

New Zealand Standard

# Gas Appliance Safety

Superseding NZS 5262:1997

**NZS 5262:2003**

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## NZS 5262:2003

### COMMITTEE REPRESENTATION

This Standard was prepared by the Gas Appliance Safety Committee (P 5262) for the Standards Council established under the Standards Act 1988.

Standards New Zealand wishes to thank the following nominating organizations for their representation on Committee P 5262:

Gas Appliance Suppliers' Association of New Zealand  
Gas Association of New Zealand  
GasLab  
Gas Utilisation Institute  
LPG Association of New Zealand Inc.  
Master Plumbers, Gasfitters and Drainlayers New Zealand Inc.  
Ministry of Consumer Affairs – Energy Safety Service  
New Zealand Council of Elders  
New Zealand Retailers Association  
Plumbers, Gasfitters and Drainlayers Board

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### AMENDMENTS

No.	Date of issue	Description	Entered by, and date
1	May 2005	Updates the list of compliance Standards listed in Appendix A.	Incorporated in this edition.

CONTENTS	PAGE
Committee representation .....	IFC
Acknowledgement .....	IFC
Copyright .....	IFC
Referenced documents .....	2
Foreword .....	4
Review of Standards .....	4

### Section

1 Scope .....	5
1.1 General .....	5
1.2 Application .....	5
1.3 Exclusions .....	5
2 Interpretation .....	5
3 Definitions .....	6
4 Technical requirements .....	7
4.1 General .....	7
4.2 Combustion requirements .....	9
4.3 Effect on gas supply .....	9
4.4 Durability .....	9
4.5 Maintenance .....	9
5 Marking .....	9
6 Instructions .....	10
7 Means of compliance .....	10
7.1 General .....	10
7.2 Gas appliances complying with 90/396/EEC .....	11

### Appendix

A Means of compliance standards (Normative) .....	12
B Establishing the compliance of gas appliances with NZS 5262 (Informative) .....	15
C Gas specifications and pressures (Normative) .....	20
D Compliance checklist (Informative) .....	23

### Table

1 Classification of gases .....	6
C1 Supply pressures .....	20
C2 Specification of test gases .....	21
C3 Indicative composition and properties of acceptable test gas mixtures .....	22

### Figure

B1 Gas appliance assessment flowchart .....	15
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## NZS 5262:2003

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### REFERENCED DOCUMENTS

Reference is made in this document to the following:

#### NEW ZEALAND STANDARDS

NZS 4219:1983	Specification for seismic resistance of engineering systems in buildings
NZS 5261:2003	Gas installation
NZS 5435:1996	Specification for liquefied petroleum gas (LPG)
NZS 5442:1999	Specification for reticulated natural gas

#### AMERICAN STANDARDS

ANSI Z21.10.1-2004	Gas water heaters – Vol I, Storage water heaters with input ratings of 75,000 BTU per hour or less
ANSI Z21.11.2-2002	Gas-fired room heaters – Vol II, Unvented room heaters, <i>with</i> ANSI Z21.11.2a-2003 First Addendum
ANSI Z21.86-2004	Vented gas-fired space heating appliances
NFPA 54-2002	National fuel gas code
NFPA 85-2004	Boiler and combustion systems hazard code

#### AUSTRALIAN STANDARDS

AS 1375-1985	Industrial fuel-fired appliances (known as the SAA Industrial Fuel-fired Appliances Code)
AS 2658-2003	LP Gas – Portable and mobile appliances
AS 3814/AG 501-2002	Industrial and commercial gas-fired appliances
AS 4551/AG 101-2000	Domestic gas cooking appliances
AS 4552/AG 102-2000	Gas water heaters
AS 4553/AG 103-2000	Gas space heating appliances
AS 4556/AG 106-2000	Indirect gas-fired ducted air-heaters
AS 4557-2004	Domestic outdoor gas barbecues
AS 4558/AG 108-2000	Decorative gas log and other fuel effect appliances
AS 4565-2004	Radiant gas heaters for outdoor and non-residential indoor use

#### OTHER STANDARDS

BS EN 437:2003	Test gases. Test pressures. Appliance categories
BS EN 449:2002	Specification for dedicated liquefied petroleum gas appliances. Domestic flueless space heaters (including diffusive catalytic combustion heaters)
BS EN 676:2003	Automatic forced draught burners for gaseous fuels
DIN 4788.1:1977	Gas burners without blowers
JIS S 2147:1998	Portable cookers attached to liquefied petroleum gas cylinder

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OTHER DOCUMENT

90/396/EEC	Appliances burning gaseous fuels (Gas appliances directive)	Amd 1 May '05
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NEW ZEALAND LEGISLATION

Consumer Guarantees Act 1993  
Electricity Act 1992  
Electricity Regulations 1997  
Fair Trading Act 1986  
Gas Act 1992  
Gas Regulations 1993

With the exception of Compliance Standards (see Appendix A), the users of this Standard should ensure that their copies of the above-mentioned New Zealand Standards or of overseas Standards approved as suitable for use in New Zealand are the latest revisions or include the latest amendments. Such amendments are listed in the annual Standards New Zealand Catalogue which is supplemented by lists contained in the monthly magazine *Standards Update* issued free of charge to committee and subscribing members of Standards New Zealand.

## **NZS 5262:2003**

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### **FOREWORD**

This Standard revises and supersedes NZS 5262:1997. It identifies the essential safety requirements which must be met for gas appliances including aspects of performance and durability that relate to safety. It also sets out the overall performance requirements for a gas appliance to be safe and suitable for use in New Zealand. It is not intended as a design standard.

This Standard places reliance on sound engineering practice and established design, and test Standards providing the fundamental safety requirements. It recognizes appliance Standards for use in achieving these fundamental safety requirements. An audit checklist has been included to provide guidance for achieving compliance.

It is intended that this Standard be cited by the Gas Regulations. Compliance with this Standard will be a requirement for all appliances first supplied in New Zealand after the date on which the Standard is cited in the Gas Regulations.

