

Australian Standard™

**Gas appliance standards—Definitions
and calculations**



This Australian Standard was prepared by Committee AG-001, Gas appliances. It was approved on behalf of the Council of Standards Australia on 12 May 2004. It was published on 19 July 2004.

The following are represented on Committee AG-001:

AGA (Network Operators)
AGA Certification Services
Appliance and Component Testing
Australian Liquefied Petroleum Gas Association Ltd
CSIRO Energy Technology
Committee AG-001-03
Consumers' Federation of Australia
Energy Retailers Association of Australia
Gas Appliance Manufacturers Association of Australia
Gas Technical Regulators Committee

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 Standards may also be withdrawn.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 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, or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 03574.

STANDARDS AUSTRALIA

RECONFIRMATION
OF
AS 4646—2004
Gas appliance standards—Definitions and calculations

RECONFIRMATION NOTICE

Technical Committee AG-001 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 25 September 2015.

The following are represented on Technical Committee AG-001:

Association of Accredited Certification Bodies
Australian Building Codes Board
Consumer Electronics Suppliers Association
Consumers Federation of Australia
Energy Efficiency and Conservation Authority of New Zealand
Energy Networks Association
Gas Appliance Manufacturers Association of Australia
Gas Association of New Zealand
Gas Energy Australia
Gas Technical Regulators Committee
Gas Utilisation Institute, New Zealand
The Australian Gas Association
Worksafe—Energy Safety New Zealand

NOTES

Australian Standard™

Gas appliance standards—Definitions and calculations

Originated as AG 701—1977.
Previous edition 1982.
Revised and redesignated as AS 4646—2004.

COPYRIGHT

© Standards Australia International

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 International Ltd GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 6165 8

PREFACE

This Standard was prepared by the Standards Australia Committee AG-001, Gas appliances, to supersede AG 701, *Glossary of terms used in the AGA Codes*.

The objective of this Standard is to assist manufacturers, designers, regulatory authorities, testing laboratories and similar organizations with the interpretation of terminology used in the various gas appliance Standards and provides details of calculations used within these Standards.

The principal difference between this edition and AG 701:1977, is the incorporation of all amendments outlined in AGA Technical Bulletins

AS 5601/AG 601, *Gas Installations*, contains further definitions that may apply to gas appliances.

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>
SECTION 1 DEFINITIONS.....	4
SECTION 2 CALCULATIONS AND DERIVATIONS	
2.1 HEATING VALUE CALCULATION FROM GAS ANALYSIS.....	28
2.2 RELATIVE DENSITY CALCULATION FROM GAS ANALYSIS.....	31
2.3 NOTES ON THE DERIVATION OF THE DETERMINED GAS CONSUMPTION CALCULATION	33
2.4 METER VOLUME CORRECTION FACTORS.....	34
APPENDICES	
A LIST OF REFERENCED DOCUMENTS	36
B TEST GASES	37

STANDARDS AUSTRALIA

Australian Standard**Gas appliance standards—Definitions and calculations**

SECTION 1 DEFINITIONS

1.1 ACCURACY

The range in which the true value of a measurement lies.

1.2 AIR DAMPER

An adjustable device for controlling airflow in forced or induced draught air systems.

1.3 ALPGA

Australian Liquefied Petroleum Gas Association Ltd.

1.4 APPLIANCE

A device that uses gas to produce flame, heat, light, power or special atmosphere.

1.5 APPLIANCE FLUE WAY

A port or passage conveying flue gases within the appliance.

1.6 APPLIANCE FLUE WAY TERMINAL

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

1.7 APPLIANCE REGULATOR

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

1.8 APPLIANCE VENTILATION DUCT

A duct through a building designed to bring combustion air from, and take products of combustion to, the outside air, for Type 2 room sealed appliances.

1.9 APPROVED

Acceptable to, and meeting the prescribed standards of, the authority having jurisdiction.

1.10 ATMOSPHERIC BURNER

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

1.11 ATMOSPHERIC STEAMER

An appliance in which the cooking medium is steam at atmospheric pressure.

1.12 AUTHORIZED AGENT (AUTHORIZED DEALER)

A person, persons or company appointed to act for and on behalf of a gas merchant.

1.13 AUTHORIZED INSTALLER

A person appointed, licensed, authorized or otherwise permitted by the authority to carry out gas-fitting work.

