### Commercial catering gas equipment

This Australian Standard ® was prepared by AG-001, Gas Appliances. It was approved on behalf of the Council of Standards Australia on DD Month 202X.

# **Preface**

This Standard was prepared by the Australian members of Joint Standards Australia/New Zealand Committee AG-001, Gas Appliances to supersede AS 4563—2004, *Commercial catering gas equipment*.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide manufacturers, designers, regulatory authorities, testing laboratories and similar organizations with uniform minimum requirements for the safety, performance and use of commercial cooking and catering gas appliances.

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

In its preparation, consideration has been given to—

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

The principal differences between this edition and AS 4563:2004 are the addition of

- (i) specific requirements for high temperature appliances (Section 17);
- (ii) specific requirements for mobile serving appliances (Section 18);
- (iii) pre-mixed burner system requirements; and
- (iv) temperature limits for adjacent surfaces when the appliance is installed with zero clearance from side and rear walls.

The AS/NZS 5601 series of Standards provides essential requirements and means of conformance for gas installations. Any reference to AS/NZS 5601 in AS 4563 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 appendices to which they apply. A "normative" appendix is an integral part of a Standard, whereas an "informative" appendix is only for information and guidance.

# 1 Scope and general

# 1.1 Scope and application

# 1.1.1 Scope

This Standard specifies general requirements and test methods for various types of commercial catering gas equipment. The fuel gases are natural gas (as described in AS 4564), town gas, liquefied petroleum gas (LP Gas, as described by AS 4670) and tempered liquefied petroleum gas.

NOTE Other statutory and regulatory requirements may be applicable to the product(s) that fall within the scope of this Standard. Manufacturers, importers or distributors have legal obligations to ensure that products conform to such requirements.

Figures referred to in this Standard are located in Appendix A.

Equipment for controlling gas pressure and measuring gas volume is specified in Appendix D.

# 1.1.2 Application

Appliances shall conform to the general requirements of Sections 2, 3, 4 and 5, and to the requirements in each of following Sections that is applicable to the nature of the appliance.

Section 6: Boiling tables — Open and closed top, Chinese cooking tables

Section 7: Salamanders, grillers and toasters

Section 8: Solid grill plates and griddles

Section 9: Barbecues

Section 10: Ovens

Section 11: Boiling water units

Section 12: Atmospheric steamers

Section 13: Stockpots and brat pans

Section 14: Fryers

Section 16: Pasta cookers and rethermalizers

Section 17: High temperature cookers

Section 18: Mobile serving appliances

AS 3645 specifies essential requirements for gas equipment that require regulatory approval before sale. This Standard 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 referenced for informative purposes are listed in the Bibliography.

AS 1722.2, Pipe threads of Whitworth form, Part 2: Fastening pipe threads

AS 4343, Pressure equipment—Hazard levels

AS 4617, Manual shut off valves

AS 4620, Thermoelectric flame safeguards

AS 4621, Regulator for use with liquid petroleum—Vapour phase

AS 4625, Electronic flame safeguards and flame detectors

AS 4627, Quick-connect devices for gas

AS 4629, Automatic shut-off valves and vent valves

AS ISO 7.1, Pipe threads where pressure-tight joints are made on the threads — Dimensions, tolerances and designation

AS/NZS 1869, Hose and hose assemblies for liquid petroleum gas (LP Gas), natural gas and town gas

EN 298, Automatic gas burner control systems for gas burners and gas burning appliances with or without fans

# 1.3 Terms and definitions

#### 1.3.1

#### ambient temperature

temperature of the air surrounding the appliance, as measured by a dry bulb thermometer or equivalent

#### 1.3.2

#### appliance connection

point of connection on the appliance to consumer piping or to any hose assembly supplied with the appliance

Note 1 to entry: This may be the same as the gas inlet connection.

#### 1.3.3

### appliance regulator

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

#### 1.3.4

### atmospheric burner

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

#### 1.3.5

#### atmospheric steamer

appliance in which the cooking medium is steam at atmospheric pressure

#### 1.3.6

### automatic ignition

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

### 1.3.7

### automatic shut off valve

valve that operates automatically to shut off gas supply to an appliance

### 1.3.8

#### available gas

### line gas

readily available gas with similar characteristics to the reference test gas

#### 1.3.9

#### bain marie

appliance that keeps cooked food hot for serving

Note 1 to entry: A bain marie may include: fitted food containers with or without lids recessed in the top surface of the appliance; heated cabinet (hotpress); or open wells where food containers are placed on a heated surface.

### 1.3.9.1

### dry bain marie

appliance that keeps cooked food hot with heated air

#### 1.3.9.2

#### wet bain marie

appliance that keeps cooked food hot using heated water

#### 1.3.10

### barbecue

char grill

distribution or use on network is prohibited. t document made a e of the document erms are available ustralia Limited doe

on the final published version

cooking appliance with an open grate cooking surface heated from beneath

Note 1 to entry: A barbecue may include media for radiant effect. The food is cooked by a combination of radiant and convected heat and may be assisted by flame or flared fat.

Note 2 to entry: A barbecue may incorporate a section with a solid cooking surface.

1.3.11

bleed line

small diameter pipe or tube that conveys gas to a safe place from a diaphragm valve

1.3.12

boiling table

appliance intended for the heating of cooking vessels from beneath

1.3.13

brat pan

pan intended for braising, stewing, boiling and also for shallow or medium frying

Note 1 to entry: A brat pan may be tilting or non-tilting.

1.3.14

burner

device that positions a flame in the desired location by delivering gas and air in such a manner that sustained combustion is accomplished

1.3.15

burner port

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

1.3.16

calibration

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

1.3.17

Chinese cooking table

open top boiling table suitable for rounded base cooking vessels including woks

Note 1 to entry: [DRAFTING NOTE: The sub-committee that prepared this draft is seeking feedback from industry around a more inclusive title or term for equipment previously known as Chinese cooking tables.]

1.3.18

closed top boiling table

target top

even-heat top

boiling table which supports and heats on a smooth metal heating surface

1.3.19

CO/CO<sub>2</sub> ratio

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

Note 1 to entry: This is a measurement indicative of appliance combustion performance.

1.3.20

combustible material

material that will ignite and burn and includes material that has been flame-proofed

1.3.21

combustion products

products of combustion

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

1.3.22

compression fittings and components

Note 1 to entry: Compression fittings and components are defined in AS/NZS 3500.0.

1.3.22.1

Type 1 compression fitting

non-manipulative compression fitting

fitting for a compression joint which does not require any working of the tube other than cutting square

Note 1 to entry: The joint is made tight by means of a loose compression ring which grips the outside wall of the tube when the coupling nut is tightened.

1.3.22.2

Type 2 compression fitting

manipulative compression fitting

fitting in which the joint is made by flaring, croxing, capping or beading the end of the tube which is then compressed by the coupling nut against the shaped end of the corresponding section in the fitting

1.3.23

control

device designed to change the operation of the appliance or component

Note 1 to entry: Examples of controls include a valve and a thermostat.

1.3.24

cooking vessel

container in which the cooking process is conducted

Note 1 to entry: A cooking vessel may form a part of an appliance or may be placed on an appliance for the cooking process.

1.3.25

http://localhost: 5000/Pdf/e5001044-74 fc-492 c-a047-91e27 c5112 fb? section View=Single Page View & pdf User Name=Baining View and View

distribution or use on network is prohibited. her copying, storage, ent-licence-agreeme ted. The registered licensee may print once only. /www.standerds.org.su/home/public-comment-d

Any user of the document should rely

e document should rely on the final published version.

cross lighting

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

1.3.26

cylinder

container for the storage of liquefied petroleum gas

Note 1 to entry: Requirements for LP Gas cylinders are specified in AS 2030.1.

cylinder compartment

compartment partially or fully enclosed on at least three sides that is intended to contain an LP Gas cylinder or cylinders either for storage or for direct connection to an inlet

1.3.28

determined gas consumption

gas consumption rate, using reference gas at specified test pressures and with ambient conditions corrected to metric standard conditions

Note 1 to entry: Determined gas consumption is usually expressed in megajoules per hour (MJ/h).

1.3.29

drain valve

device used to hold and release liquid from an appliance

1.3.30

draught diverter

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

1.3.31

excess air

air in excess of that required for complete combustion that is mixed with the combustion products, in the combustion chamber

1.3.32

fan assisted combustion system

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

1.3.33

flame abnormality

flame condition that results in spitting, sputtering, lifting or floating flames, lighting back, extinction, yellow tipping, carbon deposition, objectionable odour and undue noise

Note 1 to entry: If the length of the yellow tipping is less than 20 % of the total length of the flame on visual inspection, it is not considered to be "appreciable" yellow tipping.

Note 2 to entry: In appliances designed specifically for a luminous effect, yellow tipping and limited lifting or floating flames or limited carbon deposition within the appliance are not considered abnormal.

1.3.34

flame detector

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

1.3.35

flame establishment period

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

1.3.36

flame failure response time

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

1.3.37

flame lifting

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

1.3.38

flame proving period

supervised period following the flame establishment period and before any further operation other than shut down is permitted

1.3.39

flame safeguard

safety device that automatically cuts off the gas supply if the actuating flame is not detected

1.3.40

flame safeguard system

system consisting of a flame detector(s) plus associated circuitry, integral components, valves and interlocks the function of which is to shut off the fuel supply to the burner(s) in the event of ignition failure or flame failure

1.3.41

flame tracking

flame travel

ignition of discharged gas or gas/air mixture from one burner port to an adjacent burner port

flue

passage through which flue gases are conveyed away from an appliance, excluding draught diverter, barometric device, fan or similar part

Note 1 to entry: The terms "flue" and "exhaust duct" may be used interchangeably when related to gas appliances.

flue connection

device incorporated in an appliance for the connection of a flue system

Note 1 to entry: Where the draught diverter, barometric device, fan or similar component is an integral part of the appliance, the discharge point of the integral part shall be deemed to be the flue connection.

#### 1.3.44

#### flue gases

#### exhaust gases

combustion products plus all diluents and contaminants

Note 1 to entry: Diluents and contaminants may include excess air, dilution air, process air, and waste products from the process.

#### 1.3.45

#### flue system

#### exhaust system

passage through which flue gases are conveyed from an appliance to a discharge point (i.e. flue terminal), including draught diverter, barometric device, fan or similar part

#### 1.3.46

#### flue terminal

<flueless appliance> point at which the flue gases discharge from the appliance

#### 1.3.47

#### flue terminal

<flued appliance> point at which the flue gases discharge from the flue system into the atmosphere, or into an external flue cowl where fitted

#### 1.3.48

#### flued appliance

appliance designed to discharge its flue gases through a flue system

#### flueless appliance

appliance designed to discharge its flue gases directly into the space in which it is located

#### 1.3.50

#### flueway

port or passage conveying flue gases within the appliance

#### 1.3.51

#### food warmer

#### holding cabinet

appliance designed to keep food warm

#### 1.3.52

#### forced draught

having all or part of the air for combustion provided under positive pressure by mechanical means

#### 1.3.53

### fryer

appliance for cooking food in hot oil

#### 1.3.54

any of the fuels: NG, SNG, TG, TLP, LP Gas or NZLPG

#### 1.3.54.1

### natural gas

#### NG

hydrocarbon gas primarily consisting of methane

#### 1.3.54.2

#### liquefied petroleum gas

### LP Gas

commercial propane, commercial butane or any combination of these in the vapour phase

Note 1 to entry: Commercial propane and commercial butane are specified in AS 4670.

### 1.3.54.3

### tempered liquefied petroleum gas

gas in air mixture comprising approximately 27 % commercial propane and 73 % air

### 1.3.54.4

### town gas

### TG

gas manufactured from coal or petroleum feedstocks

Note 1 to entry: Town gas usually contains high levels of carbon monoxide.

#### 1.3.55

### gas consumption

rate at which gas is consumed by an appliance under specified conditions

Note 1 to entry: Determined gas consumption is usually expressed in megajoules per hour (MJ/h).

### 1.3.56

### gas inlet connection

point of connection to consumer piping or to an LP Gas cylinder

Note 1 to entry: This may be the same as the appliance connection.

### granular media

loose, non-combustible material used largely in decorative or radiant heating or cooking appliances

Note 1 to entry: Granular media usually takes the form of, vermiculite, crushed glass, pebbles, volcanic rocks or simulated coal.  $\label{local-host:5000} $$ http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baining (No. 1997). The section of the property of the prop$ 

use on network is prohibited.

Any user of the document should rely on the final published version. 5 8 1.3.58
griddle
solid top
flat top
grill plate
solid grill plate
solid plate heated from below that is used to cook food directly on its surface

1.3.59

grill grid

wire work grid or perforated plate on which is placed the food to be cooked by a griller

1.3.60

grill tray

dish or tray that catches any drips from the grill operation, and contains the grill grid

1.3.61

griller

toaster

appliance for cooking food by radiant heat

1.3.62

heating value

gross heating value

higher heating value

amount of energy released when a unit volume of dry gas, at metric standard conditions, is completely burnt in air with the products of combustion brought to metric standard conditions, with the water produced by combustion condensed to the liquid state

Note 1 to entry: For the purposes of this Standard, the term "heating value" refers to gross heating value.

Note 2 to entry: Heating value is expressed in megajoules per cubic metre (MJ/m<sup>3</sup>).

Note 3 to entry: Calculation of heating value is in accordance with ISO 6976.

1.3.63

high temperature cooker

appliance for the cooking of food which is suspended above the heat source

Note 1 to entry: Duck cookers and pig cookers are examples of high temperature cookers.

