC](#) (see [Clause 1.4](#)).

1.1.2 Application

This Standard is complementary to, and is intended to be used in conjunction with, AS/NZS 5263.0. The requirements given herein shall take precedence over corresponding requirements in that Standard.

AS 3645 specifies essential requirements for gas equipment that requires regulatory approval before sale. This Standard, together with AS/NZS 5263.0, 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 for informative purposes are listed in the Bibliography.

AS 1357.1, *Valves primarily for use in heated water systems, Part 1: Protection valves*

AS/NZS 5263.0, *Gas appliances, Part 0: General requirements*

IEC 60730-2-9, *Automatic electrical controls, Part 2-9: Particular requirements for temperature sensing control*

EN 15502-2-1, *Gas-fired central heating boilers, Part 2-1: Specific standard for type C appliances and type B2, B3 and B5 appliances of a nominal heat input not exceeding 1 000 kW*

EN 15502-2-2, *Gas-fired central heating boilers, Part 2-2: Specific standard for type B1 appliances*

ANSI Z21.13, *Gas-fired low pressure steam and hot water boilers*

1.3 Terms and definitions

For the purposes of this Standard the terms and definitions given in AS/NZS 5263.0 and the following apply.

1.3.201

automatic heat exchange water heater

appliance in which water is heated by passing it through a heat exchanger immersed in heated water

1.3.202

central heating boiler

appliance that is designed to heat and supply water at a temperature not exceeding 99 °C for hydronic heating purposes

1.3.203

circulator

water heater in which water passes to a storage tank after heating

Note 1 to entry: In the case of hydronic heating systems the term “circulator” might refer to a pump.

1.3.204

combination appliance

appliance that is designed to perform the functions of both a central heating boiler and a water heater by means of two separate water circuits

Note 1 to entry: Combination appliances are also known as combi boilers.

1.3.205

control thermostat

preset device enabling the water temperature to be maintained automatically, within a given range

1.3.206

drain valve

valve in the bottom of the water vessel, through which the water may be drained from an appliance

1.3.207

expansion relief valve

pressure actuated valve that automatically discharges water at a specified set pressure to prevent the pressure in the system exceeding the maximum working pressure during normal operation

1.3.208

heat output

amount of heat transferred to the water per unit time under specified conditions

Note 1 to entry: Heat output is expressed in kilowatts (kW).

1.3.209

hydronic

relating to a system of heating or cooling that involves the transfer of heat by circulation of a fluid (usually water) in a closed circuit

Note 1 to entry: The closed circuit in a hydronic system may be vented or unvented.

1.3.210**instantaneous water heater**

water heater or central heating boiler in which gas, except for any pilot flame, burns only when water is discharged from the outlet of the appliance

1.3.211**maintenance gas consumption**

gas consumption required to maintain at a steady value some particular condition in an appliance

Note 1 to entry: For a storage water heater, the maintenance gas consumption is determined for steady water temperature.

1.3.212**maximum working water pressure**

pressure setting of the water pressure relief valve or its equivalent

1.3.213**minimum working water pressure**

minimum water supply pressure required to operate the appliance at its stated performance

1.3.214**range rated appliance**

appliance with installer adjustable nominal heat input to suit the heat requirements of the installation

1.3.215**relief device**

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

1.3.216**safety temperature limiter**

device that causes safety shutdown and non-volatile lock out so as to prevent the water temperature exceeding a preset limit

1.3.217**storage capacity**

quantity of water contained within the storage vessel of a storage water heater

Note 1 to entry: Storage capacity is measured in litres (L).

1.3.218**storage water heater**

water heater that incorporates a thermally insulated container in which the water is heated and stored for subsequent use

1.3.219**temperature sensing element**

component that detects the temperature of the medium to be supervised or controlled

1.3.220**water heater**

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

1.3.221**water operated gas valve**

gas valve actuated by a flow or change of pressure in a water system of an appliance

1.3.222**water pressure relief valve**

pressure actuated valve that automatically discharges fluid at a specified set pressure

Note 1 to entry: A water pressure relief valve is fitted to a water heater to prevent the pressure in the water carrying parts from exceeding the maximum working pressure during normal use, and from exceeding a predetermined margin over the maximum working pressure when temperature controls fail to limit pressure.

1.4 Test methods

The modified and new test methods applicable for this Standard are located in the following appendices; apart from these, the test methods of AS/NZS 5263.0 apply.