1.14 AUTHORITY

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

1.15 AUTHORITY HAVING JURISDICTION

The authority having statutory (legal) control.

1.16 AUTOMATIC BOILING WATER UNIT

An appliance with automatic water feed to give a continuous supply of boiling water.

1.17 AUTOMATIC BURNER

A burner system that, on starting, follows a self-acting sequence that has been manually or automatically initiated, to provide gas and ignition to the burner without any intermediate manual operation.

1.18 AUTOMATIC IGNITION

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

1.19 AUTOMATIC OPERATION

The use of a sequence of operations, which once initiated, does not require any intermediate manual operation.

1.20 AUTOMATIC SHUT OFF VALVE

An automatic valve used to shut off gas supply to an appliance when a signal is generated indicating that a dangerous condition has developed.

1.21 AVAILABLE GAS (LINE GAS)

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

1.22 BAIN-MARIE

An appliance that keeps cooked food hot, using water or air.

1.22.1 Bain-marie, wet

A wet bain-marie may be either of the following:

- (a) *Open well type* A bain-marie with food containers that are placed on a perforated metal plate. The water level in the bain-marie just covers the metal plate and the appliance is operated entirely without covers.
- (b) *Fitted container type* A bain-marie with fitted food containers, including lids, that are recessed in the top surface of the appliance. The base of the containers is slightly in contact with, or slightly immersed in, the water.

1.22.2 Bain-marie, dry

A dry bain-marie may be either of the following:

- (a) *Hot-press type* A bain-marie with food containers that are placed in a heated cupboard or on a heated top. See also hot-press.
- (b) *Fitted container type* A bain-marie with fitted food containers, including lids, that are recessed in the top surface of the appliance. The containers are heated by dry air.

1.23 BALANCED FLUE APPLIANCE

A room sealed appliance that has combustion air ducted from, and combustion products ducted to, a common terminal assembly located externally.

1.24 BARBECUE

An underfired cooking unit with either an open grid cooking top or a solid top. The food is cooked by a combination of radiant and convected heat and may be assisted by flared fat.

1.25 BAYONET FITTING

A bayonet-style plug and mating socket designed for attachment so that the gas is turned on only when the plug is inserted and secured in a lock-fit recess.

1.26 BEDROOM

A room used primarily for sleeping.

1.27 BLOCK VALVE

See Safety shut off valve.

1.28 BOILING TABLE

A commercial appliance intended for the heating of cooking vessels from beneath.

1.29 BUILDING LINE

The face of a building, which is closest to the property line. The building line and property line may coincide.

1.30 BURNER PORT

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

1.31 BURNER UNIT

A number of burners, fed from the same manifold, controlled together, having one supervised ignition source and performing as a single burner.

1.32 BYPASS SCREW

An adjusting screw for setting the flow through a bypass.

1.33 CALIBRATION

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

1.34 CANOPY

A fixture or hood that serves to remove cooking odours and may be part of the flue gas collecting and disposal system, placed above the appliance/s and discharging into the open air by means of convection currents.

1.35 CASING (SLEEVE)

A pipe or duct through which is installed a smaller pipe carrying gas.

1.36 CATALYTIC SPACE HEATER

A space heater in which the combustion occurs without flame on a catalytic surface.

1.37 CERTIFIED/CERTIFICATION

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

1.38 CERTIFYING BODY

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

1.39 CHINESE COOKING TABLE

An open top boiling table suitable for spherical base Chinese cooking vessels (wok).

1.40 CIRCULATOR

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

1.41 CLOSED TOP BOILING TABLE

A boiling table that has a smooth metal heating surface.

1.42 CO/CO₂ RATIO

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

1.43 COMBINATION GAS CONTROL

An assembly of two or more different control functions in a single body.

1.44 COMBINATION RELIEF VALVE

A valve that functions in response to both excessive temperature and pressure.

1.45 COMBUSTIBLE CONSTRUCTION

Materials made of or surfaced with wood, compressed paper, plant fibres or other materials that will ignite and burn.

1.46 COMBUSTION PRODUCTS

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

1.47 COMMON FLUE

A flue conveying the flue gases from two or more appliances.

1.48 COMPRESSED NATURAL GAS (CNG)

Natural gas stored under pressure in cylinders.