1.3.64

hose assembly

flexible hose including end fittings connecting the gas supply to the appliance connection

Note 1 to entry: Hose assemblies in accordance with AS/NZS 1869 may include other components (e.g. a regulator).

1.3.65

ignition cycle

sequence of events including the release of gas, the provision of ignition energy and the attempt to detect flame

1.3.66

ignition safety time

time that elapses between the order to open the gas supply to the burner and the gas supply being shut off in the event of the presence of flame being detected

1.3.67

induced draught

having all or part of the air for combustion provided under negative pressure or suction in the combustion chamber by mechanical means

1.3.68

injector

component which causes air to mix with a stream of gas

Note 1 to entry: In the case of an aerated burner the injector incorporates an orifice discharging gas into the mixing throat or tube of the burner.

1.3.69

itermittent pilot

pilot that is automatically ignited each time the burner is started, and is automatically extinguished with the main burner

1.3.70

interrupted pilot

pilot that is automatically ignited each time the burner is started, and is automatically extinguished at the end of the main flame establishment period

1.3.71 jacket

annular space between the inner and outer casing of an indirectly heated vessel

1.3.72

jacketed stockpot

jacketed kettle

boiling pan

stockpot fitted with an outer jacket

Note 1 to entry: The annular space contains hot water, steam or oil from which heat is transferred to the food being cooked.

1.3.73

jointing compound

manufactured liquid, paste-like or semi-solid material used to assist in sealing joints

1.3.74

jointing material

manufactured solid material used to assist in sealing joints

in providing public comment. storage, distribution or use on network is prohibited. agreement. or that it should be relied on for any particular purpose. Any user of the document should rely on the final published version

solely for review in providing public com Further copying, storage, distribution or cument-licence-agreement. rate or complete or that it should be relia

alia to the registered licensee licensee may print once only. g.au/home/public-comment-d

draft document made available by Standarra Austra r use of the document is prohibited. The registered ce terms are available at https://www.stancards.org

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

1.3.75

light back

transfer of the flame from the burner tip or port into the body of the burner or back to the injector

Note 1 to entry: Jointing material may be in the form of a tape, cord or sheet.

1.3.76

lockout

1.3.76.1

non-volatile lockout

safety shut down condition of the control system which can only be reset by a manual operation

1.3.76.2

volatile lockout

safety shut down condition of the control system which can be reset by a manual operation or by the loss and subsequent restoration of the electricity supply

1.3.77

lower explosive limit

LEL

lowest percentage of gas in air at which combustion can be self-sustaining

Note 1 to entry: Lower explosive limit is usually determined at metric standard conditions.

1.3.78

manual ignition

1.3.78.1

direct manual ignition

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

1.3.78.2

remote manual ignition

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

1.3.79

mechanical air supply equipment

device used to bring air to the burner for the purpose of combustion

1.3.80

metric standard conditions

absolute temperature of 288.15 K (15 °C) and an absolute pressure of 101.325 kPa

1.3.81

mixing tube

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

1.3.82

mobile serving appliance

appliance, with wheels, incorporating an integral LP Gas supply designed to be easily moved by one person for hot food service in areas outside of the commercial kitchen area

1.3.83

natural draught

upward flow produced by the tendency of warmed gases to rise

minimum gas supply pressure, measured at the gas inlet connection

1.3.84

nominal gas consumption

appliance gas consumption, as stated in manufacturer's specifications, instructions, general communications and on the appliance

Note 1 to entry: This is the fundamental quantity on which all methods of test are based and is the starting point for all performance requirements.

Note 2 to entry: Nominal gas consumption is usually expressed in megajoules per hour (MJ/h).

nominal test point pressure

gas pressure specified by the manufacturer, at which the burner is designed to operate, and measured at a test point after any regulator or other valve in the gas train to the burner

1.3.86

normal test gas pressure

1.3.87

open flued appliance

indoor appliance designed to be connected to a flue system, its combustion air being drawn from the room or space in which it is installed

1.3.88

open top boiling table

boiling table with pan supports

1.3.89

orifice

precise aperture that functions as a metering device to control the gas consumption of a burner

Note 1 to entry: The orifice also acts as a directional guide for the gas injected into the burner throat.

1.3.90

oven

enclosed and insulated cabinet in which food is cooked

¥ solely for review in providing public comment.
Further copying, storage, distribution or use on networ

Any user of the document should rely on the final published version

#### 1.3.91

#### over-temperature cut-out device

manual reset or non-resetting device that functions to shut off the gas supply to a burner or burners to prevent temperature exceeding a pre-determined level

#### 1.3.92

#### pan support

#### trivet

means designed to maintain the vertical position of a vessel to be heated relative to the burner

#### permanent pilot

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

#### piezo ignition

form of ignition with which a high voltage spark is produced as the result of pressure or impact upon specially treated ceramic material

#### pilot

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

#### 1.3.96

#### pre-ignition purge

introduction of air into the combustion chamber and appliance flueway so as to either displace any gas/air mixture to a safe place or to dilute the gas/air mixture to a non-combustible level

#### 1.3.97

#### primary air

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

Note 1 to entry: Air admitted to the combustion zone after primary air combustion, and required to complete the combustion process, is known as secondary air.

#### 1.3.98

#### primary air ports

openings in the burner through which the primary air is drawn in by gas issuing from the injector orifice into the mixing tube

#### 1.3.99

#### primary flue

passage conveying flue gases from the combustion chamber of an appliance to the draught diverter, barometric device, fan or similar part when fitted

#### 1.3.100

#### primary guard

guard supplied integral with an appliance and intended to prevent direct contact with, or close approach to a heat source(s)

Note 1 to entry: A primary guard is principally intended to reduce risk of accidental ignition of flammable materials; however, if personal contact occurs, it does not necessarily prevent accidental burning.

#### programmable electronic system

system based on one or more central processing units (CPUs), connected to sensors and/or actuators, for the purpose of control, protection or monitoring

Note 1 to entry: The term PES extends to and includes all elements in the system such as —

- (a) sensors and/or other input devices;
- (b) data links and/or other communication paths; and
- (c) actuators and/or other output devices.

Note 2 to entry: The term PES includes system software such as executive, users and communication, etc. which is configured to operate a

Note 3 to entry: The term PES is used to cover systems incorporating a wide range of programmable electronic devices and includes systems incorporating —

- (a) microprocessors;
- (b) programmable controllers (PCs);
- (c) programmable logic controllers (PLCs);
- (d) programmable state controllers; and
- (e) other computer based devices.

Note 4 to entry: A PES can include a microprocessor-based temperature, pressure, air/fuel ratio, or level controller or monitor.

### 1.3.102

### programmed ignition

multistage system of automatic ignition where each stage takes place in a pre-determined sequence

### 1.3.103

#### purge

<pipework and fittings> displacement of contents with another gas

#### 1.3.104

#### purge

<appliance combustion circuit> forced or induced introduction of air through the combustion chamber and primary flue to displace any fuel/air mixture and/or products of combustion

### 1.3.105

bution or use on retwork is prohibited. e solely for review in providing pub v. Further copying, storage, distributionment-licence-agreement to the registered licensee icensee may print once only au/home/public-comment-d

Р

purpose. Any user of the document should rely on the final published version

purpose. Any user of the document should rely on the final published version.

volume of the combustion chamber and all areas where combustion products and combustible vapours, dusts or gases may accumulate in the appliance

#### 1.3.106

#### quick-connect device

two-part mating plug and socket assembly for connecting an appliance to a gas supply without the use of tools

#### 1.3.107

#### rated

maximum value for which a component is designed to operate without deterioration or failure, as specified by the manufacturer

#### regulator

device that automatically regulates the outlet pressure or the outlet volume of gas passing through it to a predetermined value

Note 1 to entry: Regulators may be adjustable (usually spring-loaded) or non-adjustable (usually weight-loaded).

#### 1.3.109

#### relative density

#### specific gravity

ratio of the mass of a volume of gas to the mass of the same volume of dry air under metric standard conditions

Note 1 to entry: Calculation of relative density is in accordance with ISO 6976.

#### 1.3.110

#### relief device

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

#### 1.3.111

#### removable

components that are intended to be removed with or without the use of a tool

#### 1.3.112

#### safety shut down

action of shutting off all gas and ignition energy by means of a safety control such that restart cannot be accomplished without a full start

#### 1.3.113

#### safety shut off system

arrangement of valves and associated control systems which shuts off the supply of gas when required, using a device which senses the approach to an unsafe condition

#### 1.3.114

#### safety shut off valve

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

### 1.3.115

### salamander

stand-alone griller

Note 1 to entry: Grillers are commonly incorporated into an appliance with other cooking functions. An appliance that is a dedicated griller is known as a salamander.

### secondary flue

that portion of the flue system conveying flue gases from the draught diverter, barometric device, fan or similar part to the flue terminal

#### 1.3.117

### standard test vessel

vessel with specified dimensions and properties for testing purposes

Note 1 to entry: See Table A.8 for specifications of standard test vessels.

### 1.3.118

#### start flame establishment period

period during which the start gas safety shut off system is permitted to be open before the flame safeguard is required to supervise the start gas flame (see Appendix E)

#### 1.3.119

#### start gas

gas flowing at a pilot or, when no pilot is fitted, at a main burner during the flame establishment period for initial ignition

#### 1.3.120

### start gas rate

restricted gas flow rate admitted either to a separate pilot burner or to the main burner during the start flame establishment period

#### steamer

appliance that heats food by exposure to steam

Note 1 to entry: The steam in a steamer may be either at atmospheric pressure or higher pressure.

#### 1.3.122

#### stockpot

appliance that heats a large vessel from below designed for the bulk cooking of liquid foodstuffs

Note 1 to entry: Liquid foodstuffs typically include soup, stock and porridge.

#### 1.3.123

#### surface combustion burner

burner where combustion takes place on the surface of a perforated or porous material or gauze

### 1.3.124

distribution or use on network is prohibited. copying. able by Standards Australia to the registered licensee solely for oblibited. The registered licensee may print once only. Further or tips://www.standards.org.suil-pme/public-comment-document-lity warrant or represent that the draft document is accurate or co

relied

purpose. Any user of the document should rely on the final published version

gas intended for the verification of the operational characteristics of appliances

Note 1 to entry: Test gases consist of reference gases and limit gases.

#### 1.3.125

#### thermostat

device that automatically maintains a pre-determined temperature

#### 1.3.126

#### thermostat bypass

integral part of a thermostat control that enables a pre-set volume of gas to bypass the thermostat valve

#### 1.3.127

#### universal LP Gas appliance

appliance intended for use with propane, butane or any mixture of propane and butane

#### 1.3.128

#### unsafe condition

condition which may lead to the following:

- (a) injury to persons or animals;
- (b) damage to the appliance; or
- (c) damage to the surroundings

#### 1.3.129

#### valve

device for the purpose of controlling or shutting off flow

#### 1.3.130

#### Wobbe index

#### Wobbe number

gas property which measures the amount of heat released by a gas burner with a constant orifice

Note 1 to entry: Wobbe index is an indicator of the interchangeability of fuel gases, such as natural gas, liquefied petroleum gas, and town gas, and is used to compare the combustion energy output of a burner.

Note 2 to entry: Wobbe index is expressed in megajoules per cubic metre (MJ/m³) and is calculated as

 $WI = \frac{Heating value}{\sqrt{Relative density}}$ 

#### 1.3.131

#### working parts

components intended to be handled by the user while operating the appliance

Note 1 to entry: These may include controls, door handles, and buttons to operate piezo ignition systems.

#### 1.3.132

#### working surfaces

surfaces through which heat passes as part of the primary function of the appliance

#### 1.3.133

#### wok

B.3

rounded bottom cooking vessel

### 1.4 Test methods

The test methods listed below are located in Appendix B.

- B.1 Gas leakage test
- B.2 Gas consumption
- B.4 Burner ignition Pilot light back and blocked aeration

Gas pressure regulator test

- B.5 Ignition at reduced pilot rate test
- B.6 Holding time of thermoelectric flame safeguard test
- B.7 Flame tracking at ignition test
- B.8 Shut off time for safety shut off system test
- B.9 Ignition gas flow rate (delayed ignition) test
- B.10 Ignition cycles Prior to lockout/after flame failure test
- B.11 Determination of CO/CO<sub>2</sub> ratio for independent burners Overload
- B.12 Determination of CO/CO<sub>2</sub> ratio for permanent pilots Overload
- B.13 Determination of CO/CO<sub>2</sub> ratio and O<sub>2</sub> levels Appliances for which Clause 4.2.1 is not applicable
- B.14 Determination of CO/CO<sub>2</sub> ratio for independent surface combustion burners Underload test
- B.15 Flame characteristics at maximum and minimum limiting conditions
- B.16 Burner ignition at maximum and minimum limiting conditions
- B.17 Delayed ignition at maximum and minimum limiting conditions
- B.18 Unburnt gas release from burner system
- B.19 Combustion air supply test
- B.20 Spillage of combustion products test
- B.21 Performance with updraught, downdraught and blocked flue tests
- B.22 Burner stability to draught test
- B.23 Pilot stability to draught test

Further copying, storage, distribution or use on network is prohibited. it document made available by Standards Australia to the region of the document is prohibited. The registered licensee may sems are available at https://www.standards.org.au/home/put/ustralia Limited does not warrant or represent that the draft do

- B.24 Effect of appliance door operation on flame stability test
- B.25 Blocked condensate drain test
- B.26 Temperature hazards test
- B.27 Temperature hazards Zero clearance test
- B.28 Heat resistance
- B.29 Heat resistance Light back condition
- B.30 Electrical supply variation test
- B.31 Zinc based alloy test
- B.32 Permanent markings test
- B.33 Strength of boiling tables
- B.34 Effect of spillover on ignition systems test
- B.35 Strength test Shelves Salamanders and grillers
- B.36 Strength of ovens
- B.37 Strength test Shelves Ovens
- B.38 Strength test Drop down doors Ovens
- B.39 Strength test Side hinged doors Ovens
- B.40 Strength of atmospheric steamers
- B.41 Temperature of surfaces and cooking oil
- B.42 Operation of low water level safety device
- B.43 Strength of stockpots
- B.44 Automatic control Fryers
- B.45 Over-temperature device Fryers
- B.46 Strength of fryers, pasta cooker and rethermalizers
- B.47 Temperature control and maintenance Wet bains marie
- B.48 Automatic temperature control Food warmers and bains marie
- B.49 Temperature maintenance Dry bain marie
- B.50 Heating time Hot press
- B.51 Temperature maintenance and variation Food warmers
  - Strength test Shelves, food warmers and bains marie
- B.53 Stability and strength test High temperature ovens
- B.54 Determination of CO/CO<sub>2</sub> ratio for independent burners Mobile serving appliance
- B.55 Containment of hot liquids Mobile serving appliance
- B.56 Strength test Mobile serving appliance
  - Stability test Mobile serving appliance

# 2 Design and construction

# 2.1 General

# 2.1.1 Controls and safety components

All components relating to the safe operation of the appliance shall conform to the requirements of the relevant component Standard(s) as far as they reasonably apply.