### **REVIEW OF STANDARDS**

Suggestions for improvement of this Standard will be welcomed. They should be sent to the Chief Executive, Standards New Zealand, Private Bag 2439, Wellington 6020.



# NEW ZEALAND STANDARD

## GAS APPLIANCE SAFETY

### 1 SCOPE

#### 1.1 General

This Standard sets out the essential safety requirements for all gas appliances intended for installation or use in New Zealand. It is not a design code and therefore it does not address matters of performance, appearance or durability, except where they are relevant to safety. The requirements are intended to protect persons, domestic animals and property from fire, explosion, release of noxious gases and physical injury hazards that may arise from gas appliances.

#### 1.2 Application

This Standard covers all gas appliances and components supplied with them, that use, or are designed or intended to use, gas, whether or not they also use, or are designed or intended to use, any other form of energy.

#### NOTE –

- (1) This Standard covers only safety requirements applicable under the Gas Act. Gas appliances may also be subject to other legislation, such as the Electricity Act, Fair Trading Act and the Consumer Guarantees Act.
- (2) Gas appliances manufactured overseas may not be suitable for use in New Zealand without adjustment. Gas appliances designed for use with 2nd family gases must operate safely on natural gas meeting the specification in NZS 5442. For gas appliances intended for use with 3rd family gases, the specifications in NZS 5435 apply. As the composition of gas discharged from cylinders filled with general product LPG can vary from predominantly propane to predominantly butane, appliances for use with refillable or exchange LPG cylinders must operate safely on both propane and butane.

#### 1.3 Exclusions

This Standard does not cover equipment wherein gas is used as an automotive fuel, nor does it cover gas appliances specifically excluded by virtue of section 3 of the Gas Act.

#### NOTE –

- (1) These exclusions include gas appliances used in metal working and fuelled exclusively by acetylene or any prescribed gas, and gas appliances designed to be fuelled exclusively from a container not exceeding 120 millilitres in capacity.
- (2) The Gas Regulations should be consulted, particularly in relation to specific requirements related to the certification of repairs and modifications of gas appliances.

### 2 INTERPRETATION

#### 2.1

In this Standard the word “shall” identifies a mandatory requirement for compliance with the Standard. The word “should” refers to practices which are advised or recommended.

#### 2.2

This Standard contains two types of appendices. A ‘Normative’ Appendix forms an integral part of the body of a Standard which, for reasons of convenience, is placed after the body of the Standard. An ‘Informative’ Appendix is only for information and guidance.

## NZS 5262:2003

### 2.3 Classification of gases

Where it is necessary to distinguish between different gas types, the following international grouping based on the Wobbe Index as shown in table 1 is used.

**Table 1 – Classification of gases**

Gas family and group	Gross Wobbe Index at 15 °C and 101.325 kPa (MJ/m <sup>3</sup> )		Typical gas
	Minimum	Maximum	
1st family	22.4	30.0	Manufactured gas
2nd family	39.1	54.7	Natural gas
– group H	45.7	54.7	
– group L	39.1	44.8	
– group E	40.9	54.7	
3rd family	72.9	87.3	LPG
– group B/P	72.9	87.3	General product LPG
– group P	72.9	76.8	Commercial propane
– group B	81.8	87.3	Commercial butane

## 3 DEFINITIONS

### 3.1

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

**APPLIANCE BURNER PRESSURE.** The pressure of gas supplied to the burner injector, downstream of the controls within the appliance, measured at or close to the burner. This pressure is used to set and control the gas throughput of the burner.

**GAS APPLIANCE.** An assembly of components, including a gas burner and control system, that uses, or is designed or intended to use, gas as a fuel (whether or not it also uses, or is designed to use, any other form of energy). It includes any special components that are designed for, supplied with and integral to the safe operation of the assembly, such as the balanced flue for a room-sealed gas appliance.

**GAS SUPPLY PRESSURE.** The pressure of the gas supplied into the installation pipework measured at the outlet of the Gas Measurement System (GMS) or custody transfer point. This pressure will normally be controlled by the service or cylinder regulator at a predetermined level but can vary under fault conditions.

**GASTIGHT.** The condition of a gas installation or gas pipework in which any leakage of gas is at a sufficiently low rate that no hazard is likely to ensue.

**LINE GAS.** The fuel gas supplied to the gas appliance as used in New Zealand.

**NOTE** – Specifications are given for liquefied petroleum gas in NZS 5435 and for natural gas in NZS 5442.

**MAXIMUM OVERPRESSURE.** The maximum pressure able to be applied at the inlet to the gas appliance without a hazardous situation developing.

**REASONABLY FORESEEABLE CIRCUMSTANCES.** The circumstances to which a gas appliance is exposed shall be taken to be reasonably foreseeable when the gas appliance is:

- (a) Installed and serviced in accordance with the instructions supplied with the gas appliance and relevant regulatory requirements;
- (b) Used with the range of gas compositions covered by the gas type for which it is marked;
- (c) Used within the pressure range specified for the gas appliance; and
- (d) Used in accordance with its intended purpose and reasonable instructions to users, or in a way which can be reasonably foreseen.

**REFERENCE GAS.** The gas that is representative of the gases currently distributed in New Zealand, and on which the input rating of the gas appliance is based.

**TEST GASES.** Gases used to assess the performance of gas appliances when supplied with gas that deviates from the specification of the gas for which the gas appliance was designed.

### 3.2

Other terms are used consistently with the definitions provided in the Gas Act and Gas Regulations.

## 4 TECHNICAL REQUIREMENTS

### 4.1 General

Gas appliances shall be designed and built such that all practical steps are taken to ensure that, under reasonably foreseeable circumstances, persons (taking into account children, the elderly and the infirm) are not exposed to hazards, and that the appliances are free from hazards to domestic animals or property under reasonably foreseeable circumstances. Gas appliances shall comply with the following requirements under reasonably foreseeable circumstances.

**NOTE** – Refer to the Electricity Regulations for requirements in relation to electrical components and their use in gas appliances.