[Appendix ZA](#) — Preliminary test methods (applicable for [Section 3](#))

[ZA.2](#) Gas consumption test

[Appendix ZB](#) — Limiting conditions test methods (applicable for [Section 4](#))

[ZB.2](#) Determination of CO/CO₂ ratio for any independent burner — Overload test

[ZB.4](#) Flame characteristics at maximum and minimum limiting conditions test

[Appendix ZC](#) — Performance test methods (applicable for [Section 5](#))

[ZC.34](#) Spillage monitoring system test for appliances with a combustion products discharge safety device

[ZC.101](#) Blocked flue test — Open flued appliances without draught diverters

[ZC.102](#) Combustion products spillage device test

[ZC.103](#) Hydrostatic cycling test — Instantaneous water heaters

[ZC.104](#) Hydrostatic cycling test — Circulators and storage water heaters

[ZC.105](#) Endurance test — Water operated gas valves

[ZC.106](#) Thermal efficiency test — Storage water heaters

[ZC.107](#) Thermal efficiency, water heating capacity, start-up heat capacity and electrical power consumption test — Instantaneous water heaters and circulators

[ZC.108](#) Thermal efficiency test — Central heating boilers

[ZC.109](#) Maintenance gas consumption test — Storage water heaters

[ZC.110](#) Stratification test — Storage water heaters

[ZC.111](#) Stratification test — Automatic heat exchange water heaters

[ZC.112](#) Drain performance test

[ZC.113](#) Over-temperature cut-out device test

[ZC.114](#) Temperature control test — Storage water heaters

[ZC.115](#) Water temperature rise test — Instantaneous water heaters

[ZC.116](#) Start-up time test — Automatic instantaneous water heaters

- [ZC.117](#) Water temperature on start-up test — Instantaneous water heaters with automatic outlet temperature control
- [ZC.118](#) Temperature control test — Instantaneous water heaters with automatic outlet temperature control
- [ZC.119](#) Relief device test — Unvented water heaters containing less than 1 L of water
- [ZC.120](#) Control thermostat test — Central heating boilers
- [ZC.121](#) Temperature safety limiting devices test — Central heating boilers
- [ZC.122](#) Safety temperature limiter test
- [ZC.123](#) Storage capacity test

Section 2 Design and construction

2.1 Scope

This Clause of AS/NZS 5263.0 applies.

2.2 General design requirements

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.2.101 Covers on cold water feed tanks

Any integral cold water feed tank shall be supplied with an adequate and securely fastened dust and vermin-proof cover.

2.2.102 Venting of central heating waterways

A central heating boiler or combination appliance shall be designed such that when it is installed and used according to the manufacturer's instructions, it shall be possible to vent the air from the central heating waterways, unless it is self-venting.

2.3 Materials

This Clause of AS/NZS 5263.0 applies.

2.4 Design for assembly and installation

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.4.5 Restraint where a hose assembly is used

Not applicable.

2.5 Design for maintenance

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.5.8 Means for gas pressure measurement

Means shall be provided to allow the measurement of both the burner gas pressure and the gas pressure at the inlet to the appliance 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 1.0 mm or equivalent restriction.

2.5.101 Collection and removal of corrosion product

Access shall be provided for the collection and removal of corrosion product.

2.5.102 Provision for draining

Appliances containing more than 1 L of water shall have provision for draining.

2.5.103 Drain valves

Drain valves shall be designed —

- (a) to take hose or flexible tubing to conduct drainage to waste; and
- (b) so that it is impossible to withdraw the valve stem completely in the normal operation of the valve.

2.6 Design for operation

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.6.4 Primary guards openings

Not applicable.

2.7 Controls and safety devices

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.7.3 Main burner shut off provision

Not applicable.

2.7.101 Relief valves for unvented appliances containing more than 1 L of water

Each unvented appliance containing more than 1 L of water shall be supplied with one or more combination temperature and pressure relief valves, conforming to AS 1357.1 (or equivalent, under the conditions of use), with a pressure setting not exceeding the maximum working pressure of the appliance and having a total rating as follows:

$$P \geq 0.21 \times R$$

where

P = total rating of relief valves (kW)

R = gas consumption of appliance (MJ/h)

For storage water heaters the valves shall be located within 150 mm of the top of the water container or top 20 % of the water capacity, whichever is the higher. In the case of instantaneous water heaters, fitting the valves in the plumbing immediately adjacent to the outlet will be deemed to conform to the requirement.