1.49 CONDUIT

A pipe or duct through which runs a smaller pipe carrying gas. The conduit protects the smaller pipe and also ensures that any gas leakage from the pipe is transferred to a safe point of discharge.

1.50 CONNECTOR ENDS

The end fittings permanently attached to the hose, which may be of a screw type or quick-connect type.

1.51 CONTINUOUS CLEANING SURFACE

An oven interior finish that, in the course of ordinary use, does not accumulate stains or deposits.

1.52 CONTROL PIPING

All piping, valves, and fittings used to interconnect air, gas or hydraulically operated control apparatus or instrument transmitters and receivers.

1.53 CONVECTION HEATER

A space heater with an effective output of heated air and no visible source of radiation.

1.54 COUNTER APPLIANCES, GAS

Small commercial gas cooking equipment that has been designed to be installed on a counter or bench.

1.55 CRITICAL ENERGY

The maximum potential energy in the form of unignited fuel, which may be introduced into an appliance before a potentially hazardous level is reached.

1.56 CRITICAL TIME

The critical time is the time required to build up a pocket of unignited gas of such quantity and proportions that, if ignited, the pressure of the resultant explosion could equal the permissible safe internal pressure of the appliance.

1.57 CROSS LIGHTING

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

1.58 CUSTOMER PIPING (FITTING LINE)

That portion of a piping that conveys gas from the outlet of the master meter, or, in the case of LP gas, from the container regulator outlet to the appliances.

1.59 CUT-OFF

The function of isolating the upstream pressure from the downstream side of a valve or regulator.

1.60 DECORATIVE GAS FIRE

An appliance that simulates a solid fuel fire, its primary function lying in the aesthetic effect of the flames.

1.61 DETERMINED GAS CONSUMPTION

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

1.62 DIRECT FIRED OVEN

An oven in which the products of combustion flow through the oven compartment.

1.63 DIRECT GAS-FIRED AIR HEATER

A heater in which all the combustion products are released into the airstream being heated.

1.64 DIRECT IGNITION DEVICE

A device that provides ignition of a burner without the use of another flame.

1.65 DIRECT SERVICE METER

A meter connected directly to the service pipe.

1.66 DRAIN VALVE

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

1.67 DRAUGHT DIVERTER

A device, without moving parts, fitted in the flue of an appliance for isolating the combustion system from the effects of pressure changes in the secondary flue.

1.68 DRESS GUARD

A grid fitted to a space heater to lessen the chance of fire or injury.

1.69 DRIP (ALSO TAILPIPE)

The provision, placed at a low point in a gas pipe system, to collect condensate and from which the condensate may be removed. *See* dust trap.

1.70 DUCTED AIR HEATER

A heater with a fan made for the delivery of warm air by ducts.

1.71 DUST TRAP

A tee piece fitted at the lowest practical location in a vertical riser and having a short vertical capped pipe fitted to it for the collection and removal of dust, scale, etc.

1.72 ELECTRONIC FLAME SAFEGUARD

A flame safeguard utilizing electronic components to perform its function.

1.73 EXCESS AIR

Air, in excess of that required for complete combustion, that is mixed unchanged with the combustion products, in the combustion chamber.

1.74 EXHAUST DAMPER

An adjustable means of controlling exhaust flow in forced or induced draught air systems.

1.75 EXPANDING FLAME BURNER

A burner where the start gas is ignited on the same port(s) as the main gas.

1.76 FAN-ASSISTED COMBUSTION SYSTEM

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

1.77 FIRE DAMPER

A device for automatically closing off the flow of air through a ventilation opening in the event of fire.

1.78 FIRE RESISTANCE RATED DUCT

A duct formed of fire resistance rated material and which may be constructed as an integral part of the building or by construction between the floor and ceiling of a storey. A duct may be made continuous by a full opening left in the floor or ceiling of a storey or by the provision of holes in the floor or ceiling of adjacent storeys.

1.79 FITTING

A component used to—

- (a) join pipes;
- (b) change direction or diameter of a pipe;
- (c) provide a branch; or
- (d) terminate a pipe.

1.80 FLAME ABNORMALITY

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

1.81 FLAME BLOW-OFF

Separation of a flame from a burner port, resulting in extinction.

1.82 FLAME DETECTOR

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

1.83 FLAME ESTABLISHMENT PERIOD

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