NOTE This includes, but is not limited to, automatic ignition systems, flame safeguards, flue cowls, gas valves, regulators, pressure switches and transducers, whether or not these carry gas.

### 2.1.2 Manual shut off valves

Manual shut off valves fitted to an appliance shall conform to AS 4617 and be classified as a Type 1 or Type 2.

# 2.1.3 Classification of safety shut off valves

Where a safety shut off system is required, the minimum classification of the valve shall be selected in accordance with Table 2.1.

Table 2.1 — Safety shut off valve selection and classification						
Burner type Standard and classification						
Atmospheric	AS 4620 or AS 4629, Class 3					
Induced draught	AS 4629, Class 3					
Forced draught with air pressure not exceeding 3 kPa	AS 4629, Class 2					
Forced draught with air pressure exceeding 3 kPa	AS 4629, Class 1					

# 2.1.4 Safety devices and interlocks

Safety devices, interlocks and their associated parts shall be adequately protected and shall not be capable of being inadvertently overridden. Safety shut off valve(s) shall not be rendered inoperable.

distribution or use on network is prohibited.  The over-temperature cut-out device shall—

- (a) be of the fail safe type; and
- (b) cause a non-volatile lockout.

### 2.1.6 Main burner automatic shut off valves

For appliances with automatic ignition 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.

# 2.1.7 Suitability of bearings

Bearings for motors, blowers or fans shall be suitable for the temperatures to which they are subjected in normal operation.

NOTE Normal operation means operating at nominal gas consumption with the fan operating at all fan speeds (including the "OFF" position if the appliance will function in that condition).

### 2.1.8 Protection of bearings

Fan and motor bearings shall be protected from dust and lint. Where for this purpose, filters are fitted to the inlet air stream, they shall not interfere with the combustion air of the appliance.

### 2.1.9 Protection of vitreous enamel

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

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

### 2.1.10 Protection of electric lamps

Electric lamps shall be protected from damage.

### 2.1.11 Provision for removal of condensate

Where the appliance is specifically designed to operate under condensing conditions, adequate provision shall be made for the collection and removal of condensate.

### 2.1.12 Appliance base

The base of an appliance intended to stand on surfaces that may become wet shall be designed to resist corrosion of the base material.

# 2.1.13 Provision for moving appliances

Mobile appliances shall be provided with means to facilitate moving the appliance safely.

# 2.1.14 Adequacy of means of support

Appliances shall be provided with adequate means of support which shall allow the appliance to remain stable on the intended supporting surface and shall not have sharp edges in contact with the supporting surface.

# 2.1.15 Positioning of removable components

User accessible removable components shall be positioned positively. Reasonable rearrangement of such parts shall not be possible unless it can be demonstrated that the changes do not adversely affect combustion or appliance safety.

NOTE Removable components include, for example, pan supports, flame tamers and decorative coals

# 2.1.16 Provision for an LP Gas cylinder

Appliances other than mobile serving appliances shall not incorporate provision for an LP Gas cylinder.

# 2.2 Features specially required

# 2.2.1 Normal gas inlet pressure

Normal gas inlet pressure shall be as follows:

- (a) LP Gas appliances: 2.75 kPa.
- (b) Natural gas appliances: 1.13 kPa.
- (c) TG and TLP appliances: 0.75 kPa.

# 2.2.2 Provision of pressure regulators

A gas pressure regulator shall be provided with each appliance.

An appliance with an adjustable regulator shall have a nominated test point pressure not exceeding:

- (a) Town gas, TLP: 0.63 kPa.
- (b) Natural gas: 1.00 kPa.
- (c) LP Gas: 2.75 kPa.

An appliance incorporating a zero pressure regulator or an air/fuel ratio controller, pneumatic type (ISO 23551-2) satisfies this requirement and does not need a separate gas appliance regulator.

## 2.2.3 Positioning of regulators

Regulators shall be so placed that—

- (a) breather holes cannot become easily blocked; and
- (b) overheating and the risk of ignition of gas leaking from the breather hole is minimized

## 2.2.4 Means for gas pressure measurement

Readily accessible means that are designed to accept 6 mm bore flexible tubing shall be provided to allow the gas pressure in the appliance to be measured while the appliance is in operation.

When a dedicated pressure test point is fitted, it shall contain a limiting orifice not exceeding 1.0 mm or equivalent restriction.

### 2.2.5 Fitting of flame safeguards

Each burner system shall be protected by a flame safeguard.

# 2.2.6 Bypass for thermostatically controlled burners

Thermostatically controlled burners shall include a thermostat bypass or other means to ensure automatic reignition of the burner.

### 2.2.7 Control of bleed lines

Bleed lines from diaphragm type automatic valves shall be constructed so that there is no continuous bleed during the "off" period and terminate in a location such that—

- (a) ignition of the bleed gas by the main burner or pilot is ensured; and
- (b) blockage of the bleed line tip is prevented.

## 2.2.8 Means to turn off gas supply to pilots

Accessible means shall be provided for turning off the gas supply to pilot burners without altering the setting of any pilot gas consumption adjusting device.

### 2.2.9 Programmable electronic systems

Where a programmable electronic system (PES) is employed for safety related functions of burner management systems, the PES shall conform to the relevant requirements of AS 4625 and EN 298 (or equivalent.)

# 2.3 Burners and ignition systems

# 2.3.1 Aeration adjustment for universal LP Gas appliances

For universal LP Gas appliances, any means of primary burner aeration adjustment shall require the use of a tool.

# 2.3.2 Protection of ports and injectors

Any ports and injectors that may be exposed in their normal operation to falling particle, grease drippings, accidental spill or boilover shall be protected against blockage.

# 2.3.3 Restrictions on gauze over primary air ports

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

# 2.3.4 Positive location of flash ignition tubes

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

# 2.3.5 Support of pilots, ignitors and flame sensing devices

Pilots, ignitors and flame sensing devices shall be supported in such a manner that their position relative to each other and the main burner(s) shall remain fixed.

# 2.3.6 Location of burner mixing tubes

Burner mixing tubes shall be positively located in relation to gas injectors. Where a mixing tube rests on an injector, provision shall be made to prevent the mixing tube from interfering with the correct functioning of the valve or injector.

# 2.3.7 Burner supports

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

# 2.3.8 Securing of removable burner components

Removable burner components, when in position, shall be secure and designed so that they cannot be disturbed in normal usage.

# 2.3.9 Fixing of gas manifolds

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

### 2.3.10 Burners with media

The specification for the media shall include the following:

- (a) Clear definition of the type of material.
- (b) Size and size distribution.
- (c) Maximum and minimum depth of media bed.

# 2.3.11 Tray type burner-turndown limits

Appliances using tray type burners with granular or other porous media through which gas passes before ignition shall be fitted with a device that limits turndown gas consumption to prevent flame abnormality at the turndown condition.

# 2.3.12 Burners with remote manual ignition

The remote manual ignition of a burner, including pilots, shall be visible or visibly indicated to the user while operating the ignition devices and appropriate gas controls.

### 2.3.13 Burners with direct manual ignition

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

# 2.3.14 Manually operated burners enclosed in a compartment

Where manually operated burners are enclosed in a compartment in which an explosive accumulation of gas can occur it shall be necessary to open the compartment to light the burner, unless an adequate interlock purge is provided.

### 2.4 Materials

### 2.4.1 Suitability of materials and finishes

The quality and thickness of the materials and finishes, including dressings and lubricants used in the construction of an appliance shall be such that the constructional and performance characteristics do not alter significantly during a reasonable life and under normal conditions of installation and use.

When the appliance is installed in accordance with the manufacturer's instructions, all components shall withstand the mechanical, chemical and thermal conditions to which they may be subjected in the course of normal operation.

### 2.4.2 Resistance to corrosion

All materials shall be resistant to corrosion under normal conditions of installation and operation of the appliance.

# 2.4.3 Materials containing asbestos

Materials containing asbestos shall not be used.

# 2.4.4 Materials in contact with gas

Materials in contact with gas shall be suitable for all gases that the appliance is intended to use.

# 2.4.5 Components required to be placed in a flame

Pilots, thermocouples and other components required to be placed in a flame shall be resistant to the effects of heat and corrosion. When refractory alloys are used, they shall not produce a catalytic cracking effect.

# 2.4.6 Zinc based alloys

Zinc based alloys shall not be used in contact with water or condensate. Brass is excluded from this requirement.

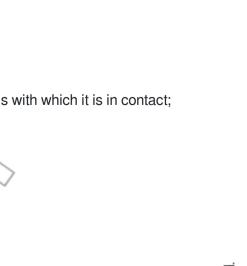
# 2.4.7 Jointing compounds and jointing materials

Jointing compounds and jointing materials shall be of a type demonstrated as suitable for the conditions of use. Refer to AS 4623 for information on jointing compounds and materials.

### 2.4.8 Thermal insulation

Thermal insulation shall—

- (a) not contaminate food or water in the appliance, nor produce obnoxious odours, fumes, nor corrode materials with which it is in contact:
- (b) be fitted in such a way that it is not rendered ineffective or objectionable by—
  - (i) settling;
  - (ii) dislodgment; or
  - (iii) condensation during the normal operation of the appliance; and
- (c) be protected against rodents.



### 2.4.9 Protection of aluminium tubing

Aluminium tubing in areas of restricted ventilation shall be provided with a protective barrier to prevent corrosion due to contact with condensation, insulation and other materials of the appliance.

# 2.5 Design for assembly and installation

NOTE Refer to AS/NZS 5601 (series) for further requirements on the installation of catering gas equipment.

### 2.5.1 Compliance in alternative forms

If appliances are so designed that certain components may be fitted or omitted, e.g. legs or trolleys, the appliances shall conform to all requirements in their alternative forms.

# 2.5.2 Fixing of gas connections

The gas inlet connection and appliance connection shall be fixed to prevent rotation.

This requirement is met if the connection can be held in position by means of a spanner while making or breaking the connection in accordance with the manufacturer's instructions.

NOTE The gas inlet connection and the appliance connection may be the same.

### 2.5.3 Gas inlet connection

Where the appliance is to be connected to consumer piping, the gas inlet connection shall—

- (a) have a thread in accordance with AS ISO 7.1 or AS 1722.2; or
  - NOTE Refer to AS 3688 for guidance on the appropriate class of thread for various types of connection.
- (b) have a quick-connect device in accordance with AS 4627 Type 1 or 2.

Where the appliance is to be directly connected to an LP Gas cylinder, the inlet connection to the hose and regulator shall conform to AS 4627, Type 27.

### 2.5.4 Access to connection

The gas inlet and water connections shall have sufficient free space to enable connection and disconnection.

# 2.5.5 Appliance connection for appliances connecting directly to an LP Gas cylinder

### 2.5.5.1 Gas hose connection

Where the appliance is intended to be directly connected to an LP Gas cylinder, the appliance connection between the hose assembly and the appliance shall be—

- (a) a threaded connection using threads in accordance with AS ISO 7.1 or AS 1722.2;
- (b) a Type 2 quick-connect device in accordance with AS 4627; or
- (c) a 3/8" SAE Flare connection with 5/8-18 UNF threads.

### 2.5.5.2 Gas hose assemblies

Gas hose assemblies shall conform to AS/NZS 1869 and be Class B or Class D.

### 2.5.5.3 Protection of hose assembly

An appliance that may be installed with a hose assembly, shall be constructed so that when installed in accordance with the manufacturer's instructions with a hose assembly supplied or specified by the manufacturer and operated under normal conditions, the hose assembly shall not be—

- (a) exposed to temperatures exceeding that for which it is designed or tested; nor
- (b) subject to tension, abrasion, kinking or permanent deformation.

### 2.5.5.4 Restraint where a hose assembly is used

Where an appliance is supplied with castors and is to be connected to a fixed gas supply via a flexible hose connection, a restraining tether of adequate strength shall be fixed to the appliance and be suitable to be fixed to the wall within 50 mm of the connection point. The length of the tether shall not exceed 80 % of the length of the hose assembly.

NOTE The tether is to prevent stress being imparted onto the hose assembly when the appliance is moved out of its normal operating position.