2.7.102 Relief devices for unvented appliances containing less than 1 L of water

All unvented appliances not exceeding 1 L in storage capacity shall be supplied with a relief device meeting the requirements of [Clause 5.101.6](#).

2.7.103 Thermostats

A thermostat shall be provided on all appliances other than instantaneous water heaters.

2.7.104 Over-temperature cut-out devices

All unvented appliances containing more than 1 L of water and all water heaters with nominal gas consumption greater than 200 MJ/h shall be fitted with an over-temperature cut-out device actuated

by hot water temperature as an integral part of the appliance. The device shall operate independently of other controls and shall be a manual reset type.

2.7.105 Controls for manually operated instantaneous water heaters

An integral water inlet valve shall be provided on all manually operated instantaneous water heaters.

The valve shall be so arranged that the water supply shall be turned on either prior to, or at the same time as, the main gas supply.

2.7.106 Controls for automatic instantaneous water heaters

The controls of an automatic instantaneous water heater shall be so designed that gas shall only be supplied to the main burner when water is flowing through the appliance.

2.7.107 Cold water feed tank overflow

The overflow from an integral cold water feed tank shall be so located that, with the water in the feed tank adjusted to the marked water level, there shall be no discharge from the overflow during the initial heating of the appliance from cold.

2.7.108 Temperature controls for central heating boilers and combination appliances

2.7.108.1 General

Central heating boilers and combination appliances shall be fitted with thermostats and water temperature control devices in accordance with [Table 2.7.108](#).

Table 2.7.108 — Temperature controls — Central heating boilers

Boiler type	Control type			
	Control thermostat	Limit thermostat	Overheat cut-off device	Safety temperature limiter
	Clauses 2.7.108.2 and 5.101.7.2	Clauses 2.7.108.3 and 5.101.7.3	Clauses 2.7.108.4 and 5.101.7.4	Clauses 2.7.108.4 and 5.101.7.5
Open expansion vessel	✓			
Sealed expansion vessel < 300 kPa	✓			✓
Sealed expansion vessel < 300 kPa	✓	✓	✓	
Sealed expansion vessel > 300 kPa	✓			✓
NOTE 1 For central heating boilers with sealed expansion vessels < 300 kPa, instead of a limit thermostat, other devices (e.g. water rate monitoring device, low water detector) may be acceptable, provided the appliance conforms to EN 15502-2-2.				
NOTE 2 For central heating boilers with sealed expansion vessels < 300 kPa, either solution shown in the Table is acceptable.				

2.7.108.2 Control thermostats

The control thermostat for a central heating boiler or the central heating function of a combination appliance shall conform to the requirements of IEC 60730-2-9 for Type 1 devices.

2.7.108.3 Limit thermostats

The limit thermostat for a central heating boiler or the central heating function of a combination appliance shall conform as follows:

- (a) The limit thermostat shall conform to the requirements of IEC 60730-2-9 for Type 1 devices.
- (b) The maximum set point temperature shall be non-adjustable.

NOTE When the water temperature falls below the set point of the limit thermostat, the gas supply to the burner may be restored automatically.

2.7.108.4 Overheat cut-off devices and safety temperature limiters

An overheat cut-off device or safety temperature limiter for a central heating boiler or the central heating function of a combination appliance shall conform as follows:

- (a) The overheat cut-off device or safety temperature limiter shall conform to the requirements of IEC 60730-2-9 for Type 2 devices.
- (b) Interruption of the link between the sensor and the device responding to its signal shall cause at least safety shutdown.

2.7.108.5 Sensors

Thermostats, limit thermostats, safety temperature limiters and overheat cut-off devices shall have independent sensors, except that for an electronic system, thermostats and limit thermostats may have the same sensor, provided that in the event of failure of the sensor the appliance continues to conform to [Clause 5.101.7](#).

2.7.109 Expansion vessel and pressure gauge for central heating boilers

If a sealed system expansion vessel is incorporated in a central heating boiler or the central heating function of a combined appliance, then —

- (a) the expansion vessel shall be located or protected in such a way that heat cannot damage the diaphragm; and
- (b) the appliance shall be fitted with a pressure gauge indicating the water-side operating pressure.

2.8 Gas train

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.8.5 Main burner automatic shut off valves

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. One valve shall be actuated by the temperature control device and or by water flow, the other by the device specified in [Clause 2.7.104](#) unless both devices control both valves.