#### 4.1.1 *Mechanical safety*

Gas appliances shall be free from mechanical hazards.

**NOTE** – Mechanical hazards include hazards to the installer, service person or user, such as sharp points, corners or edges, and hazards from moving parts.

#### 4.1.2 *Stability and support, including seismic safety*

Gas appliances shall have adequate means of support and shall be stable or remain safe when subjected to external forces.

**NOTE** –

- (1) External forces include those from seismic activity and any that might tend to overturn a freestanding gas appliance. In most cases restraint or protection against seismic acceleration is adequate if effective for accelerations up to 1 g. Refer to NZS 4219 for further information.
- (2) Mobile and unsupervised portable gas appliances should cut off automatically if toppled.

## NZS 5262:2003

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### 4.1.3 *Unburned gas release*

Gas appliances shall be so designed and built that any gas leakage cannot give rise to a hazardous situation.

Gas appliances shall be so designed and built that gas release during ignition, re-ignition and after flame extinction is limited to avoid a dangerous accumulation of unburned gas in and around the gas appliance.

### 4.1.4 *Temperature*

Parts of gas appliances intended to be installed or placed in close proximity to combustible surfaces shall not reach temperatures which create a hazard.

Surface temperatures of gas appliance controls intended to be operated and parts of gas appliances which are likely to be touched shall not present a danger to the user.

### 4.1.5 *Climatic conditions*

Gas appliances shall be designed so that they will remain safe under New Zealand climatic conditions.

### 4.1.6 *Gas supply pressures*

Gas appliances shall operate safely at all gas supply pressures within the range specified for the appliance.

NOTE –

- (1) For gas appliances supplied in volume, the pressure ranges for safe operation should encompass:
  - (a) 1.0 – 5.0 kPa for 2nd family gases (natural gas);
  - (b) 2.0 – 3.5 kPa for 3rd family gases (LPG).
- (2) If the safe operation could be maintained by, for example, installing an additional pressure control valve, that device must be supplied as part of the gas appliance.
- (3) The pressure range for safe operation is required to be marked (see 5.1).

### 4.1.7 *Maximum overpressure*

Gas appliances shall not cause a dangerous situation to develop when subjected to a gas pressure up to the maximum overpressure specified by the manufacturer.

NOTE –

- (1) For gas appliances supplied in volume, the overpressure should be not less than:
  - (a) 7 kPa for 2nd family gas (natural gas) appliances;
  - (b) 14 kPa for 3rd family gas (LPG) appliances.
- (2) Development of a dangerous situation could be avoided by, for example:
  - (a) Automatic shutdown in a gastight condition, although manual shutdown may be sufficient for some gas appliances;
  - (b) Any restricted leakage through the regulator passing into the combustion chamber and being discharged through the flue.

It is recognized that a situation of incomplete combustion could occur for a short period.

- (3) The maximum overpressure that the gas appliance can tolerate is required to be marked if it is less than the relevant value in Note (1). (See 5.1.)

#### **4.1.8 Electrical supply**

For gas appliances requiring electrical supply at standard low voltage, the appliance shall continue to operate safely for supply voltages within the range 230 V +5 %, –11 %, 50 Hz  $\pm$ 1.5 %, and shall continue to operate safely or shutdown safely if the supply voltage falls below 230 V –11 % or in the event of momentary voltage fluctuations.

For other voltages, the supplier shall specify the safe operating range.

NOTE – These requirements address the need to ensure that electrical supply variations do not create gas-related hazards. Electrical hazards (e.g. electrical shock) must also be addressed, through compliance with electrical safety legislation.

### **4.2 Combustion requirements**

#### **4.2.1**

The products of combustion from gas appliances shall be of such composition, and be discharged in such a manner, as to present no health or fire hazard.

#### **4.2.2**

Burners and associated ignition systems of gas appliances shall be such that:

- (a) Ignition and re-ignition are reliable and complete; and
- (b) Burner cross-lighting is assured.

#### **4.2.3**

There shall be no flame abnormality.

NOTE – Flame abnormality could include flame lift, lightback, yellow tipping or sooting.

### **4.3 Effect on gas supply**

The operation of gas appliances shall not cause the gas supply to be contaminated or disrupted.

### **4.4 Durability**

Gas appliance materials, components and construction shall be sufficiently durable to withstand the physical, chemical and thermal conditions to which they are likely to be subjected and to fulfill correctly their intended purposes throughout the life of the gas appliance or components.

The reasonably foreseeable failure of any component shall not lead to an unsafe situation.

### **4.5 Maintenance**

Any parts that require maintenance for safety purposes shall be readily accessible.

## **5 MARKING**

### **5.1**

Except as provided for in 5.2, each gas appliance shall be legibly and clearly marked in the English language in a permanent manner with:

- (a) The name or registered trade-name or mark of the manufacturer, or New Zealand supplier;
- (b) Means to identify the specific gas appliance type and model;
- (c) The type of gas or gases the gas appliance may safely use;

## NZS 5262:2003

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- (d) Minimum and maximum gas supply pressure at which the gas appliance will operate safely;
- (e) For gas appliances supplied in quantity, the gas appliance burner pressure(s) at which the burner is designed to operate;
- (f) The maximum overpressure if it is less than 7 kPa for 2nd family gas (natural gas) appliances, or less than 14 kPa for 3rd family gas (LPG) appliances; and
- (g) The input rating (value and units) of the gas appliance.

### 5.2

Appliances for 3rd family gases (LPG) and intended for connection to disposable canisters, or supply from a refillable cylinder and operation at cylinder pressure, shall be legibly and clearly marked in the English language in a permanent manner with:

- (a) The name or registered trade-name or mark of the manufacturer, or New Zealand supplier;
- (b) Means to identify the specific gas appliance type and model; and
- (c) The type of gas or gases the gas appliance may safely use.

## 6 INSTRUCTIONS

### 6.1

Relevant and clear instructions in English, and or in graphic form, for the safe installation, commissioning, operation and maintenance of the gas appliance under New Zealand conditions, shall be provided for each gas appliance.