# 2.5.6 Compression fittings

Compression fittings on gas lines shall conform to the following conditions:

- (a) They shall be made to an acceptable standard and the mating surfaces shall be compatible.
- (b) Loose olives, where used, shall be symmetrical to prevent incorrect assembly.
- (c) Shear olives, where used, may be asymmetrical.

on network is prohibited.

- (d) After making and breaking the fittings 10 times, applying the torque value as listed in Table 2.5.9 to remake the fittings, the joints shall conform to the requirements of Clause 3.3.
- (e) The component parts shall be made of materials with a melting point not less than 430 °C.

Table 2.5.9 — Torque values				
Nominal size, mm	Torque, Nm			
6	15			
8	20			
10	35			
15	50			
20	75			
25	125			
32	160			
40	200			
50	250			

### Design of air entry and combustion product discharge

Appliances shall be so designed and constructed that the flueway terminals, explosion reliefs and openings for the entry of combustion air or discharge of combustion products are part of the appliance structure, and unlikely to be obstructed by cabinets, walls or partitions when the appliance is installed.

In the case of appliances specifically designed to be built-in, any clearance necessary to the safe and effective operation of the appliance shall be ensured by means of permanently attached spacers.

# Flue terminal and draught diverter construction

Flue terminals and draught diverters shall be constructed so that they can only be installed in the correct position.

### Design to prevent flueway blockage

Flueways and terminals shall be designed such that they are:

- (a) not easily blocked under normal use;
- (b) readily cleanable; and
- (c) unsuitable for the placement of vessels over the flueway terminals.

# Adequacy of means of support

Appliances having more than two wheels shall be provided with means to prevent movement of the appliance when in use.

#### 2.5.11 Means to level appliance

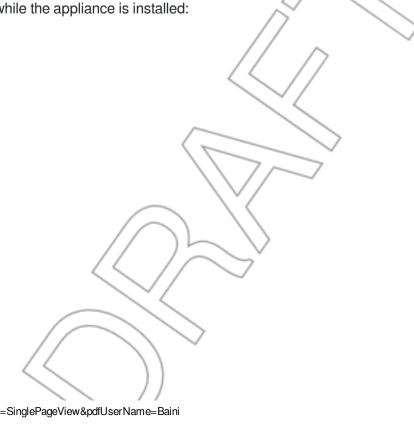
Appliances intended for stationary installations shall be fitted with means for levelling.

# Design for maintenance

# Accessibility for adjustment

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

- (a) Aeration controls.
- (b) Pilots.
- (c) Thermostat bypasses where provided.
- (d) Thermostat calibration.
- (e) Regulator adjustments.
- (f) Gas consumption adjusters.
- (g) Ignition devices.
- (h) Safety devices.
- (i) Pressure control devices.
- (j) Vacuum control devices.
- (k) Belt tension adjusters.
- (I) Water flow rate controls.



roviding public comment. rage, distribution or use on network is prohibited.

NOTE It is acceptable for adjustments to be finalized with some components removed, provided no settings will be disturbed during replacement of those components.

# 2.6.2 Accessibility for replacement

Components that require removal for service work shall be accessible for replacement without undue risk of injury.

For appliances that cannot be easily disconnected and handled by one person, the following components shall be accessible for replacement without moving the appliance from the installed position:

- (a) Regulator diaphragms and valves (body exempt).
- (b) Gas valve plugs.
- (c) Injectors.
- (d) Thermostats (complete including sensing elements). Thermostat valve plug and bypass adjuster to be separately removable.
- (e) Filters (gas and water).
- (f) Pilot head assemblies, pilot injectors.
- (g) Clocks and timers.
- (h) Door springs or other door control mechanisms.
- (i) Burners.
- (j) Ignition devices.
- (k) Drip trays.
- (I) Automatic control equipment.
- (m) Safety shut off systems.
- (n) Electric lamps.
- (o) Fans, electric motors and drives.
- (p) Belts.
- (q) Pressure control devices.
- (r) Vacuum control devices.
- (s) Flame safeguards.
- (t) Radiant elements.
- (u) Flue dampers.
- (v) Water flow controls.
- (w) Printed circuit boards

### 2.6.3 Screwed connections

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

### 2.6.4 Inaccessible nuts or bolts

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

# 2.6.5 Insertion and removal of gas injectors

Removable burner injectors shall be made so that they can be inserted and removed without damage.

# 2.6.6 Burner operation

If a clear visual indication of burner operation is not provided, it shall be possible to verify burner operation, either directly, or by other means.

# 2.6.7 Plug and socket connections

Plug and socket connections of electrical components within the appliance shall be-

- (a) non-interchangeable;
- (b) colour coded; or
- (c) appropriately identified.

# 2.7 Design for use

# 2.7.1 Accessibility by the user

Controls and working parts shall be safely accessible to the user.

# 2.7.2 Design of valve handles, movable dials and pointers

Turther copying, storage, distribution or use on network is prohibited.

oran occument made evaluable by otandards Australia to the registered licens in use of the document is prohibited. The registered licensee may print once ce terms are available at https://www.standards.org.au/home/public-comme la Australia I imited does not warrent or represent that the doctors.

Valve handles, movable dials and pointers shall—

- (a) be so designed that they are not capable of being incorrectly assembled;
- (b) be securely attached to their spindles;
- (c) not contain loose parts that may become detached when the handles are removed; and
- (d) be located to avoid accidental change of setting while appliance is in use.

### 2.7.3 Protection of control knobs

Control knobs on the front of an appliance and within 1 m of the floor shall be protected against damage by recessing, or by fitting of a guard rail or equivalent appliance protrusions beyond the control knob and within 1 m of the floor.

# 2.7.4 Locking means for adjusting devices

Adjusting devices shall be provided with locking means that shall be sufficiently positive to prevent subsequent movement, either through accident or through the creep of sealing material. The tightening of any sealing or locking device shall not alter the setting.

### 2.7.5 Prevention of injury at ignition

The method of ignition shall be such that it is not necessary to place the hand in a position where injury may occur when ignition takes place.

### 2.7.6 Proving ignition

It shall be possible to determine that the burner or pilot is alight when the appliance is in the installed position and operating under normal conditions.

### 2.7.7 Dismantling and replacement by the user

Any dismantling required by the user shall be easily carried out without tools other than those supplied with the appliance or undue force. Parts intended to be removed by the user shall be either impossible or completely obvious.

### 2.7.8 Sharp edges

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

### 2.7.9 Design to minimize contact with hot surfaces

Handles and knobs shall be so designed as to minimize accidental touching of hot surfaces.

### 2.7.10 Provision for the collection of grease and food particles

Provision shall be made for the safe collection and easy cleaning of spills, grease and food particles.

# 2.7.11 Accessibility of water feed and drainage systems

Water feed and drainage systems shall be readily accessible and capable of being easily cleaned.

# 2.7.12 Connection of electrical components

Electrical components or assemblies which may be required to be removed from an appliance shall not be connected by permanent or soldered joints.

# 2.8 Markings

# 2.8.1 Language

Markings required by this Standard shall be in English. Where markings are also provided in languages other than English, the contents in all languages shall be consistent with the requirements of this Standard.

# 2.8.2 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, and such markings shall include those listed below.

- (a) Name, trade mark or identification mark of the manufacturer or responsible vendor.
- (b) Model designation.
- (c) Serial number or month and year of manufacture.
- (d) Gas or gases for which the appliance is intended to be used.
- (e) For main burners with an adjustable thermostat bypass and which are ignited at low rate, the main burner test point pressure in kPa at the thermostat bypass rate for each gas nominated in (d) above.
- (f) Total nominal gas consumption, in MJ/h, and, the test point pressure in kPa for each gas nominated in Item (d).
- (g) Wiring diagrams except where electrical equipment is limited to one electric lamp. Where the circuit is complicated an adequate diagram shall be supplied as part of the installation and operating instructions.

to the registered licensee solely for review in providing public comment.
nsee may print once only. Further copying, storage, distribution or use on network is prohibited.
shome/public-comment-document-licence-agreement.

- (i) Where manufacturer's instructions require an appliance to be installed on a non-combustible floor, the marking:
  - NOT TO BE INSTALLED ON A COMBUSTIBLE BASE
- (j) Where manufacturer's instructions require an appliance to be installed on fire resistant material, the marking:
  - TO BE INSTALLED ON FIRE RESISTANT MATERIAL

### 2.8.3 Marking of doors and covers

Those doors, covers and other components that shall be left open, closed or removed during operation shall be indicated with a permanent marking.

### 2.8.4 Marking of flash ignition tubes

Flash ignition tubes that are used for the manual ignition of burners shall have the point of ignition suitably marked.

### 2.8.5 Indication of function

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

### 2.8.6 Identification of gas valves

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

### 2.8.7 Gas type marking

A marking stating the type of gas for which the appliance has been manufactured and adjusted shall be located in a prominent position near the gas connection.

For appliances intended for use with a flexible connection to a fixed gas supply system, additional wording shall refer to the local gas supplier for confirmation of the gas type, if in doubt.

# 2.8.8 Gas type colour code

Where a colour code only is used to indicate the type of gas for which an appliance or component is to be used, it shall conform with Table 2.8.8.

	Table 2.8.8 — Gas	type colour codes	
Gas type	Colour code (refer to AS 2700)	PMS colour code	RAL colour code
Natural gas (Australia)	Black	419	9005
Natural gas (NZ)	Black	419	9005
Propane	Signal orange	1595	2010
Butane	Grass green	363	6010
Universal LP Gas	Signal red	1805	3001
NZLPG	Vivid yellow	130	1003
TLP	Light pink	1895	3015
TG	Ultramarine blue	2747	5002
All gases	Primrose	121	1018
NOTE The RAL Classic Colour S	System Series and Pantone Matching Sy	stem (PMS) colour codes are indicativ	ve only.

# 2.8.9 Markings on packaging

The packaging shall be marked in a prominent position with—

- (a) Except for mobile appliances, the following:
  - TO BE INSTALLED ONLY BY AN AUTHORIZED PERSON
- (b) The maximum packaged weight in kilograms.

# 2.8.10 Marking of thermostat dials

Variable setting thermostats and temperature controls shall clearly indicate the action required to raise or lower the temperature.

### 2.8.11 Interference with combustion air

Where it is possible to remove any part of an appliance without the use of tools and this removal could cause interference with flueing or the entry of combustion air, the appliance shall be marked with a suitable warning.

### 2.8.12 Identification of injectors

Injectors shall carry an identifying cipher. The cipher shall be in the form of numerals indicating the orifice size in millimetres or the drill size number. In the case of pilot injectors, a colour coding in accordance with Table 2.8.8 is acceptable. Alternatively, the injector size shall be marked on the appliance.

### 2.9 Instructions

# 2.9.1 Language

All instructions required by this Standard shall be in English. Where instructions are also provided in languages other than English, the contents in all languages shall be consistent with the requirements of this Standard.

### 2.9.2 Installation

### 2.9.2.1 Instructions supplied with the appliance

Each appliance shall be supplied with installation instructions that include the following:

- (a) Model or type of appliance.
- (b) The gas for which the model or type of appliance is intended, and data such as gas consumptions, pressures, etc, or reference to where this information is marked on the appliance.
- (c) The requirements of AS/NZS 5601 (series), local authority, gas, electricity and any other relevant statutory regulations.
- (d) Overall dimensions of the appliance and location by measurement of connecting points of gas, water, electricity, flues.
- (e) The alternative types of installations which may be made.
- (f) Details of removal of any transit protection.
- (g) Details of the methods of connection and alternatives.
- (h) Required surroundings of the appliance, clearance from cupboards and fixings, walls, curtains, floors, or other combustible materials.
- (i) Details of methods of installation that affect other trades, e.g. details of built-in flues. Where electrical connections are required, details for the electrician.
- (j) Special conditions that shall be avoided, e.g. marine environment, and any conditions necessary to ensure optimum performance.
- (k) Details of any assembly work required to be done by the installer.
- (I) Explicit instructions to the installer to test the operation of the appliance after installation.
- (m) Details of the necessary testing and instructions for minor adjustments.
- (n) Instructions on the procedure to be adopted if the appliance cannot be adjusted to perform correctly.
- (o) Fitting of temperature and pressure relief valve(s) where applicable.
- (p) For open flued appliances, details of the necessary ventilation requirements including the size of any openings in accordance with AS/NZS 5601 (series).
- (q) A wiring diagram with the connection terminals, including those for external controls.
- (r) An indication of the external controls that can be used with the appliance.
- (s) Method of connection to other services e.g. water, electricity, drainage, etc.
- (t) The removal of any part of an appliance that could cause interference with the entry of combustion air.
- (u) The injector size(s).
- (v) The maximum dimensions of overhanging projections
- (w) For appliances with fan assisted combustion systems, conditions when a barometric device is required in the flue system and the method of its installation.
- (x) Details of the commissioning requirements, including instruments required.

### 2.9.2.2 Built-in appliances

Appliances designed as "built in" units shall be provided with clearly defined and prominent instructions for their installation. These instructions shall specify the uses of non-combustible materials for the immediate surrounds of the appliance, unless combustible materials are suitable.

# 2.9.3 Operation

### 2.9.3.1 General

Operating instructions shall be supplied with each appliance covering each separate function of the appliance and such dismantling, cleaning and assembly as is necessary for the user and that include the following:

- (a) For programmed appliances, a clear explanation of programming and the effect of any power supply interruption.
- (b) Information to assist the user to recognize abnormal operation which requires service.
- (c) A recommended maintenance schedule for the life expectancy of the appliance.

distribution or use on network is prohibited nent made available by Standards Australia to the register document is prohibited. The registered licensee may prime available at https://www.standards.org.au/home/public-Limited does not warrant or represent that the draft docu

- (d) Where service and any necessary replacement parts may be obtained.
- (e) Clear and complete instructions for lighting and/or shut down where incorrect procedures can result in a hazardous condition.
- (f) Where necessary, a safe purge before the appliance is re-lit.
- (g) Where symbols are used to indicate the functions of operating controls, the meanings of these symbols.
- (h) Where an integral LP Gas supply is incorporated, the specific size and/or capacity of the cylinder to be used.
- (i) The use of large utensils.
- (j) For high temperature cookers, the manufacturer's recommended load.
- (k) For universal LP Gas appliances, a statement that the primary aeration adjustment must not be altered from the position specified by the manufacturer.