2.9 Combustion air and flue systems

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.9.5 Design of flue connection

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

The minimum length of engagement shall not be less than 13 mm for a vertical flue connection and 25 mm for a horizontal flue connection.

2.9.101 Flueing of indoor appliances

An indoor appliance shall be flued.

2.10 Fan assisted combustion systems

This Clause of AS/NZS 5263.0 applies.

2.11 Burners and ignition systems

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.11.10 Tray type burners-turndown limits

Tray type burners shall not be used.

2.12 Components

This Clause of AS/NZS 5263.0 applies.

2.13 Cylinders and cylinder compartments

This Clause of AS/NZS 5263.0 applies.

2.14 Markings

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.14.2 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 Standard. 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. Such markings shall include the items specified in this clause of AS/NZS 5263.0 and the following:

- (aa) Maximum working water pressure in kPa or MPa.
- (bb) Minimum working water pressure, except for storage water heaters.
- (cc) Storage capacity in litres, for storage water heaters.
- (dd) Water heating capacity in litres per minute (L/min) for a nominated temperature rise, for instantaneous water heaters only.
- (ee) Heat output in kW or for range-rated appliances the maximum and minimum output values in kW.
- (ff) Where relevant, that the appliance is intended only for a central heating system with an open expansion vessel, for central heating boilers and combination appliances.
- (gg) Provision for the installer to indicate the nominal heat input to which the appliance has been adjusted, for range rated central heating boilers and combination appliances.

2.14.12 Label on guard

Not applicable.

2.14.14 Markings on packaging

The packaging shall be marked in a prominent position with the items specified in this Clause of AS/NZS 5263.0 and, in the case of an appliance unsuitable for use as a pool heater, the text "NOT TO BE USED AS A POOL HEATER".

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

2.14.101 Identification of connections

Gas and water inlet and outlet connections shall be clearly identified.

2.14.102 Relief valve warning notice

Storage water heaters shall carry a warning notice, immediately adjacent to the temperature and pressure relief valve location, advising the installer to fit the valve unless it has been fitted by the manufacturer.

2.14.103 Temperature setting markings

Storage water heaters for sanitary purposes and with variable setting thermostats shall have a marking to indicate a nominal thermostat set point of 60 °C.

2.14.104 Marking of cold water feed tank water levels

The normal water level shall be permanently marked on any integral cold water feed tank of a water heater.

2.14.105 Energy label — Water heaters and combination appliances

2.14.105.1 Energy label format and content

Where an appliance carries an energy label, the format and content of the label shall be in accordance with [Appendix AA](#).

Where an appliance is available for more than one type of gas, the energy label parameters for one gas type may be applied to any other gas type for which the appliance nominal gas consumption is the same.

2.14.105.2 Energy label to be fitted

The energy label, as specified in [Clause 2.14.105.1](#), shall be affixed in a prominent position on each water heater and combination appliance with gas consumption up to and including 50 MJ/h for storage types and 250 MJ/h for instantaneous types.

2.15 Instructions

This Clause of AS/NZS 5263.0 applies, except as modified below.

2.15.2 Installation

2.15.2.1 Instructions supplied with the appliance

Each appliance shall be supplied with installation instructions that include the items specified in this Clause of AS/NZS 5263.0 and the following:

- (aa) Details of the fitting of temperature and pressure relief valve(s) where applicable.
- (bb) A warning if the appliance is unsuitable for use as a pool heater.
- (cc) For a boiler or combination appliance, the maximum output water temperature that the appliance can deliver in °C.
- (dd) For sealed heating systems, instructions regarding the installation of a pressurized expansion vessel where the appliance is not originally fitted with such a device.
- (ee) For a boiler or combination appliance intended only for use with an open expansion vessel, a warning that they can only be installed in a central heating system with an open expansion vessel.
- (ff) For a boiler or combination appliance with an integral pump, the water pressure head available at the appliance outlet connection as a function of water flow rate in graphical or tabular form.
- (gg) For a boiler or combination appliance without an integral pump, the pressure loss as a function of water flow rate in graphical or tabular form.
- (hh) For a boiler or combination appliance with an adjustable control thermostat, the maximum temperature setting of the thermostat.

Section 3 Preliminary test — Line gases

3.1 General

This Clause of AS/NZS 5263.0 applies.

3.2 Preparation for testing

This Clause of AS/NZS 5263.0 applies, except as modified below.