### 6.2

As far as practicable, any instructions critical to the safe use of the gas appliance (such as ventilation requirements for portable gas appliances or warnings regarding gas appliance doors that must be open during operation) shall be clearly marked on the gas appliance.

NOTE – “Critical to the safe use” is not intended to encompass information that users can be expected to already have and act on, e.g. instructions are not expected to warn against parts that are obviously hot (e.g. radiant surfaces).

## 7 MEANS OF COMPLIANCE

### 7.1 General

A gas appliance that complies with the safety requirements of any one of the Standards listed in Appendix A except as substituted by the requirements of 7.1.1, 7.1.2, and 7.1.3 shall be deemed to comply with NZS 5262.

For the purposes of this section and Appendix B, the Standard from Appendix A that is used as the basis for determining compliance is referred to as the “Compliance Standard”.

NOTE – The Compliance Standards in Appendix A, in conjunction with variations in 7.1.1, 7.1.2 and 7.1.3, effectively set benchmarks for the requirements of NZS 5262. If none of these Standards is followed, there is an obligation on the supplier to be able to demonstrate that safety is not compromised. Appendix B gives guidance on this.



### **7.1.1 Test gases and pressures**

Where the Compliance Standard specifies test gases and pressures for certain performance criteria, those performance criteria shall be met using the test gases, gas supply and appliance burner pressures specified in Appendix C.

NOTE – The performance criteria need not be met using the test gases and pressures specified in the Compliance Standard.

### **7.1.2 Marking**

The gas appliance shall be marked in accordance with section 5.

NOTE – The marking requirements of the Compliance Standard need not be met.

### **7.1.3 Other variations**

The gas appliance shall comply with any variations to specific Standards as listed in Appendix A.

## **7.2 Gas appliances complying with 90/396/EEC**

A gas appliance that has a CE conformity marking issued in accordance with European “COUNCIL DIRECTIVE of 29 June 1990 on the approximation of the laws of the Member States relating to appliances burning gaseous fuels (90/396/EEC)”, and for which compliance with the requirements of 7.2.1, 7.2.2 and 7.2.3 can be demonstrated, shall be deemed to comply with NZS 5262.

### **7.2.1 Test gases and pressures**

The gas appliance category shall be appropriate to the gas composition and supply pressure applicable in New Zealand. For natural gas appliances, the category marking shall indicate suitability for group 2H or group 2E gases. For LPG appliances, the category marking shall indicate suitability for group 3B/P gases.

NOTE – The gas appliance category marked on the appliance or its data plate indicates the family of gases and group within that family, and the nominal operating pressure of the appliance, for which the appliance conforms to the safety requirements of the European gas directive. (See BS EN 437.)

### **7.2.2 Marking**

The gas appliance shall be marked in accordance with section 5.

NOTE – The marking requirements of the Compliance Standard need not be met.

### **7.2.3 Seismic restraint and climatic conditions**

The gas appliance shall comply with the requirements of 4.1.2 and 4.1.5.

### **7.2.4 Instructions**

Instructions shall be in English and/or in graphic form.

## APPENDIX A MEANS OF COMPLIANCE STANDARDS

(Normative)

### A1 General

This Appendix lists the Standards that may be used as the basis for demonstrating compliance with NZS 5262. It is referenced from, and shall be read in conjunction with section 7.

This listing is also provided at the Standards New Zealand web page (<http://spex.standards.co.nz/project.jsp?id=103152>) where it is updated periodically as a result of the publication of new or revised Standards, pending the issue of an amendment to NZS 5262. Users of this Standard are advised to check the current listing at the website.

NOTE –

- (1) The listing of Compliance Standards cites specific editions. Subsequent editions, although likely to be acceptable, need to be reviewed and formally incorporated in the Appendix A list.
- (2) Other Standards or Codes for appliances may be acceptable for demonstrating compliance with NZS 5262.

### A2 Compliance Standards

The gas appliance shall also comply with the additional requirements listed after each Standard.

#### A2.1 ANSI Z21.11.2-2002 Gas-fired room heaters – Vol II, Unvented room heaters, with ANSI Z21.11.2a-2003 First Addendum

Additional requirement:

Freestanding appliances shall be equipped to safely shut off if overturned.

#### A2.2 ANSI Z21.86-2004/CSA 2.32-2004 Vented gas-fired space heating appliances

Additional requirement:

Freestanding appliances shall be provided with means of attachment to the building sufficient to withstand seismic loadings.

#### A2.3 ANSI Z21.10.1-2004 Gas water heaters – Vol I, Storage water heaters with input ratings of 75,000 BTU per hour or less

Additional requirement:

Appliances shall be capable of restraint against earthquake forces without compromising any aspects of performance.

#### A2.4 AS 2658-2003 LP Gas – Portable and mobile appliances

No additional requirements.

#### A2.5 AS 3814/AG 501-2002 Industrial and commercial gas-fired appliances

Additional requirements:

- (a) Moving parts shall be located or guarded to minimize hazards therefrom;
- (b) Structural design and construction of the appliance shall ensure strength is adequate to withstand loads likely to arise during use of the appliance from associated plant and equipment and from process materials. Such loading shall include seismic loadings;
- (c) The design process shall include failure mode and effects analysis of the whole appliance including the valve train, all control systems and associated equipment. This analysis shall include the effect of variations in the electrical voltage;



- (d) The sufficiency of those details of the design, required by AS 3814/AG 501 to be submitted to the technical regulator for approval (clauses 1.2.3, 1.2.4, 2.26.3 and 5.3.10 of AS 3814/AG 501), shall be verified by a suitably qualified person independent of the designer.

NOTE – This may be a person in the same organization.

**A2.6 AS 4551/AG 101-2000 Domestic gas cooking appliances**

No additional requirements.

