

Australian Standard™

**Industrial and commercial gas-fired  
appliances**



This Australian Standard was prepared by Committee AG-011, Gas Components and Industrial Equipment. It was approved on behalf of the Council of Standards Australia on 26 May 2005.

This Standard was published on 3 August 2005.

---

The following are represented on Committee AG-011:

AGA Certification Services  
Appliance and Component Testing  
Energy Networks Association  
Engineers Australia  
Gas Appliance Manufacturers Association of Australia  
Gas Appliances and Services Association  
Gas Technical Regulators Committee  
LPG Australia  
Major Industrial Gas Installations

---

### **Keeping Standards up-to-date**

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Web Shop at [www.standards.com.au](http://www.standards.com.au) and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Global Standard*, has a full listing of revisions and amendments published each month.

Australian Standards™ and other products and services developed by Standards Australia are published and distributed under contract by SAI Global, which operates the Standards Web Shop.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at [mail@standards.org.au](mailto:mail@standards.org.au), or write to the Chief Executive, Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard™

## **Industrial and commercial gas-fired appliances**

Originated as AG 501—1984.  
Previous edition 2002.  
Republished and designated AS 3814—2005.

### **COPYRIGHT**

© Standards Australia

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia, GPO Box 476, Sydney, NSW 2001, Australia  
ISBN 0 7337 6804 0

## PREFACE

This Standard was reviewed by the Standards Australia Committee, AG-011, Gas Components and Industrial Equipment, to supersede AS 3814/AG 501—2002, *Industrial and commercial gas-fired appliances*. The Standard is republished without technical alterations.

The objective of this Standard is to provide uniform minimum requirements for the safe operation of gas-fired industrial appliances, and other large appliances used for commercial applications, which are not covered by any other Standard.

This Standard should not be regarded as a design specification or as an instruction manual; it has been prepared with due regard for gas rules and regulations now in force. In its preparation, consideration has been given to—

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

Explosions are the main hazard on the firing side of the equipment covered by the Standard, the basic cause being ignition of a combustible mixture in the combustion chamber or associated ductwork. The magnitude and intensity of the explosion will depend on both the quantity of combustibles present and the proportion of air with which the combustibles are mixed.

Explosions may be the result of one or more of the following—

- (i) improper design of equipment or control systems;
- (ii) equipment or control system malfunction, including valve leakage;
- (iii) interruption and restoration of gas or air supply causing loss of flame followed by delayed ignition of the resultant accumulation of a combustible mixture; or
- (iv) flame failure on a burner and subsequent ignition of the resultant accumulation of a combustible mixture.

The presence of a well-trained, reliable and competent operator provides a major contribution to safety.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

## CONTENTS

	<i>Page</i>
<b>SECTION 1 SCOPE, APPLICATION AND DEFINITIONS</b>	
1.1 SCOPE .....	5
1.2 APPLICATION .....	5
1.3 REFERENCED DOCUMENTS .....	6
1.4 DEFINITIONS .....	6
<b>SECTION 2 REQUIREMENTS FOR DESIGN AND CONSTRUCTION</b>	
2.1 GENERAL REQUIREMENTS .....	17
2.2 CONTROLS, BURNER AND SAFETY DEVICE ACCESS.....	18
2.3 FLAME VISIBILITY .....	18
2.4 TEMPERATURES OF SURFACES AND COMPONENTS .....	18
2.5 RESTRICTION ON ELECTRICAL CONNECTIONS.....	18
2.6 ACCESSIBILITY OF MANUAL CONTROLS .....	19
2.7 MATERIALS .....	19
2.8 GAS PIPEWORK AND VALVE TRAINS .....	20
2.9 GAS PRESSURE REGULATION.....	22
2.10 GAS OVER-PRESSURE PROTECTION.....	23
2.11 GAS LOW-PRESSURE PROTECTION .....	24
2.12 GAS PRESSURE TEST POINTS.....	25
2.13 GAS FILTER.....	25
2.14 SAFETY SHUT OFF SYSTEMS .....	25
2.15 COMBUSTION AIR SUPPLY—GENERAL REQUIREMENTS.....	32
2.16 COMBUSTION AIR FOR ATMOSPHERIC BURNERS.....	32
2.17 FORCED AND INDUCED DRAUGHT BURNERS.....	33
2.18 DAMPERS .....	34
2.19 APPLIANCE PRE-PURGING.....	34
2.20 PROCESS CONTROLS .....	37
2.21 IGNITION SYSTEMS.....	37
2.22 PILOT BURNERS.....	38
2.23 MAIN BURNERS .....	38
2.24 FLAME SAFEGUARD SYSTEMS.....	39
2.25 BLEED LINES .....	42
2.26 APPLIANCE/BURNER CONTROL CIRCUITS .....	42
<b>SECTION 3 OPERATION</b>	
3.1 APPLIANCE OPERATION DETAILS .....	44
3.2 IGNITION .....	44
3.3 MAIN BURNERS .....	46
3.4 INTERLOCKS AND LIMIT DEVICES .....	46
3.5 OPERATION SEQUENCES .....	47
3.6 COMBUSTION CONDITIONS .....	49
3.7 COMMISSIONING.....	49
<b>SECTION 4 MARKINGS AND INSTRUCTIONS</b>	
4.1 MARKINGS .....	51
4.2 INSTRUCTIONS .....	51