3.2.101 Additional setting up for hydronic heating appliances

In addition to Clause 3.2 of AS/NZS 5263.0, an appliance intended for the provision of hydronic heating shall be set up in accordance with the following:

- (a) The appliance shall be connected to an appropriate test rig. The water circuit installation shall be purged of air in accordance with the manufacturer's instructions.
- (b) If fitted with a thermostat which is adjustable up to 95 °C, or with a non-adjustable thermostat having a set point in the range 70 °C to 95 °C, the tests shall be carried out with a flow temperature of 80 ± 2 °C. However, where the maximum flow temperature, by design, cannot exceed some lower temperature, the tests shall be carried out using the maximum flow temperature stated in the manufacturer's instructions.
- (c) The test rig shall have means to achieve a temperature difference between the flow and return as specified by the manufacturer or a temperature difference 20 ± 1 °C where the manufacturer does not specify a temperature difference.
- (d) Except where otherwise stated, all tests shall be carried out with the boiler at thermal equilibrium, that is, when the water flow and return temperatures have stabilized within 2 °C.

3.3 Gas leakage

This Clause of AS/NZS 5263.0 applies.

3.4 Gas consumption

This Clause of AS/NZS 5263.0 applies, except as modified below.

3.4.2 Determined gas consumption of permanent pilots

The determined gas consumption of each permanent pilot, when tested in accordance with Test Method [ZA.2](#), shall not be more than 0.25 MJ/h, except where —

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

3.5 Gas pressure regulators

This Clause of AS/NZS 5263.0 applies.

3.6 Ignition and safety shut off systems

This Clause of AS/NZS 5263.0 applies, except as modified below.

3.6.1 General requirements

3.6.1.11 Proving of start flame

Gas shall not flow beyond the ignition safety time unless the start flame has been proved. The start flame shall be proved before the gas rate increases beyond the start flame rate.

3.6.1.101 Start flame establishment period — Non-permanent pilot systems

For burner systems without permanent pilots, the start flame establishment period and, where applicable, the main flame establishment period shall be less than the maximum value as nominated by the manufacturer.

3.6.2 Additional requirements for atmospheric burners with automatic burner ignition systems not based on permanent pilots

3.6.2.4 Start flame proving period

Not applicable.

3.6.3 Additional requirements for fan assisted combustion systems with automatic ignition not based on permanent pilots

3.6.3.5 Start flame proving period

Not applicable.

3.7 Ignition of draped fabric

Not applicable.

Section 4 Tests under limiting conditions

4.1 General

This Clause of AS/NZS 5263.0 applies.

4.2 CO/CO₂ ratio limits for any independent surface combustion burner — Underload

This Clause of AS/NZS 5263.0 applies.

4.3 CO/CO₂ ratio limits for any independent burner — Overload

This Clause of AS/NZS 5263.0 applies.

4.4 CO/CO₂ ratio limits for permanent pilots — Overload

This Clause of AS/NZS 5263.0 applies.

4.5 Flame characteristics at maximum and minimum limiting conditions

This Clause of AS/NZS 5263.0 applies.

4.6 Burner ignition at maximum and minimum limiting conditions

This Clause of AS/NZS 5263.0 applies.

4.7 Delayed ignition at maximum and minimum limiting conditions

This Clause of AS/NZS 5263.0 applies.

4.8 Reignition at turndown under draught conditions

This Clause of AS/NZS 5263.0 applies.

4.9 Pilot ignition and stability at maximum and minimum limiting conditions

This Clause of AS/NZS 5263.0 applies.

4.10 Burner stability when changing setting

This Clause of AS/NZS 5263.0 applies.

4.11 Unburnt gas release from burner system

This Clause of AS/NZS 5263.0 applies.

4.12 Blocked flueway terminal

This Clause of AS/NZS 5263.0 applies.

4.13 Case pressure test

This Clause of AS/NZS 5263.0 applies.

4.14 Effect of opening and closing doors at turndown condition

This Clause of AS/NZS 5263.0 applies.

4.15 Sooting — Luminous effect appliances

This Clause of AS/NZS 5263.0 applies.

4.16 Burner interference at ignition or during combustion

This Clause of AS/NZS 5263.0 applies.

Section 5 Performance specifications

5.1 Combustion air supply

This Clause of AS/NZS 5263.0 applies.

5.2 Flue operation

This Clause of AS/NZS 5263.0 applies, except as modified below.