**A2.7 AS 4552/AS102-2000 Gas water heaters**

Additional requirements:

- (a) Freestanding appliances shall be capable of restraint against earthquake forces without compromising any aspects of performance;
- (b) Appliances with fan assisted combustion systems shall satisfy the combustion test criteria when tests are conducted at 89 % and 105 % of rated supply voltage;
- (c) Appliances intended for outdoor installation shall comply with suitable tests (yet to be determined) or be labelled as unsuitable for installation where they would be exposed to sub-zero conditions.

**A2.8 AS 4553/AG103-2000 Gas space heating appliances**

Additional requirement:

Freestanding appliances shall be equipped to safely shut off if overturned.

**A2.9 AS 4556/AG 106-2000 Indirect gas-fired ducted air-heaters**

Additional requirement:

Appliances shall be provided with controls or means of support or of attachment to the building sufficient to maintain their safety under seismic loadings.

Amd 1  
May '05

**A2.10 AS 4557- 2004 Domestic outdoor gas barbecues**

No additional requirements.

**A2.11 AS 4558/AG 108-2000 Decorative gas log and other fuel effect appliances**

Additional requirement:

Appliances shall be provided with means for securing them to the building sufficient to withstand seismic loadings.

Amd 1  
May '05

**A2.12 AS 4565-2004 Radiant gas heaters for outdoor and non-residential indoor use**

No additional requirements.

**A2.13 JIS S 2147:1998 Portable cookers attached to liquefied petroleum gas cylinder**

Additional requirement:

Appliances shall be tested to ensure flame stability when subjected to a draught equivalent to that used in AS 4551 directed on the front and the sides of the appliance.

**A2.14 BS EN 449:2002 Specification for dedicated liquefied petroleum gas appliances.  
Domestic flueless space heaters (including diffusive catalytic combustion heaters)**

No additional requirements.

NOTE – The following Standards have been evaluated, but are insufficiently comprehensive to qualify for recognition as a Compliance Standard:

Amd 1  
May '05

- (1) BS EN 676:2003 Automatic forced draught burners for gaseous fuels

As this Standard covers automatic forced draught burners for fitting to appliances, it cannot stand alone as an

## NZS 5262:2003

appliance Standard. Other requirements for the relevant appliance apply additionally. Appliances equipped with burners to BS EN 676 will require testing in accordance with NZS 5262 clause B2.3.2 to ensure compliance of the appliance as a whole.

(2) DIN 4788.1:1977 *Gas burners without blowers*

As this Standard covers only burners for fitting to appliances, it cannot stand alone as an appliance Standard. It relies on compliance with other DIN Standards for many requirements and on installation testing to DGVW G622 for combustion performance. Appliances equipped with burners claiming compliance with DIN 4788:Part 1 will require testing in accordance with NZS 5262 clause B2.3.2 to ensure compliance of the appliance as a whole.

(3) AS 1375-1985 *Industrial fuel-fired appliances* (known as the SAA Industrial Fuel-fired Appliances Code)

This Standard addresses many of the relevant requirements of NZS 5262 but does not give quantitative performance criteria. Any appliance constructed to AS 1375 is likely to comply with NZS 5262, but will require testing in accordance with NZS 5262 clause B2.3.2 to ensure compliance of the appliance overall. On-site testing of the appliance is required.

(4) NFPA 54-2002 *National fuel gas code*

This Standard is an installation code, similar in scope to NZS 5261:Part 2. It does not address the requirements in NZS 5262 that are specific to appliances.

(5) NFPA 85-2004 *Boiler and combustion systems hazard code*

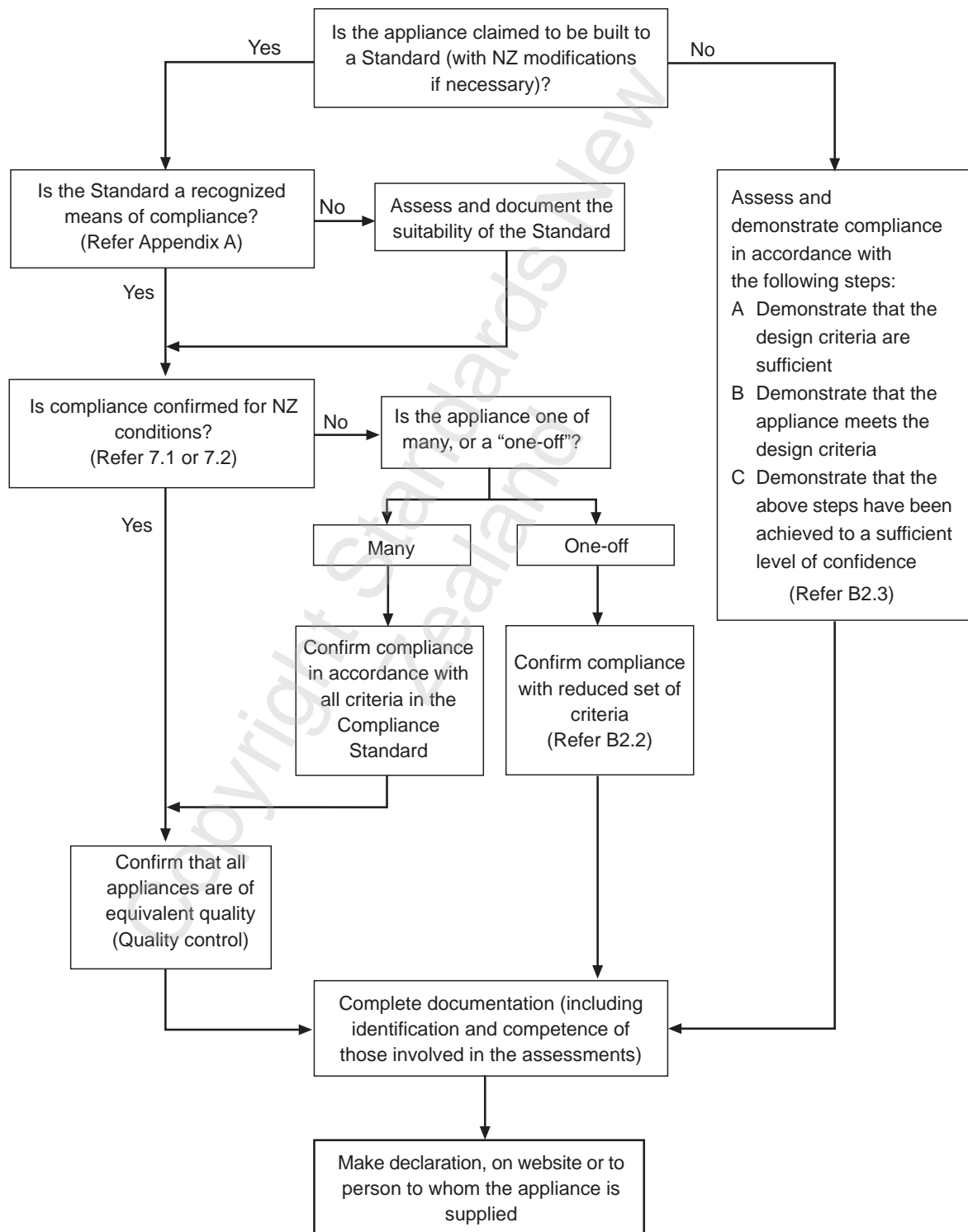
This Standard covers the hazards controlled by burner management systems but does not address many of the other relevant requirements of NZS 5262. Any appliance designed and constructed on the basis of this code is likely to comply with NZS 5262, but will require comprehensive commissioning and testing possibly in excess of the tests outlined in NZS 5262 clause B2.3.2 to ensure compliance of the appliance overall. Extensive on-site testing of the appliance is required.