## 2.9.3.2 Warning statements

The instructions shall contain the following or similar statements:

DO NOT SPRAY AEROSOLS IN THE VICINITY OF THIS APPLIANCE WHILE IT IS IN OPERATION

DO NOT USE OR STORE FLAMMABLE MATERIALS IN OR NEAR THIS APPLIANCE

DO NOT PLACE ARTICLES ON OR AGAINST THIS APPLIANCE

DO NOT MODIFY THIS APPLIANCE

### Maintenance

### Documents supplied with the appliance

Any document referencing servicing instructions, supplied with the appliance, shall contain a warning that servicing shall be carried out only by authorized personnel, and that the appliance shall not be modified.

### Servicing instructions and maintenance schedule

Servicing instructions shall be available and they shall include reference to the following:

- (a) Removal of covers and other parts for access to all components.
- (b) Removal of components, where applicable, for service, including-
  - (i) burners;
  - (ii) pilot and flame safeguard;
  - (iii) ignition devices;
  - (iv) thermostat;
  - (v) combination control;
  - (vi) water controls;
  - (vii) injectors;
  - (viii) filters (gas and water);
  - (ix) baffles when flue cleaning is necessary;
  - (x) drip trays;
  - (xi) pressure and vacuum control devices; and
  - (xii) printed circuit boards.
- (c) Parts replacement, including—
  - (i) fan;
  - over-temperature cut-out device; and
  - (iii) heat exchanger or cylinder;
- (d) Adjustments to the following—
  - (i) pilot;
  - (ii) aeration controls;
  - (iii) thermostat:
  - (iv) ignition devices (spark gap);
  - (v) gas rate adjuster;
  - (vi) regulator;
  - (vii) safety devices;
  - (viii) pressure control devices;
  - (ix) vacuum control devices;

- (x) belt tension adjusters; and
- (xii) water flow rate controls.
- (e) Fault finding chart.
- (f) Wiring diagram as specified in Clause 2.9.2.1(q).

# 3 Preliminary tests — Line gases

### 3.1 General

# 3.1.1 Gases for testing

Unless otherwise specified, tests in this Standard shall be carried out using the following gases (see Table 3.1.2 for test gas characteristics):

- (a) Appliances intended for use with NG shall be tested using available NG but in the case of dispute or borderline results test gas "N" shall be used.
- (b) Appliances intended for use with TG test gas "D" shall be used.
- (c) Appliances intended for use with propane only shall be tested with test gas "X".
- (d) Appliances intended for use with butane only shall be tested with test gas "Y".
- (e) Universal LP Gas appliances shall be tested with test gas "X" for all performance tests except for Clauses 5.5 and 5.6 where test gas "Y" shall be used.

NOTE Nominal gas consumption is determined using test gas "X" and this is the figure marked on the appliance.

(f) Appliances intended for use with TLP shall be tested with test gas "T"

NOTE Where an appliance is being tested for multi-gas certification, performance results for the gas type having the highest gas consumption may be deemed to apply to other gas types for the tests in Clauses 5.4 and 5.5.

### 3.1.2 Test gas composition

Reference gases and limit gases used in this Standard are specified in the test gas table (Table 3.1.2) and are based on pure components. Actual test gases shall be made up to the respective Wobbe index within ± 2 % using constituent gases of purity not less than—

- (a) 99 % for hydrogen and nitrogen;
- (b) 95 % for methane  $(H_2 + CO + O_2 < 1 \%, N_2 + CO_2 < 2 \%)$ ;
- (c) 95 % for propane  $(H_2 + CO + O_2 < 1 \%, N_2 + CO_2 < 2 \%)$ ;
- (d) 95 % for propene ( $H_2 + CO + O_2 < 1$  %,  $N_2 + CO_2 < 2$  %); and
- (e) 95 % for butane  $(H_2 + CO + O_2 < 1 \%, N_2 + CO_2 < 2 \%)$ .

Where gases of the required composition or purity are not readily available, suitable blended gases of the same Wobbe index and other combustion characteristics may be used.

In case of dispute, the purity of the constituent gases shall not be less than the above values

# 3.1.3 Test gas pressure

For appliances for use in Australia, normal test gas pressure shall be:

- (a) When the appliance is supplied with vaporized LP Gas to the inlet at unregulated pressure from refillable containers, the pressure as specified in Table 3.1.1.
- (b) When the appliance is supplied with vaporized LP Gas to the inlet at unregulated pressure from non-refillable containers, the pressure corresponding to the saturated vapour pressure of the fuel gas at a temperature of 15 °C.
- (c) For other appliances, the pressure as follows:
  - (i) 0.75 kPa for TG and TLP.
  - (ii) 1.13 kPa for natural gas and SNG.
  - (iii) 2.75 kPa for LP Gas.

Butane (propane)  Y 110 (butane)	Appliance gas type	Gas	Pressure kPa
(butane)  Universal LP Gas  X (propane)  Y  110	Propane		630
(propane) Y 110	Butane	'	110
	Universal LP Gas		630
		'	110
For appliances for use in New Zealand, normal test gas presson (A) NZLPG: 2.75 kPa.			

- (B) Natural gas: The manufacturer's marked minimum gas inlet pressure or 1.13 kPa where no minimum is marked.

# Burners with displaceable media

Where the displacement of any coals, logs or media may interfere with the ignition or combustion of any burner, including pilots, the tests required in this Section shall be repeated with the media in the displaced position, and in the case of granular media both in the displaced position and with the media partially removed.

Table 3.	1.2 —	Test	gas	table
nosition	nerce	nt		

											4	98.7 07.0
		Composition, percent								Charact	eristics <sup>a</sup> 📳	Furt cum rate
Test gas	Application	Hydrogen	Methane	Propane	Propylene	Butane	Nitrogen	Air	Specific energy MJ/kg	Heating value MJ/m <sup>3</sup>	Relative	Wobbe index MJ/m³
Ν	Natural gas	_	97.5	1	_	_	1.5	_	_	37.8	1.00	<u> </u>
Na		_	86	14	_	_	_	_	_	45.7	0.692	25.00 Hz
Nb		13	87	_	_	_	_	_	_	34.4	0.492	480 Per di
Nc		_	90	_	_	_	10	_	_	34.0	0.596	44 .
S		_	_	55	_	_	_	45	_	52.1	1.296	15 TE B
X	LP Gas	_	_	100	_	_	_	_	50.4	95.8		788.99 GB
Υ		_	_	_	_	100	_	_	49.5	125.7	2.078	8 <sup>2</sup> 2 5
Z	1	_	_	_	100	_	_	_	_	88.5		72.5 E
Т	TLP	_	_	27	_	_	_	73	_	25.4	1.142	28 to
D	TG	50	_	15	_	_	35	_	_	20.2		26.0 8

The reference conditions for the characteristics are 15 °C, 101.325 kPa, dry. The test gases shall be of a composition and of combustion characteristics as shown in the table. Where base gases of the required combustion purity are not available suitably blended gases of the same Wobbe index and oth combustion characteristics may be used. In case of dispute, only gases shown in the table shall be used.

#### Preparation for testing 2

# Electrical safety requirements

The appliance shall conform to the following electrical safety requirements:

- (a) When the appliance is disconnected from the power supply the measured resistance between the earth pin of the plug and any exposed metal on the appliance shall not exceed 1  $\Omega$  for rotating parts and 0.1  $\Omega$  for all other parts with all switches in the "ON" position.
- (b) When the appliance is disconnected from the power supply the measured insulation resistance between current carrying conductors and any exposed metal shall not be less than 1 M $\Omega$ . The resistance for double insulated equipment shall not be less than 10 M $\Omega$ .

#### Setting up appliance for testing 3.2.2

The appliance shall be set up in accordance with the manufacturer's instructions unless otherwise specified in this Standard. This includes the adjustment in response to combustion performance of zero pressure regulators and gas/air ratio controllers.

All services (e.g. gas, electricity, water etc.) shall be connected.

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

The appliance gas train and any gas meter shall be purged with the appropriate test gas before commencing a test and when a test procedure calls for a change in the test gas.

The appliance shall be examined to ensure that it does not have any structural, mechanical or operational defects.

The gas consumption, aeration, temperature settings and other adjustments shall be checked to ensure they have been made in accordance with the manufacturer's recommendations. Adjustments shall be made with the test gas that is applicable with the inlet pressure set at normal test gas pressure.

All panels, covers and doors shall be in the fitted position during testing.

Appliances designed for use with proprietary flue components shall be tested for conformance to the requirements of this Standard with the components in place.

# 3.2.3 Appliance regulator not to be removed during testing

Appliance regulators are to be considered an integral part of the appliance and shall not be removed during tests, unless specifically instructed otherwise.

### 3.2.4 Protection from accidental draughts

The appliance under test shall be protected from accidental draughts.

### 3.2.5 Prevention of gas rate variation

Provision shall be made to prevent thermostats, or any other variable restriction in the gas line, from varying during tests unless otherwise specified in this Standard.

### 3.2.6 Turndown gas consumption

Where a test is required to be performed at turndown gas consumption, the appliance shall be tested as follows:

- (a) For non-thermostatic gas controls with limited turndown: at the lowest gas consumption to which the burner control can be set.
- (b) For non-thermostatic gas controls with unlimited turndown: at 25 % of the nominal gas consumption.
- (c) For thermostatic gas controls: at the rate determined by the bypass or where no bypass is provided, at the marked turndown setting.

# 3.3 Gas leakage

When tested in accordance with Test Method B.1, the leakage rate from the fully assembled gas train shall not exceed 1 mL/min when the appliance is subjected to an inlet gas pressure of 1.5 times the working pressure or 14.0 kPa, whichever is greater.

NOTE It is intended that this is the first test performed in any test program.

# 3.4 Gas consumption

# 3.4.1 Tolerance on determined gas consumption

The determined gas consumption in MJ/h of each burner other than a pilot, shall be within  $\pm$  5 % of nominal gas consumption when tested in accordance with Test Method B.2.

# 3.4.2 Total determined gas consumption — All burners operating

Total determined gas consumption for all burners operating together shall be within 20 % of the sum of the nominal gas consumptions when tested in accordance with Test Method B.2.

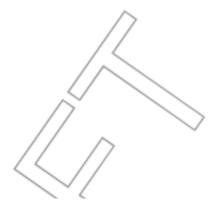
# 3.4.3 Determined gas consumption of pilots

The determined gas consumption of each continuously burning pilot shall not be more than 1 MJ/h when tested in accordance with Test Method B.2.

# 3.5 Gas pressure regulators

When tested in accordance with Test Method B.3, the measured test point pressure shall not vary by more than  $\pm$  20 % from the nomina test point pressure when the appliance inlet pressure is varied between the limits shown in Table 3.5.

For appliances incorporating zero pressure regulator, the measured test point pressure shall remain at or below atmospheric pressure.



cument made available by Standards Australia to the registered licensee solely for review in providing public comment. the document is prohibited. The registered licensee may print once only. Further copying, storage, distribution or use on network is prohibited. s are available at https://www.standards.org.su/home/public-comment-document-licence-agreement.

Table 3.5 — Test pressures — Regulator performance Gas type Minimum pressure Maximum pressure **kPa kPa** 1.13 5.0 Natural gas Propane 7.0 2.75 Butane 2.75 7.0 Universal LP Gas 2.75 7.0 TLP/TG 0.75 3.0

# Ignition and safety shut off systems

#### 3.6.1 General

If the appliance is fitted with gas consumption devices that are not sealed to prevent unauthorized alteration, then the requirements shall be met at maximum and minimum settings.

### 3.6.2 General requirements

### 3.6.2.1 Pilot light back

When tested in accordance with Test Method B.4, any aerated pilots during light back, shall either ignite the main burner promptly and without undue noise or cause a safety shut off valve to close.

### 3.6.2.2 Aerated pilot — Blocked air

When tested in accordance with Test Method B.4, any aerated pilots, when the primary air opening is closed, shall either ignite the main burner promptly and without undue noise or cause the safety shut off valve to close.

#### Ignition at reduced pilot rate 3.6.2.3

When tested in accordance with Test Method B.5, the pilot flame is turned down to the point where it just actuates the flame safeguard system. In this condition, the main burner, operating at any rate at which its control will permit, shall light safely and reliably from that pilot flame or operation of the main burner shall cause the safety shut off valve to close without ignition.

### 3.6.2.4 Means of ignition other than permanent pilot

For any means of ignition other than a permanent pilot, when the voltage supplied to the appliance is lowered to any point where the main gas valves will still actuate, the main burner, operating at any rate at which its control will permit, shall light safely and reliably from that means of ignition, or the ignition system shall shut down safely.

### 3.6.2.5 Holding time of thermoelectric flame safeguard

On carrying out the normal lighting procedure on a manually ignited atmospheric burner protected by a thermoelectric flame safeguard system, the flame safeguard shall hold open within 1 min of igniting the operating flame, when tested in accordance with Test Method B.6.