5.2.3 Performance with updraught, downdraught and blocked flue

Not applicable.

5.2.3.101 Open flued appliances with a draught diverter or similar device

When an open flued appliance with a draught diverter or alternative system is tested in accordance with Test Method ZC.4, the CO/CO₂ ratio shall not exceed 0.02.

During testing the appliance is operated at nominal gas consumption and in the case of appliances with turndown or modulating controls, the appliance shall be tested down to the lowest setting and sufficient intermediate points which characterize the appliance performance.

5.2.3.102 Forced or induced draught open flued appliances without a draught diverter or similar device

When the flue terminal is progressively blocked until lockout occurs, in accordance with Test Method [ZC.101](#), lockout shall not occur at back pressures less than the manufacturer's recommendation or 140 Pa, whichever is the higher.

5.2.7 Safety shutdown — Combustion products limits

Where a flued appliance is fitted with a system to prevent the release of combustion products in a dangerous quantity into the room under abnormal draught conditions, the appliance shall comply with the following:

- (a) An appliance fitted with an atmosphere sensing system (e.g. a CO detector) shall shut down before the CO concentration exceeds 200 ppm by volume in the atmosphere of the test room when tested in accordance with Test Method ZC.33.
- (b) When an appliance fitted with a combustion products discharge safety device is tested in accordance with Test Method [ZC.34](#) —
 - (i) The appliance shall shut down within the times given in [Table 5.2.7](#);
 - (ii) Nuisance shutdowns shall not occur; and
 - (iii) Where safety shutdown occurs, automatic restart shall only be possible after a minimum waiting time of 10 min.

Table 5.2.7 — Shutdown times

Degree of blockage	Area of plate opening	Maximum shut down time, s	
		On/Off	Modulating
Complete blockage	0	200	$200 \times Q_n/Q_m$
Key Q_n = nominal input of the appliance. Q_m = input at turndown for appliances with modulation or turndown.			

5.2.101 Combustion products spillage device — Storage water heaters

An open flued storage water heater with a gas consumption of less than 50 MJ/h and intended for installation on a floor shall be fitted with a combustion products spillage device.

When the appliance is tested in accordance with Test Method [ZC.102](#), the device shall —

- (a) cut off all gas to the burners within 2 min when combustion products spill from the appliance, other than from the flue connection, at 100 °C above ambient;
- (b) not prevent normal operation of the appliance at overload gas consumption; and
- (c) be so designed that it cannot be bypassed or readily reset.

5.3 Condensate

This Clause of AS/NZS 5263.0 applies.

5.4 Temperature hazards

This Clause of AS/NZS 5263.0 applies, except as modified below.

5.4.2 Appliance operating conditions

The appliance shall be operated as follows:

- (a) The appliance shall be operated continuously for not less than 2 h with the thermostat, if fitted, set at maximum and sufficient water passing through to keep the thermostat open.
- (b) For storage water heaters intended for indoor installation, the floor temperature measurements shall be repeated with the dome of the combustion chamber lined with insulation and the burner aeration adjusted to give a luminous, sooting flame.
- (c) For instantaneous water heaters, the wall temperature measurements shall be repeated with a 30 mm diameter hole cut in the rear skirt of the heat exchanger, centrally between the top and second top coils and centrally between the sides.
- (d) For central heating boilers and combination appliances the appliance shall be connected to a simulated central heating system, in accordance with the manufacturer's instructions.

5.4.6 Temperature limits — Appliance safety**5.4.6.101 Expansion vessel**

The corrected temperature of any sealed system expansion vessel shall not exceed the maximum temperature specified by the manufacturer.

5.4.7 Temperature limits — Protection from contact with the heat source

Not applicable.

5.5 Heat resistance of appliance

This Clause of AS/NZS 5263.0 applies, except as modified below.

5.5.1 Resistance to temperatures

5.5.1.2 Test conditions

The appliance is operated continuously at overload gas consumption for 10 h with the thermostat (if fitted) set at maximum, and sufficient water passing through to keep the thermostat open.

5.5.3 Minimum temperature requirements of heat exchangers during warming-up period

Not applicable.

5.5.4 Maximum temperature requirements for heat exchanger materials

Not applicable.

5.6 Durability

This Clause of AS/NZS 5263.0 applies, except as modified below.

5.6.101 Hydrostatic cycling requirements — Water heaters and combination appliances

Water carrying parts shall not leak or distort when subjected to Test Method [ZC.103](#) in the case of automatic instantaneous water heaters, or Test Method [ZC.104](#) in the case of circulators or storage water heaters.