## SECTION 5 SPECIAL APPLICATION REQUIREMENTS

5.1	GENERAL .....	53
5.2	HIGH INPUT GAS-FIRED APPLIANCES.....	53
5.3	AIR-GAS MIXING MACHINES AND MIXING BLOWERS.....	54
5.4	SPECIAL ATMOSPHERES AND ATMOSPHERE GENERATORS .....	56
5.5	PROCESS AFTER-BURNERS .....	58
5.6	STEAM AND HOT WATER BOILERS .....	60
5.7	DIRECT-FIRED AIR HEATERS AND CURTAINS .....	60
5.8	STATIONARY GAS ENGINES AND TURBINES .....	61
5.9	INCINERATORS AND CREMATORS .....	63
5.10	OVENS—DIRECT-FIRED .....	64
5.11	SMOKE OVENS—DIRECT-FIRED.....	64
5.12	WATER HEATERS .....	65
5.13	MULTI-FUEL FIRING SYSTEMS.....	66

## APPENDICES

A	STANDARD INFORMATION AND TECHNICAL DATA .....	68
B	PROCEDURES FOR THE APPROVAL OF INDUSTRIAL AND COMMERCIAL APPLIANCES .....	71
C	LIST OF REFERENCED DOCUMENTS .....	74
D	TYPICAL VALVE TRAIN ARRANGEMENTS .....	75
E	TYPICAL OPERATING SEQUENCE FOR AN AUTOMATIC FORCED OR INDUCED DRAUGHT BURNER WITH INTERRUPTED PILOT.....	81
F	A TYPICAL COMMISSIONING PROCEDURE.....	82
G	FIELD CHECK LIST .....	85
H	FLAME SAFEGUARD SELECTION .....	92
I	PRO-FORMA LETTER TO THE GAS TECHNICAL REGULATOR FROM A CONTRACTOR /COMPANY CERTIFYING THE TESTS CONDUCTED ON THE PES .....	93

## STANDARDS AUSTRALIA

### Australian Standard Industrial and commercial gas-fired appliances

#### SECTION 1 SCOPE, APPLICATION AND DEFINITIONS

##### 1.1 SCOPE

###### 1.1.1 General

This Standard provides minimum requirements for the design, construction and safe operation of Type B appliances that use town gas, natural gas, simulated natural gas, liquefied petroleum gas, tempered liquefied petroleum gas or any combination of these gases either together or with other fuels.

Construction requirements given relate only to matters affecting gas-firing or to any interconnection between the gas-firing system and the safety requirements of the appliance.

NOTE: Additional information regarding safety principles for industrial appliances is given in AS 1375.

The Standard does not cover all the requirements for the safety of the process carried out in the appliance. Other statutory and regulatory requirements may be applicable to the appliances and/or installations that fall within the scope of this Standard. It is the installer/manufacture's responsibility to ensure that appliances and/or installations comply with these requirements.

Installation requirements for appliances covered by this Standard are detailed in AS 5601.

###### 1.1.2 Exclusions from Standard

The following appliances are excluded from this Standard:

- (a) Manually operated bunsen type burners.
- (b) Simple atmospheric burners that are not fitted into a combustion chamber and burn in an open ventilated space under the control of an operator.
- (c) Engines other than stationary engines.

##### 1.2 APPLICATION

###### 1.2.1 General

The requirements of this Standard shall be used in conjunction with, but do not take precedence over, the requirements of the technical regulator. The technical regulator may determine the extent of application of this Standard.

This Standard applies to—

- (a) the appliance; and
- (b) the component parts of the appliance whether supplied with the appliance or separately; and