## APPENDIX B ESTABLISHING THE COMPLIANCE OF GAS APPLIANCES WITH NZS 5262

(Informative)

### B1 Guiding principles

The process for assessment of gas appliances for the appliance declaration regime is outlined in figure B1.



Amd 1  
May '05

Figure B1 – Gas appliance assessment flowchart

## NZS 5262:2003

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### **B1.1** *Design criteria*

The Standards recognized in Appendix A, subject to the variations noted in section 7 and the additional requirements listed in Appendix A, are accepted as providing sufficient design criteria to meet the requirements of NZS 5262. If Standards recognized in Appendix A are not followed, the design criteria to which appliances are built shall be assessed. The assessment should address the following:

- (a) What is the reason for not using a recognized Standard?
- (b) Are all essential safety requirements specified in sections 4, 5 and 6 addressed?
- (c) Are the criteria addressed to an acceptable level of safety when compared with relevant means of compliance Standards (i.e. is it clear that safety is not compromised)?
- (d) Are NZ-specific criteria met (refer to section 7)?

NOTE – If a Standard recognized in Appendix A is not used or if a deviation is made from such a Standard, considerable care is required to ensure that the design criteria, and the methods used to confirm that gas appliances meet the design criteria, are sufficient.

### **B1.2** *Meeting the design criteria*

Gas appliances shall be able to operate safely on the gas for which they are intended for use in NZ and on the test gases used for performance assessment without any changes of injector, supply pressure or primary aeration setting except as permitted in the test methods in the Compliance Standard. In particular this means that appliances for use on general product LPG shall operate safely on both propane and butane.

In all cases, compliance with all of the design criteria shall be assessed. The assessment should address the following. This may be done by, for example:

- (a) Undertaking specific tests; or
- (b) Establishing that tests have already been completed under circumstances at least as demanding as those specified in the design criteria; or
- (c) Establishing that tests already completed confirm compliance by inference (e.g. if the appliance rating remains unchanged from tests on other gases, surface temperature tests need not be repeated); or
- (d) Establishing that compliance can be interpolated or extrapolated from tests on other similar appliances; or
- (e) As an alternative to physical testing in some circumstances, design analyses to assess compliance.

NOTE – Expectations in relation to testing assume greater importance for tests that require an element of value judgement, or are not easily repeatable. Although there is no formal requirement for testing, the supplier must be able to demonstrate in some way that the gas appliance complies with the safety requirements in the Gas Regulations. The overall test is whether a court could be satisfied that the supplier has established compliance of the gas appliance.

### **B1.3** *On-going quality control*

There should be adequate means of establishing that all product supplied meets or exceeds the compliance obligations. This might be achieved through:

- (a) Having a recognized quality assurance programme in place; or

- (b) Having a sufficient product inspection regime in place; or
- (c) Having processes that clearly offer a sufficient degree of repeatability.

#### **B1.4** *Verification*

##### **B1.4.1** *Competence*

All tests and other assessments should be done by a person or organization who:

- (a) Can be demonstrated to have sufficient competence for the task; and
- (b) Can be demonstrated to have acted with integrity.

NOTE – For example, use a Competent Organization as defined in regulation 2 of the Gas Regulations.

##### **B1.4.2** *Documentation*

All information necessary to demonstrate compliance should be documented. This should include:

- (a) Standards used, and or reasons why a Standard recognized in Appendix A was not used;
- (b) All variations from Standards;
- (c) Test methods and procedures;
- (d) Test results;
- (e) Reasons for decisions; and
- (f) The competence of persons involved in assessing compliance.

#### **B2** *Guidance for combustion related tests*

##### **B2.1** *Gas appliances built to a Standard recognized in Appendix A, and supplied in volume within New Zealand*

For gas appliances built to a Standard recognized in Appendix A, and supplied in volume within New Zealand, the following apply:

- (a) If a gas appliance has been verified as compliant using a gas that lies within the bounds of the NZ gas specification and gases that meet the test gas specification of table C2, no further testing is required;
- (b) If a gas appliance has been verified as compliant using a gas that lies within the bounds of the NZ gas specification but has not been verified compliant for the full range of gases that meet the test gas specification in Appendix C, testing as specified in the Compliance Standard but using NZ test gases as specified in table C2 is required. This testing is to include testing with line gas or the relevant reference gas to determine appliance rating, but other tests based on line gas or reference gas are not required.
- (c) In all other situations, testing as specified in the Compliance Standard but using either line gas or the relevant reference gas and NZ test gases as specified in Appendix C is required. This testing is to include a rating test using either line gas or the relevant reference gas. An assessment of compliance may be possible as an alternative to some physical tests.