### 3.6.2.6 Flame tracking at ignition

When tested in accordance with Test Method B.7, flames shall track freely to all ports on a burner when the gas is ignited in accordance with the manufacturer's instructions and at any gas consumption in the operating range of the burner.

### 3.6.2.7 Cessation of ignition spark

If the means of ignition can interfere with the flame sensing system, then the means of ignition shall cease at the end of the start flame establishment period.

### 3.6.2.8 Commencement of ignition after purge

Where a pre-ignition purge period is included, the means of ignition shall commence immediately upon the completion of the purge period.

### 3.6.2.9 Proving of start flame

Gas shall not flow beyond the ignition safety time unless the start flame has been proven.

### 3.6.2.10 Self-check for safety shut off systems

Safety shut off systems shall incorporate a self-check of integral circuitry to verify that the system is not in the flame proved condition prior to start-up.

Manually operated "thermoelectric" types are exempt from this requirement.

### 3.6.2.11 Flame failure

Flame failure of a burner supervised by a flame safeguard shall result in safety shut down.

### 3.6.2.12 Main flame establishment period for burners with interrupted and intermittent pilot

Where an interrupted or intermittent pilot is used, the main flame establishment period shall not exceed 5 s.

3.6.2.13 Shut off time for safety shut off system

When tested in accordance with Test Method B.8, the combined time for the safety shut off system and its associated valves to shut off the gas supply in the event of flame failure at the point of supervision shall not exceed—

- (a) 90 s, where atmospheric type main burners are used and the total gas consumption is up to and including 50 MJ/h;
- (b) 60 s, where atmospheric type main burners are used and the total gas consumption exceeds 50 MJ/h up to and including 150 MJ/h;
- (c) 45 s, where atmospheric type main burners are used and the total gas consumption exceeds 150 MJ/h up to and including 500 MJ/h;
- (d) 3 s, for all other types of main burner, or up to 6 s provided the appliance meets delayed ignition tests up to twice the flame failure response period.

### 3.6.2.14 Interrupted pilot

Where an interrupted pilot is used the main flame shall be proved on its own at the end of the main flame establishment period.

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

### 3.6.3.1 Ignition gas flow rate

The appliance shall meet one of the following criteria:

- (a) The start gas rate shall not exceed 4 MJ/h and the maximum start flame establishment period shall not exceed 90 s.
- (b) The energy released during the ignition safety time shall not exceed 0.1 MJ.
- (c) When tested in accordance with Test Method B.9, the ignition shall remain satisfactory when delayed for up to twice the flame establishment period.

NOTE As this is a safety test under abnormal operation, explosive noise and flame roll-out may be acceptable provided—

- (a) there is no damage to the appliance;
- (b) the burner does not light back; and
- (c) there is no danger to persons or adjacent property.

Where the gas valves open and close multiple times during an ignition cycle, the calculation of energy released or flame establishment period shall take into account the total time that the valves may be open during the cycle.

### 3.6.3.2 Ignition cycles prior to lockout (no flame established)

The total number of ignition cycles prior to lockout, shall be limited to five.

Each ignition cycle after the first shall conform to either of the following, when tested in accordance with Test Method B.10:

- (a) Shut down shall be followed by a full start cycle including mechanical pre-ignition purge sufficient to ensure that the volume of the purging medium is at least five times the purge volume.
- (b) Shut down shall be followed by a delay of not less than 5 min before the next ignition attempt.

### 3.6.3.3 Reignition cycles after flame failure

After flame failure, the total number of reignition cycles prior to lockout shall be limited to five.

Flame safeguard systems shall respond to flame failure or loss of flame detector signal by initiating a reignition cycle within 2 s.

The first reignition cycle following loss of flame shall conform to one of the following, when tested in accordance with Test Method B.10:

- (a) The ignition source shall be applied immediately.
- (b) Safety shut down shall be followed by a full start cycle including mechanical pre-ignition purge sufficient to ensure that the volume of the purging medium is at least five times the purge volume.
- (c) Safety shut down shall be followed by a delay of not less than 5 min before a reignition attempt.

Subsequent reignition cycles shall be in accordance with Items (b) or (c).

### 3.6.3.4 Start flame proving period

Where the nominal gas consumption of the supervised burner exceeds the maximum gas flow rate permitted in Clause 3.6.3.1(a), then there shall be a start flame proving period of not less than the flame failure response time or 5 s, whichever is the greater.

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

### 3.6.4.1 Pre-ignition purge

A pre-purge period sufficient to ensure purging of at least five times the purge volume shall be provided immediately prior to any ignition attempt except where purging continues during the "burner off" part of the cycle.

### 3.6.4.2 Ignition gas flow rate

The appliance shall meet one of the following criteria;

http://localhost:5000/Pdf/e5001044-74 fc-492 c-a047-91e27 c5112 fb? section View=Single Page View & pdf User Name=Baining View and View

ng public comment. distribution or use on network is prohibited.

- (a) The start gas rate shall not exceed 4 MJ/h and the maximum start flame establishment period shall not exceed 90 s.
- (b) Throughout the flame establishment period, the gas concentration in relation to the proved air flow rate for that period shall not exceed 50 % of the lower explosive limit (LEL) for natural and town gases, or 25 % of the LEL for other fuels provided that—
  - (i) the gases during the start gas flame establishment period shall be thoroughly mixed with the air flow except in the immediate vicinity of the burner; and
  - (ii) the preheated air temperature shall not exceed 400 °C.
- (c) When tested in accordance with Test Method B.9, the ignition shall remain satisfactory when delayed for up to twice the flame establishment period.

Where the gas valves open and close multiple times during an ignition cycle, the calculation of energy released or flame establishment period shall take into account the total time that the valves are open during the cycle.

### 3.6.4.3 Ignition cycles prior to lockout (no flame established)

The total number of ignition cycles prior to lockout, shall be limited to five.

When tested in accordance with Test Method B.10, the following criteria shall apply to each ignition cycle after the first:

- (a) The main burner shut off valve shall remain closed during pre-ignition purge.
- (b) Each ignition cycle shall commence with the pre-ignition purge and the requirements of Clause 3.6.4.2 shall be met.
- (c) The duration of the pre-ignition purge period shall be sufficient to ensure that the volume of the purging medium is at least five times the purge volume.

### 3.6.4.4 Reignition cycles after flame failure

When tested in accordance with Test Method B.10, up to five reignition attempts after flame failure may be made prior to lockout provided—

- (a) the main burner shut off valve is closed within 3 s of loss of flame and remains closed during pre-ignition purge;
- (b) each reignition commences with a pre-ignition purge and the requirements of Clause 3.6.4.2 are met; and
- (c) the duration of the pre-ignition purge period is sufficient to ensure that the volume of the purging medium is at least five times the purge volume.

### 3.6.4.5 Start flame proving period

Where the nominal gas consumption of the supervised burner exceeds the maximum gas flow rate permitted in Clause 3.6.4.2(a), then there shall be a start flame proving period of not less than 5 s.

# 4 Tests under limiting conditions

## 4.1 General

Appliances shall conform to the requirements of this Section when supplied with the test gases and under the limiting conditions specified in each clause.

Where there is a possibility that user controls may affect ignition or combustion performance of the appliance, testing to confirm conformance to the requirements of this Section shall be carried out with the controls set to the least favourable control position.

Where the displacement of any coals, lava rock or any other media may interfere with the ignition or combustion of any burner, including pilots, the tests required in this Section shall be repeated with the media in the displaced position and in the case of granular media both in the displaced position and with the media partially removed.

# 4.2 Combustion performance for any independent burner —Overload

# 4.2.1 CO/CO<sub>2</sub> ratio limits for any independent burner — Overload

When tested in accordance with Test Method B.11, the CO/CO<sub>2</sub> ratio of the combustion products of any independent burner of an appliance operating at the test conditions specified in Table 4.2.1 shall not exceed 0.02 after 10 min.

Where the overload condition cannot be achieved as the appliance incorporates a non-adjustable regulator that delivers gas only in response to the operation of an electronic control and mechanical air supply, then Clause 4.2.2 is applicable.

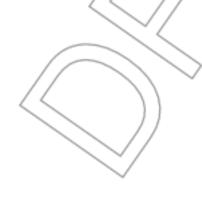


Table 4.2.1 — Limiting conditions — Overload					
Appliance gas type	Test gas	Gas consumption (% of nominal gas consumption)			
Natural gas	N	120			
Propane	X	113			
Butane	Υ	113			
Universal LP Gas	Υ	125			
TLP gas	Т	120			
Town gas	D	120			

The specified overload conditions shall be obtained by adjusting the inlet pressure with the appliance regulator at its nominal setting. If the overload condition cannot be obtained with a maximum inlet pressure of 3.0 kPa then the appliance regulator shall be rendered inoperative.

# 4.2.2 CO/CO<sub>2</sub> ratio and O<sub>2</sub> limits for any independent burner — Overload

An appliance which incorporates a non-adjustable regulator that delivers gas only in response to the operation of an electronic control and mechanical combustion-air supply, when tested in accordance with Test Method B.13, shall satisfy the following:

- (a) CO/CO<sub>2</sub> ratio of the combustion products shall not exceed 0.02 after 10 min at all limiting conditions specified in Table 4.2.2.
- (b)  $O_2$  levels in the combustion products shall not be lower than 3.5 % at all limiting conditions specified in Table 4.2.2, except for universal LP Gas the  $O_2$  level shall not be lower than 1.0 %

Table 4.2.2 — Limiting conditions — Overload					
Appliance gas type	Test gas	Appliance inlet pressure, kPa			
Natural gas	N	5.0			
Propane	X	7.0			
Butane	Υ	7.0			
Universal LP Gas	Υ	7.0			
TLP gas	Т	3.0			
Town gas	D	3.0			

# 4.3 CO/CO<sub>2</sub> ratio limits — Permanent pilots

When tested in accordance with Test Method B.12, the CO/CO<sub>2</sub> ratio of the combustion products of a permanent pilot of an appliance operating at the test conditions specified in Table 4.3 shall not exceed 0.02 after 10 min.

Table 4.3 — Limiting conditions — Pilot overload					
Appliance gas type	Test gas	Appliance inlet pressure, kPa			
Natural gas	N	3.0			
Propane	X	3.5			
Butane	Υ	3.5			
Universal LP Gas	Υ	3.5			
TLP gas	Т	2.5			
Town gas	D	2.5			

# 4.4 CO/CO<sub>2</sub> ratio limits for any independent surface combustion burner — Underload

When tested in accordance with Test Method B.14, the CO/CO<sub>2</sub> ratio of the combustion products of any independent surface combustion burner of an appliance operating at the test conditions specified in Table 4.4 shall not exceed 0.02 after 10 min.

-incence-agreement. Annulate or that it should be relied on for enumericular number of the shoument should rak on the final numbers werein

e registered licensee solely for review in providing public comment.

may print once only. Further copying, storage, distribution or use on network is prohibited.
ie/public-comment-document-licence-agreement.

Table 4.4 — Limiting conditions — Surface combustion burners						
Appliance gas type	Test gas	Appliance inlet pressure, kPa	Limiting condition			
Natural gas	N	0.75	The lowest operating			
Propane	X	2.00	setting to which the			
Butane	Υ	2.00	burner control can be set			
Universal LP Gas	Υ	2.00				
TLP gas	Т	0.50				
Town gas	D	0.50				

# 4.5 Flame characteristics at maximum and minimum limiting conditions

When tested in accordance with Test Method B.15, an appliance burner shall exhibit no flame abnormality, or safety shut down shall occur, at maximum and minimum limiting conditions specified in Table 4.5. Whether the appliance is hot or at ambient temperature.

An open flued appliance fitted with a draught diverter or similar device shall conform when-

- (a) the flue connection of the appliance is closed;
- (b) a downdraught having a velocity head of up to 7.5 Pa is applied to the flue connection for 1 min; and
- (c) an updraught having a velocity head of up to 7.5 Pa is applied to the flue connection for 1 min.

An open flued appliance not fitted with a draught diverter or similar device shall conform if a back-pressure of 140 Pa is applied to the flue connection and shall shut down safely if the flue is blocked.

Appliance gas type	Minimun	n condition	Maximun	n condition
	Test gas	Test point pressure, kPa	Test gas	Test point pressure, kPa
Natural gas	N	0.75 × Pt	N //	1.40 × Pt
Propane	X, Z	0.75 × Pt	X, Z	1.25 × Pt
Butane	Υ	0.75 × Pt	Y	1.25 × Pt
Universal LP Gas	X, Z	0.75 × Pt	Y, Z	1.25 × Pt
TLP gas	Т	0.75 × Pt	Т \//	1.25 × Pt
Town gas	D	0.75 × Pt	D	1.40 × Pt

# 4.6 Burner ignition at maximum and minimum limiting conditions

When the normal lighting procedure is followed and the appliance is tested in accordance with Test Method B.16, all burners shall ignite completely and quietly within 5 s for all gases, irrespective of types of ignition, at maximum and minimum limiting conditions, specified in Table 4.6 when the appliance is hot and at ambient temperature. The time shall be measured from the first flow of gas.

In the case of mains ignition systems a voltage equivalent to both 85 % and 110 % of the nominal supply voltage shall be applied to the appliance.

In the case of battery-operated ignition systems a voltage equivalent to 80 % and 100 % of the nominal voltage for each battery shall be applied to the supply contacts of the battery holder.

Five successive ignition tests shall be applied. Satisfactory ignition shall occur in all five tests.