5.6.102 Water operated automatic gas valves

The operation of a water operated automatic gas valve shall remain satisfactory when it is subjected to an endurance test of 50 000 cycles in accordance with Test Method [ZC.105](#).

5.7 Electrical supply variation or failure

This Clause of AS/NZS 5263.0 applies.

5.8 Appliance operation under linting conditions

When an indoor appliance that has the combustion air inlet lower than 150 mm above floor level, is operated under linting conditions in accordance with Test Method ZC.16, then —

- (a) the CO/CO₂ ratio shall not exceed 0.02;
- (b) there shall be no flame abnormality; and
- (c) fan and motor bearings shall not be impaired.

5.9 Rain test for outdoor and room sealed appliances

This Clause of AS/NZS 5263.0 applies.

5.10 Operation under windy conditions

This Clause of AS/NZS 5263.0 applies.

5.11 Strength and stability

This Clause of AS/NZS 5263.0 applies, except as modified below.

5.11.4 Hydrostatic strength

5.11.4.1 Water heaters

When tested in accordance with Test Method ZC.24, water carrying components, including hot water storage tanks of storage water heaters, shall not leak or show permanent distortion when subjected to hydrostatic pressures for 5 min as follows:

- (a) *Appliances designed for direct connection to the water mains* — 1.5 times the rated working pressure. In addition, these components shall not leak when the hydrostatic pressure is increased to twice the rated working pressure or 2.10 MPa, whichever is the greater, and then released.
- (b) *Appliances not designed for direct connection to the mains* — twice the rated working pressure.
- (c) *Appliances designed for use with an open outlet* — 35 kPa.

5.11.4.2 Central heating boilers

When tested in accordance with Test Method ZC.24, water carrying components shall not leak or be permanently deformed when subjected to a hydrostatic pressure of 1.5 times the maximum operating pressure as marked on the appliance for 10 min.

5.11.4.3 Combination appliances

A combination appliance shall conform to —

- (a) [Clause 5.11.4.1](#) for the water heating function; and
- (b) [Clause 5.11.4.2](#) for the central heating function.

5.11.7 Attachment of primary guard

Not applicable.

5.11.8 Strength of primary guard incorporating glass

Not applicable.

5.12 Thermal efficiency

This Clause of AS/NZS 5263.0 applies, except as modified below.

5.12.101 Minimum thermal efficiency

5.12.101.1 Water heaters (Australia only)

The thermal efficiency of a water heater operating at nominal gas consumption shall be not less than 75 %, when the appliance is tested in accordance with the following:

- (a) Test Method [ZC.106](#) for storage types with nominal gas consumption up to 0.5 MJ/h per litre of storage capacity.
- (b) Test Method [ZC.107](#), for storage types with nominal gas consumption in excess of 0.5 MJ/h per litre of storage capacity and instantaneous types.

5.12.101.2 Central heating boilers (Australia only)

The thermal efficiency of a central heating boiler operating at nominal gas consumption shall not be less than 75 %, when the appliance is tested in accordance with Test Method [ZC.108](#).

Appliances are deemed to conform to this requirement if they are certified to —

- (a) EN 15502-2-1, EN 15501-2-2; or
- (b) ANSI Z21.13 and have a declared thermal efficiency in excess of 75 %.

5.12.101.3 Combination appliances

A combination appliance shall conform to —

- (a) [Clause 5.12.101.1](#) for the water heating function; and
- (b) [Clause 5.12.101.2](#) for the central heating function.

5.12.102 Maintenance gas consumption — Storage water heaters (Australia only)

When a storage water heater is tested in accordance with Test Method [ZC.109](#), the gas consumption required to maintain the average temperature of the water at 45 °C above ambient shall not exceed the following:

$$M = 0.42 + 0.02V^{2/3} + 0.006R$$

where

- M = maintenance gas consumption (MJ/h)
- V = nominal storage capacity (L)
- R = nominal gas consumption (MJ/h)

5.12.103 Stratification

5.12.103.1 Storage water heaters (Australia only)

When a storage water heater is tested in accordance with Test Method [ZC.110](#), it shall deliver, at a continuous draw-off rate as set out in [Table 5.12.103.1](#), not less than 70 % of its nominal storage capacity before the outlet water temperature falls 6 °C below the temperature measured at the end of the fourth litre.