## NZS 5262:2003

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In all tests, the procedures and criteria of the Compliance Standard apply.

NOTE – A gas that lies within the bounds of the NZ gas specification means for natural gas, a gas that falls inside the envelope defined by NZS 5442; for LPG, gas that satisfies the specification in NZS 5435; and for other gases, gas that meets a declared specification.

### **B2.2** *Gas appliances built to a Standard recognized in Appendix A, but with no more than 10 to be supplied within New Zealand*

For gas appliances built to a Standard recognized in Appendix A, but no more than 10 are to be supplied within New Zealand, the following apply:

- (a) If a gas appliance has been verified as compliant using a gas that lies within the bounds of the NZ gas specification and gases that meet the test gas specification of table C2 no further testing is required;
- (b) If a gas appliance has been verified as compliant using a gas that lies within the bounds of the NZ gas specification but has not been verified compliant for the full range of gases that meet the test gas specification in Appendix C, the extensive testing specified for appliances with larger production runs (for which the greater population of appliances increases the scale of risks) is not considered justified. However completion of some key tests on line gas or relevant reference gas is necessary. These tests may be undertaken as part of a rigorous commissioning procedure.
- (c) In all other situations, the extensive testing specified for gas appliances with larger production runs is not considered justified. The completion of some key tests using line gas or relevant reference gas is however necessary. These tests may be undertaken as part of a rigorous commissioning procedure.

In all tests, the procedures and criteria of the Compliance Standard apply.

NOTE –

- (1) As an example of key tests to be undertaken, gas appliances constructed to a Standard in the Australian AG 100 series should be checked against the Individual Certification (or Second Tier) Checklist of the relevant AG Standard.
- (2) Basic commissioning procedures are detailed in NZS 5261.

### **B2.3** *Gas appliances not built to a Standard recognized in Appendix A*

#### **B2.3.1**

For gas appliances not built to a Standard recognized in Appendix A, the following apply:

- (a) If more than 10 gas appliances are to be supplied, appropriate tests should be conducted using line gas or the relevant reference gas, and gases that meet the test gas specification in Appendix C.
- (b) If no more than 10 gas appliances are to be supplied, appropriate tests should be conducted using line gas or the relevant reference gas.

#### **B2.3.2**

It is necessary to verify compliance with all the performance requirements of this Standard over the full range of operating conditions. The verification should include assessment of the following where relevant and appropriate:

- (a) Gas tightness;
- (b) Spillage;



- (c) Temperature hazards;
- (d) Input rating;
- (e) Ignition delay, speed and completeness of flame propagation;
- (f) Flame character – tendency to lift, lightback, excessive yellow tipping, sooting;
- (g) CO/CO<sub>2</sub> ratio in the flue gases;
- (h) Effect of restricted air supply;
- (i) Effect of restriction to the flue;
- (j) Effect of cross-draughts;
- (k) Effect of flue up- and down-draughts;
- (l) Effect of operation with a vitiated air supply; and
- (m) Effectiveness of safety devices.

#### **B2.3.3**

The verifications should also encompass:

- (a) The range of gas supply pressures as defined in Appendix C; and
- (b) The range of reasonably foreseeable electrical supply voltages, refer to 4.1.8.

#### **B2.3.4**

Other tests may also be necessary, according to circumstances.

#### **B2.3.5**

The methods and criteria for all tests should be fully documented. Those in the Standards recognized in Appendix A may be appropriate despite the Standard not having been used in designing the gas appliance.

APPENDIX C  
GAS SPECIFICATIONS AND PRESSURES

(Normative)

C1 Maximum and minimum pressures

C1.1 Gas supply pressures

The gas supply pressures at which the gas appliances are tested shall be as in table C1.

Table C1 – Supply pressures

Supply pressure, (kPa)	1st Family gases (Wobbe Index = 22.5 – 30 MJ/m <sup>3</sup> )	2nd family gases (Natural gas)	3rd family gases (LPG)
Maximum	3.5	5	3.5
Minimum	0.5	1	2

NOTE – If the gas appliance is marked with a higher maximum supply pressure, then that higher value shall be used.

C1.2 Gas appliance burner pressures

Regulated gas appliances shall operate safely at the following maximum and minimum burner test pressure conditions, where the test point is that directly upstream of the burner nozzle:

- (a) The maximum test pressure shall be the maximum burner test pressure specified in the Compliance Standard, or 1.1 times the nominal gas appliance maximum burner test pressure if no compliance Standard is used;
- (b) The minimum burner test pressure shall be the minimum burner test pressure specified in the Compliance Standard, or 0.75 times the nominal gas appliance burner pressure if no compliance Standard is used.

C2 Gas specifications

C2.1 Application

This section gives the specification of test gases to be used for the combustion tests in Appendix B. The test gases chosen are those applicable to the gas type specified on the gas appliance label.

C2.2 Test gas specification

C2.2.1

The test gases are specified in table C2 in terms of Wobbe Index and relative density, the main parameters used in the specification for reticulated natural gas. Each of the test gases is intended to highlight particular combustion abnormalities as shown in the table.

- (a) For natural gas appliances, the test gases shall be test gases P, Q and S, as specified in table C2.
- (b) For LPG appliances, the test gases shall be test gases X and Y, as specified in table C2.
- (c) For LPG/air and other fuel gases, test gases shall be related to the declared specification of the gas supplied as specified in table C2.

NOTE – Test gas R (similar to Australian test gas Nb) specified in NZS 5262:1997 and elsewhere has been deleted because it represents an unlikely deviation from the natural gas specification of NZS 5442. Performance under lightback conditions is addressed using test gas S.