Annlianaa gaa	Minin	Minimum condition		Maximum condition		
Appliance gas type	Test gas	Test point pressure, kPa	Test gas	Test point pressure, kPa		
Natural gas	N	0.75 × Pt	N	1.40 × Pt		
Propane	X	0.75 × Pt	Х	1.25 × Pt		
Butane	Υ	0.75 × Pt	Υ	1.25 × Pt		
Universal LP Gas	X	0.75 × Pt	Υ	1.25 × Pt		
TLP gas	Т	0.75 × Pt	Т	1.25 × Pt		
Town gas	D	0.75 × Pt	D	1.40 × Pt		

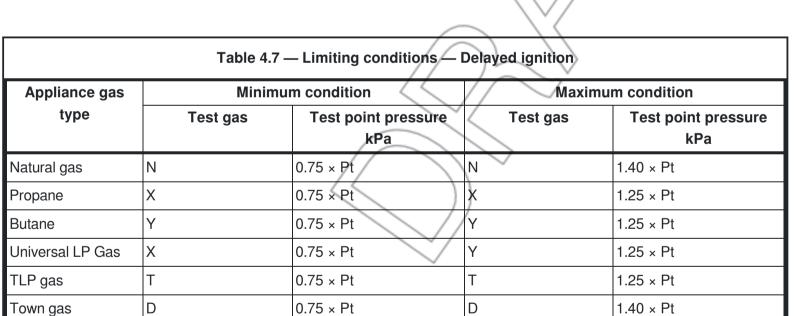
# 4.7 Delayed ignition at maximum and minimum limiting conditions

When tested in accordance with Test Method B.17, and the ignition of a manually ignited burner has been delayed for 5 s, the burner shall at both maximum and minimum limiting conditions, specified in Table 4.7, whether the appliance is hot or at ambient temperature—

- (a) ignite completely;
- (b) remain alight;
- (c) not light back;
- (d) not burn outside the appliance;
- (e) not extinguish any other burner at any setting; and
- (f) not damage the appliance.

NOTE As this is a safety test under abnormal operation, explosive noise and flame roll-out may be acceptable provided-

- (i) there is no damage to the appliance;
- (ii) the burner does not light back; and
- (iii) there is no danger to persons or adjacent property.



Pt = nominal test point pressure (kPa)

# 4.8 Unburnt gas release from burner system

When tested in accordance with Test Method B.18, unburnt gases shall not spill from any part of an aerated burner except for the burner ports.

The limit conditions specified in Table 4.8 shall be used.

Table 4.8 — Limiting conditions — Unburnt gases		
Appliance gas type	Test gas	Test point pressure kPa
Natural gas	N	0.75 × Pt
Propane	X	0.75 × Pt
Butane	Υ	0.75 × Pt
Universal LP Gas	X	0.75 × Pt
TLP gas	Т	0.75 × Pt
Town gas	D	0.75 × Pt
Pt = nominal test point pressure (kPa)		

# 4.9 Burner interference at ignition or during combustion

Where there is a possibility that the operation of any burner may interfere with the ignition or combustion of any other burner, including pilots, then the tests required in Section 4 shall be repeated under the most critical conditions with such interference conditions operating.

# 5 Performance specifications

# 5.1 Combustion air supply

### 5.1.1 Combustion air supply and equipment

Combustion air supply equipment shall be supplied with the appliance and shall be correctly sized and arranged to ensure an air flow adequate for all operating conditions unless a permanent marking is present to inform the user to not operate it at that setting.

### 5.1.2 Combustion air flow proving

Combustion air flow proving devices shall be interlocked to cause lockout or prevent an ignition attempt unless the devices are in the "no flow" condition prior to the start-up of their respective supply fans.

### 5.1.3 Prevention of combustion air back-flow

Where air at pressure is pre-mixed with the fuel gas, effective means shall ensure air does not pass back into the gas line.

# 5.1.4 Proving of means of mechanical air supply

Where combustion air is supplied mechanically, provision shall be made to prove that the means for supplying the air is operating.

# 5.1.5 Burner shut down following air supply failure

In the case of failure of the means for supplying the combustion air, the gas to the burner(s) requiring the air shall be shut off.

# 5.1.6 Obstruction of air inlets on appliances with fan assisted combustion systems

When tested in accordance with Test Method B.19, for appliances with fan assisted combustion systems the CO/CO<sub>2</sub> ratio of the combustion products shall not exceed 0.02 as the combustion air flow inlets into the appliance are progressively blocked until lockout occurs.

# 5.2 Flue operation

# 5.2.1 Spillage of combustion products — Flued appliances

When tested in accordance with Test Method B.20, there shall be no leakage or spillage of combustion products from a flued appliance other than the flue terminal, 5 min after ignition when the appliance is operated at nominal gas consumption.

# 5.2.2 Performance with downdraught, updraught and blocked flue

When tested in accordance with Test Method B.21, the CO/CO<sub>2</sub> ratio of the combustion products of a flued appliance shall not exceed 0.02.

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

# 5.3 Burner operation

# 5.3.1 Burner flames — Stability to draught and changing setting

When tested in accordance with Test Method B.22, a burner set at turndown and subjected to a 5 km/h draught, shall completely reignite when the draught is removed.

# 5.3.2 Burner stability when changing setting

When tested in accordance with Test Method B.22, burners which have a fixed turndown or thermostat bypass setting shall not light back or be extinguished when turned normally from full-on to turndown position, or from the turndown to full-on position.

### 5.3.3 Pilot flames — Stability to draught

When tested in accordance with Test Method B.23, a pilot which is set to the manufacturer's specifications, shall light satisfactorily and its flames shall not be extinguished when—

- (a) the appliance is subjected to a 5 km/h draught; and
- (b) the gas to the main burner is turned on and off in a normal manner.

# 5.3.4 Flame stability — Effect of door operation

When tested in accordance with Test Method B.24, and with the appliance installed in accordance with the manufacturer's instructions, the normal opening and closing of appliance doors and other doors associated with the installation shall not extinguish any burner.

### 5.4 Condensation

### 5.4.1 Control of condensate

Appliances shall be designed so that under normal operating conditions no condensation shall escape, other than through a condensate drain.

### 5.4.2 Condensate — interference with combustion

Condensation, where present, shall not interfere with combustion.

### 5.4.3 Blocked condensate drain

A blocked condensate drain shall not create an unsafe condition.

Appliances with fan assisted combustion systems shall be tested in accordance with Test Method B.25.

# 5.5 Temperature hazards

### 5.5.1 General

When the appliance is tested in accordance with Test Method B.26, the measured temperatures shall conform to Clauses 5.5.2 to 5.5.5.

Appliances intended for connection to the mains electricity supply shall conform when—

- (a) the electricity supply is connected; and
- (b) the electricity supply is disconnected.

# 5.5.2 Temperature limits — Floor, wall, bench and adjacent surfaces

When the appliance is installed in accordance with the manufacturer's instructions, the temperatures of floor, wall, overhead and bench surfaces shall not exceed 65 °C above ambient.

Where an appliance is marked "NOT TO BE INSTALLED ON A COMBUSTIBLE BASE", the floor temperature shall not exceed 80 °C above ambient.

# 5.5.3 Temperature limits — Surfaces intended to be handled

The temperature rise above ambient for surfaces intended to be handled, except those parts that are located in an area where they are obviously hot, shall not exceed—

- (a) 35 °C for metals;
- (b) 45 °C for porcelain or vitreous enamel; and
- (c) 60 °C for plastics and wood.

Where the surface is coated, the temperature rise limits of the supporting material shall apply for—

- (i) any plastic coating less than 0.3 mm; and
- (ii) any metal coating less than 0.1 mm.
- NOTE 1 Parts in this category include control knobs, control valve handles, push buttons, and door handles.
- NOTE 2 The temperatures for plastics refers to components that are substantially, if not entirely manufactured from plastics material.

# 5.5.4 Temperature limits — Surfaces likely to be accidentally touched

The temperature rise above ambient for all other surfaces, except those parts that are located in an area where they are obviously hot and not closer than 25 mm to a working surface, shall not exceed the following:

- (a) For mobile serving appliances—
  - (i) 60 °C for metals;
  - (ii) 65 °C for vitreous enamelled steel;

draft dccument made available by Standards Australia to the registered licensee solely for review in providing public commer ruse of the document is prohibited. The registered licensee may print once only. Further copying, storage, distribution or use of terms are available at https://www.standards.org.su/home/public-comment-document-licence-agreement.

- (iv) 100 °C for plastics.
- (b) For other appliances—
  - (i) 80 °C for metals;
  - (ii) 95 °C for vitreous enamelled steel, glass and similar surfaces;
  - (iii) 100 °C for plastics.

NOTE 1 Working surfaces include the following:

- (a) Pan supports.
- (b) Cooking surfaces.
- (c) Barbecue covers.
- (d) Lids
- (e) Grease channels.
- (f) Splash/grease shields.

NOTE 2 Surfaces likely to be accidentally touched include the following:

- (a) Control panel fascias.
- (b) Side panels.
- (c) Panels adjacent to door handles.
- (d) Parts of doors that are accessible when the door is closed.

# 5.5.5 Temperature limits — Appliance safety

### 5.5.5.1 Controls and safety devices

Corrected temperatures of controls and safety devices shall not exceed the maximum continuous service temperature specified by the component manufacturer.

### 5.5.5.2 Components containing non-metallic diaphragms

Temperatures of components containing non-metallic diaphragms shall not exceed 45 °C above ambient, unless specified for use at higher temperatures and so marked permanently.

### 5.5.5.3 Components containing zinc based alloys

Where failure of a zinc based alloy may affect the safe operation of the appliance, the temperature of the alloy shall not exceed 50 °C above ambient.

### 5.5.5.4 Main gas and pilot lines susceptible to sulphide attack

Main gas and pilot lines of materials susceptible to sulphide attack, e.g. copper, shall not exceed 50 °C above ambient, unless internally tinned.

### 5.5.5.5 Flexible hoses

Corrected temperatures of flexible hoses shall not exceed the maximum temperature for that class of hose.

### 5.5.5.6 Joints sealed with jointing materials

Corrected temperatures of joints sealed with jointing materials shall not exceed the maximum temperature recommended by the manufacturers of the materials, under the conditions of use.

### 5.5.5.7 Glass components

Corrected temperatures e of glass components shall not exceed the maximum temperature specified by the manufacturer of the glass.

### 5.5.5.8 Electrical wiring

Corrected temperatures of electrical wiring shall not exceed the maximum temperature specified for the wiring.

### 5.5.5.9 Wooden components

The temperature of wooden components shall not exceed 65 °C above ambient.

### 5.5.5.10 Grease collection tray or container

Where a grease collection tray or container is incorporated, temperatures shall not exceed 220 °C above ambient.

### 5.5.5.11 Gas cylinder temperature

For mobile serving appliances the temperature of the LP Gas cylinder shall not exceed 35 °C above ambient.

# 5.5.6 Temperature limits — Zero rear clearance installation

When the appliance is tested in accordance with Test Method B.27, the temperatures of adjacent surfaces shall not exceed 200 °C.

NOTE 1 Clearance channels or spacers may be fixed to the appliance to ensure conformance to this requirement. Where this is the case, any channels or spacers are a permanent component of the appliance.

distribution or use on network is prohibited.

# 5.6 Heat resistance

# 5.6.1 Normal operation

After operation in accordance with Test Method B.26 and assessment in accordance with Test Method B.27, the appliance shall function normally and satisfy the following:

- (a) There is no structural damage or permanent distortion.
- (b) Doors and other movable fittings function correctly.
- (c) Surface finishes of the appliance or its surroundings have not deteriorated permanently.
- (d) Operating components do not seize or fail.
- (e) Refractories have not deteriorated seriously. Incipient cracks shall not be regarded as failures, unless the appearance or the operation of the appliance is affected.
- (f) There is no distortion or deterioration of burners sufficient to affect normal operation.
- (g) There is no deterioration of belts, motors and fans,
- (h) Wiring insulation is not scorched or melted.
- (i) The set points of sensors, control thermostats, limit thermostats, safety temperature limiters and overheat cut-off devices are not affected.
- (j) Flue passages are not restricted by expansion or movement of any part of the appliance.
- (k) Where applicable, there is no leakage of cooking fluid or water out of the vessel, and/or through attached components.
- (I) Where applicable, closed tops have not distorted sufficiently to affect safe usage
- (m) The appliance continues to comply with Clause 3.3.

### 5.6.2 Resistance to temperatures — Burner lightback

For any burners in which a light back condition can be established, the materials of the burners shall not melt or distort when tested in accordance with Test Method B.28.

# 5.7 Response to electrical power variation or failure

When tested in accordance with Test Method B.29, appliances shall—

- (a) function normally at rated voltage +10 % and -15 %; and
- (b) operate without hazard or cease operation without hazard with—
  - (i) electricity supply disconnected; and
  - (ii) electricity supply voltage fluctuations outside the limits specified in Item (a).

# 5.8 Durability

# 5.8.1 Zinc based alloys

Where failure of a zinc based alloy may affect the safe operation of the appliance the alloy shall not swell, crumble or develop cracks, as demonstrated when tested in accordance with Test Method B.31.

NOTE The presence of white rust on the surface of castings is not regarded as a failure.

# 5.8.2 Permanent markings

Markings that are required to be permanent shall be durable as demonstrated by testing in accordance with Test Method B.32.

# 6 Specific requirements — Boiling tables — Open and closed top, Chinese cooking tables

# 6.1 Temperature hazards and heat resistance

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

# 6.2 Strength — Applied load

# 6.2.1 Appliance

When tested in accordance with Test Method B.33, the appliance shall support without breakage or apparent damage, for a period of 15 min, a load of 140 kg applied without impact evenly distributed across the centre of the two weakest members of the top of the appliance.