Table C2 – Specification of test gases

Test gas	Purpose	Wobbe Index (MJ/m <sup>3</sup> )	Relative density
<i>For natural gas appliances</i>			
N	Natural gas reference gas	50.0	0.70
P	Incomplete combustion, yellow tipping, sooting	≥54.6	
Q	Flame lift, incomplete combustion	≤42.2	
S	Sooting, lightback	42 > W(S) > 55	> 1.2
<i>For LPG appliances</i>			
X	LPG reference gas, flame lift, lightback, incomplete combustion	≤77.0	
Y	Incomplete combustion, yellow tipping, sooting	≥85.0	
<i>For gas appliances using other fuel gases</i>			
T	Reference gas	W(T)	
Ta	Incomplete combustion, yellow tipping, sooting	1.07 W(T)	
Tb	Flame lift, lightback, incomplete combustion	0.93 W(T)	
NOTE – W(T) is the specification Wobbe Index of the gas supplied.			

### C2.2.2

Indicative compositions of gas mixtures satisfying specifications in table C2 are listed in table C3. The specification in table C2 can be met by using gases of alternative compositions and adjusting the concentration of each component as necessary.

## NZS 5262:2003

**Table C3 – Indicative composition and properties of acceptable test gas mixtures**

Test gas	N	P	Q	S	X	Y
Composition (mol %)						
Methane	85.5	69.0	79.5			
Propane	10.0	26.0	7.0	55.0	100.0	
Butane						100.0
Carbon dioxide	4.5	5.0	13.5			
Air				45.0		
Wobbe Index (MJ/m <sup>3</sup> )	50.0	55.0	42.1	45.7	76.8	87.1
Relative density	0.70	0.86	0.76	1.30	1.56	2.09
Flame speed (mm/s)	354	367	324	405	405	380

## APPENDIX D COMPLIANCE CHECKLIST

(Informative)

### D1 Purpose

The following checklist may be used as an aid to demonstrate or assess compliance of gas appliances with this Standard. All responses must be supported by the appropriate documentation.

Reference section/clause	No.	Question or requirement	Response or comments	Has this been achieved?	How has this been achieved?	How has this been assessed?
7 Means of compliance	1	Standard or Code used as the basis for determining compliance with NZ 5262.				
	2	Other Standards, Codes or tests that have been used for determining compliance with any specific requirement of NZS 5262.				
	3	Process used to notify that appliance complies with NZS 5262.				
	4	Specific NZ installation, commissioning, operating and maintenance requirements have been identified.				
	5	Compliance of all appliances of the type is assured.				
4.1.1 Mechanical safety	6	Appliance is free from mechanical hazards.				
4.1.2 Stability, support and seismic safety	7	Appliance has adequate means of support.				
	8	Appliance is able to be restrained against seismic forces.				
	9	Seismic restraint is adequate.				

## NZS 5262:2003

Reference section/clause	No.	Question or requirement	Response or comments	Has this been achieved?	How has this been achieved?	How has this been assessed?
4.1.3 Unburned gas release	10	Appliance is gastight.				
	11	Rapid and complete ignition is achieved.				
	12	Rapid and complete re-ignition is achieved.				
	13	Release of unburned gas is minimized when flame is extinguished.				
	14	Flame failure equipment, if fitted, prevents the accumulation of dangerous quantities of unburned gas.				
4.1.4 Temperature	15	Accumulation of unburned gas is prevented during appliance operation.				
	16	What are the maximum operating temperatures of external surfaces?		NA	NA	
	17	What external parts of the appliance can harm persons or cause ignition?		NA	NA	
	18	Persons and combustible materials are protected from external parts that can be harmful or cause ignition.				
	19	Guards can't be easily removed.				
4.1.5 Climatic conditions	20	All of the controls can be operated safely under all operating conditions.				
	21	Dangers posed to children, the elderly and the infirm have been catered for.				
	22	Appliance remains safe under New Zealand climatic conditions.				

Reference section/clause	No.	Question or requirement	Response or comments	Has this been achieved?	How has this been achieved?	How has this been assessed?
4.1.6 Gas supply pressures	23	What are the maximum and minimum gas supply pressures that the appliance is designed to operate at?		NA	NA	
	24	The appliance operates safely throughout the gas supply pressure range.				
4.1.7 Maximum overpressure	25	Appliance remains safe when subject to supply pressures up to the maximum overpressure.				
4.1.8 Electrical supply	26	Appliance operates safely over the supply voltage range and remains safe over any fluctuations.				
4.2 Combustion requirements	27	Combustion tests, carried out on NZ limit gases, are satisfactory.				
	28	How is ignition achieved?		NA	NA	
	29	Ignition and re-ignition is achieved in a reliable and complete manner.				
	30	Satisfactory cross lighting is achieved.				
	31	No flame abnormality present.				
4.3 Effect on gas supply	32	Contamination or disruption to the gas supply is prevented.				
4.4 Durability	33	The appliance and the components are appropriately durable.				
4.5 Maintenance	34	Maintenance requirements are satisfactory.				
	35	Components that require maintenance are accessible.				

## NZS 5262:2003

Reference section/clause	No.	Question or requirement	Response or comments	Has this been achieved?	How has this been achieved?	How has this been assessed?
5 Marking	36	Markings on the appliance are legible, clear, permanent and appropriate for NZ conditions.				
	37	The manufacturer or NZ supplier is identified correctly.				
	38	The appliance type is marked correctly.				
	39	The model number is marked correctly.				
	40	The type(s) of gases the appliance is suitable to operate on is marked correctly.				
	41	The minimum and maximum gas supply pressures are marked correctly.				
	42	For appliances supplied in volume, the appliance burner pressure(s) is marked correctly.				
	43	The maximum overpressure if it is less than 7 kPa for natural gas or 14 kPa for LPG is marked correctly.				
	44	The input rating of the appliance is marked correctly.				
	45	Installation commissioning, operation and maintenance instructions are provided.				
6 Instructions	46	The installation and commissioning instructions are relevant, clear and appropriate for NZ conditions.				
	47	The operation and maintenance instructions are relevant, clear and appropriate for NZ conditions.				
	48	Instructions critical to the safe use of the appliance are clearly marked on the appliance.				

## NOTES

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