# 6.2.2 Pan supports

When tested in accordance with Test Method B.33, pan supports shall support, without breakage or apparent damage, for a period of 15 min a load of 68 kg applied evenly and without impact over an area 225 mm in diameter at the centre of the grid in the case of open boiling tables, and over an area of 400 mm in diameter at the centre of the top in case of closed top burners.

# Effect of spillover on ignition system

When tested in accordance with Test Method B.34, the operation of ignition systems shall not be adversely affected by accidental spill or

A spillover shall—

- (a) not extinguish any pilot; and
- (b) not hinder the reignition of burners.

# Specific requirements — Salamanders, grillers and toasters

# Temperature hazards and heat resistance

The appliance shall conform to Clause 5.5 when tested in accordance with Test Method B.26.

# Provision of grill grids and drip trays

Grill grids and drip trays shall—

- (a) be provided with every salamander, griller and toaster;
- (b) be stable and horizontal when in position;
- (c) be completely removable, but not able to be removed accidentally; and
- (d) in conjunction with the tray have a minimum clearance of 50 mm between the grid and the lowest projection above it.

# Shelves, racks and grids strength — Applied load

When tested in accordance with Test Method B.35, each shelf, rack and grid shall support 50 kg/m<sup>2</sup> of its area with the load distributed evenly over a central strip two thirds of the width and the full depth of the shelf, both when it is in position and when it is withdrawn to the stop position.

# Specific requirements — Solid grill plates and griddles — Temperature hazards

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

# Specific requirements — Barbecues —Temperature hazards and heat resistance

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

# Specific requirements — Ovens

# Temperature hazards and heat resistance

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

## 10.2 Provision of thermostat

Oven burners shall be thermostatically controlled.

# Design of ovens

# 10.3.1 Oven doors — Open position

Oven doors shall be so constructed that when fully open they will remain in that position.

### Oven shelves

Oven shelves shall be—

- (a) stable and horizontal when in position;
- (b) prevented by their supports from tilting to an angle greater than 10° in any position up to the stop position; and
- (c) completely removable but not able to be removed accidentally.

# 10.3.3 Impingement of flame on shelves or cooking utensils

Ovens shall be designed so as to prevent the accidental placement of oven shelves or cooking utensils in a position where they may be impinged upon or directly heated by a burner flame.

# 10.4 Strength — Applied load

# 10.4.1 Appliance

When tested in accordance with Test Method B.36, oven units shall support, without breakage or damage for a period of 15 min, a load of 180 kg uniformly applied to the top.

### 10.4.2 Oven shelves

When tested in accordance with Test Method B.37, each oven shelf shall support 100 kg/m<sup>2</sup> of its area with the load distributed evenly over a central strip two thirds of the width and the full depth of the shelf, both when it is in position and when it is half withdrawn.

### 10.4.3 Drop down doors

When tested in accordance with Test Method B.38, drop down doors on ovens, when open, shall be capable of sustaining without breakage or permanent deformation a loading equivalent to a mass of 90 kg evenly distributed over the inner surface for a period of 15 min. When installed according to manufacturer's instructions the appliance shall not tilt under these conditions.

### 10.4.4 Side hinged doors

When tested in accordance with Test Method B.39, side hinged doors on ovens, when open, shall be capable of sustaining without breakage or permanent deformation a loading equivalent to a mass of 25 kg applied within 25 mm of the outer top edge of the door for a period of 15 min. When installed according to manufacturer's instructions the appliance shall not tilt under these conditions.

# 11 Specific requirements — Boiling water units

# 11.1 Temperature hazards and heat resistance

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

# 11.2 Integral cold water feed tanks

Integral cold water feed tanks and fittings shall conform to the following:

- (a) The overflow from a cold water feed tank shall be so located that with the water in the feed tank adjusted to the correct water level there shall be no discharge from the overflow during the initial heating of the appliance from cold.
- (b) The cold water tank shall be supplied with an adequate and securely fastened dust and vermin-proof cover.

### 11.3 Drain valves

Drain valves shall be-

- (a) fitted to every boiling water unit;
- (b) of smooth bore and capable of being easily cleaned; and
- (c) so designed that it is impossible to withdraw the valve stem completely in the normal operation of the valve.

# 11.4 Provision for the collection of corrosion products

Adequate provision shall be made for the collection, removal and disposal of flue corrosion products.

# 12 Specific requirements — Atmospheric steamers

# 12.1 Temperature hazards and heat resistance

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

# 12.2 Steam generator

Where the steam generator cannot be easily removed, it shall be provided with a drain valve of at least 13 mm bore, capable of completely draining the pan. The outlet of the valve shall be so positioned that there is room under it for a container of adequate capacity.

# 12.3 Appliance strength — Applied load

When tested in accordance with Test Method B.40, atmospheric steamers shall support, without breakage or apparent damage for a period of 15 min, a load of 50 kg.

# 13 Specific requirements — Stockpots and brat pans

# 13.1 Temperature hazards and heat resistance

stribution or use on network is prohibited. Jould be relied on for any particular purpose. Any user of the document should re

#### 3.1.2 Temperature of surfaces in contact with cooking oil

When tested in accordance with Test Method B.41, the highest temperature of any surface likely to come into contact with cooking oil shall not exceed the maximum temperature of the cooking oil by more than 75 °C.

#### 13.2 Pressure vessels

Stockpots operating above atmospheric pressure or under vacuum shall conform to AS 4343.

#### 13.3 Provision of tilt cut-off device

A tilting brat pan shall be fitted with a tilt cut-off device. This device shall shut off the gas supply before the angle of tilt exceeds 10° and only allow the gas to be re-established when the pan is within 1° of the horizontal.

#### 13.4 Provision of low water level overheat device

A jacketed stockpot shall be fitted with a device to shut off the gas to prevent over-heating due to low water level. When tested in accordance with Test Method B.42, this device shall operate satisfactorily before damage to the appliance occurs.

#### 13.5 Drain valves

Drain valves when fitted shall—

- (a) be of smooth bore and capable of being easily cleaned;
- (b) be provided with a strainer that is firmly secured when in position and capable of easy removal and replacement; and
- (c) have a bore not less than 25 mm diameter.

#### 13.6 Construction of cooking vessel

The cooking vessel and its surround shall be constructed without seams that might absorb, collect or allow the passage of grease into the combustion chamber or on to any part where it will interfere with the correct operation of the burner.

#### 13.7 Provision to empty completely

Provision shall be made for completely emptying a brat pan in a safe manner.

#### 13.8 Means to keep lid in raised position

A hinged lid of a brat pan shall be so constructed that when completely opened, it will remain in the raised position.

## 13.9 Strength and stability

#### 13.9.1 Stockpots — Applied load

When tested in accordance with Test Method B.43, stockpots shall support without breakage or apparent damage, for a period of 15 min, a load of 25 % of the rated capacity of the stockpot applied centrally without impact.

#### 13.9.2 Brat pans — Applied force

A brat pan shall not overturn when subjected to a horizontal force of 340 N applied to its top edge in the most unfavourable position. A tilting brat pan with a pan base area greater than 0.25 m<sup>2</sup> shall remain stable in any position.

# 14 Specific requirements — Fryers

#### 14.1 Temperature hazards and heat resistance

#### 14.1.1 General

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

#### 14.1.2 Temperature of surfaces in contact with cooking oil

When tested in accordance with Test Method B.41, the highest temperature of any fryer surface likely to come into contact with cooking oil shall not exceed the maximum temperature of the cooking oil by more than 75 °C.

#### 14.1.3 Flue gas temperature

Flue gas temperature measured directly at the flueway terminal of any fryer shall not exceed 575 °C above ambient.

# 14.2 Design of fryers

# 14.2.1 Construction of cooking vessel and surround

The cooking vessel and its surround shall be-

draft document made available by Standards Australia to the registered licensee solely for review in pruse of the document is prohibited. The registered licensee may print once only. Further copying, sto ce tems are available at https://www.standards.org.au/home/public-comment-document-licence-agn

for review in providing public comment. er copying, storage, distribution or use on network is prohibited. ant-licence-agreement. ant complete or that it should be relied on for any particular purpose. Any user of the document should rely on the final p

- (a) constructed such that it does not absorb, collect or allow the passage of grease into the combustion chamber or on to any part where it will interfere with the correct operation of the burner; and
- (b) so designed that the cooking oil will drain back into the cooking vessel or to a vessel or vessels provided.

#### 14.2.2 Provision of oil drain valve

Each fixed cooking vessel of a fryer shall be provided with an oil drain valve, with a minimum internal diameter of 25 mm.

#### 14.2.3 Design of drain valve

Drain valves of fryers shall—

- (a) be of smooth bore and capable of being easily cleaned; and
- (b) where not concealed, shall be protected against inadvertent operation.

#### 14.2.4 Provision of shut off for each cooking vessel

The gas control system of a fryer shall incorporate a means to shut off the gas to each individual cooking vessel which shall be accessible during normal operation.

#### 14.2.5 Provision of automatic temperature control

Each pan of a fryer shall be provided with an automatic temperature control system.

#### 14.2.6 Maximum temperature

The thermostat on a fryer shall have a maximum setting which does not exceed 210 °C.

#### 14.2.7 Automatic filtration systems

Fryers equipped with an automatic filtration system, shall be equipped with means to detect insufficient cooking oil in the pan and shut off the gas to the burner before the development of an unsafe condition.

#### 14.2.8 Provision of over-temperature cut-out device

Each cooking vessel of a fryer shall be equipped with an over-temperature cut-out protection device which shall operate independently and override all other control devices.

#### 14.2.9 Pressure relief device

Fryers operating above atmospheric pressure shall be equipped with a pressure relief device.

#### 14.2.10 Copper and copper bearing alloys

Copper and copper bearing alloys shall not be exposed to hot cooking oil.

# 14.3 Performance of fryers

#### 14.3.1 Temperature control

When tested in accordance with Test Method B.44, thermostats on fryers shall control the cooking oil temperature to within 6 °C of the temperature setting.

#### 14.3.2 Over-temperature cut-out

When tested in accordance with Test Method B.45, the over-temperature device shall shut off the gas when the cooking oil temperature in the fryer is greater than the maximum thermostat setting +20 °C and less than 246 °C.

## 14.4 Markings

#### 14.4.1 Marking of normal working liquid level

The normal working liquid level shall be permanently marked in the cooking vessel.

## 14.4.2 Warning regarding correct level of cooking oil

The following marking shall be located on the outside of the appliance in a position where it can be easily read by the operator when the appliance is being used in the installed position.

CAUTION NEVER ALLOW BURNER TO OPERATE WITH THE FRYER EMPTY. LIGHT ONLY WITH LIQUID AT OPERATING OIL LEVEL MARK.

#### 14.4.3 Marking of drain valve

The drain valve of a fryer shall be suitably marked with the word "Drain".

# 14.5 Appliance strength — Applied load

When tested in accordance with Test Method B.46, fryers shall support without breakage or apparent damage, for a period of 15 min, a load of 50 kg.

sgistered licensee solely for review in providing public comment.

y print once only. Further copying, storage, distribution or use on network is prohibited.

ublic-comment-document-licence-sgreement.

#### 15.1 Temperature hazards and heat resistance

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

#### 15.2 Design of food warmers and bains marie

#### 15.2.1 Nominal working temperature

The nominal working temperature for all food warmers shall be at least 80 °C.

#### 15.2.2 Heating performance

#### 15.2.2.1 Time to reach temperature — Wet bains marie

When tested in accordance with Test Method B.47, the time required to heat the water in the bain marie well from 15 °C to 80 °C shall not exceed 60 min.

#### 15.2.2.2 Temperature maintenance — Wet bains marie

When tested in accordance with Test Method B.47, a fitted container type bain marie, filled with water to the manufacturer's recommended level in the case of a wet type, shall be capable of maintaining water in open containers at a temperature exceeding 80 °C.

#### 15.2.2.3 Temperature control — Food warmers and bains marie

When tested in accordance with Test Method B.48, thermostats fitted to food warmers and to bains marie shall be capable of controlling the average temperature to within 5 °C of the temperature setting.

#### 15.2.2.4 Temperature maintenance — Dry bain marie

When tested in accordance with Test Method B.49, it shall be possible for food in the containers of a dry heat bain marie to be maintained at a temperature not less than 70 °C without overheating or scorching.

#### 15.2.2.5 Time to reach temperature — Hot-press

When tested in accordance with Test Method B.50, the temperature of a hot-press shall rise at least 60 °C in 45 min.

#### 15.2.2.6 Temperature maintenance and variation — Food warmer

When tested in accordance with Test Method B.51, the temperature of a food warmer at any test point shall not be less than 70  $^{\circ}$ C and shall not differ by more than  $\pm$  10  $^{\circ}$ C from the mean within the food warmer. If the top is heated, the temperature at any test point on the top shall not differ by more than  $\pm$  10  $^{\circ}$ C from the mean.

#### 15.2.3 Resistance to boiling dry — Wet bain marie

When tested in accordance with Test Method B.47, a wet bain marie, filled to the level recommended by the manufacturer shall not have boiled dry 2 h after lighting, with the gas valve full-on, and the thermostat, if variable, turned to its maximum setting.

# 15.3 Strength — Applied load

#### 15.3.1 Appliance

When tested in accordance with Test Method B.52, food warmers and bains marie shall support without breakage, displacement or apparent damage, for a period of 15 min, a load of 100 kg/m<sup>2</sup> applied evenly over each shelf and over the top if it is flat. Water compartments and containers of wet food warmers and bains marie shall be filled with water.

#### 15.3.2 Food containers

When tested in accordance with Test Method B.52, food warmers and bains marie shall support without breakage or apparent damage a load of 34 kg placed evenly and in turn on each  $1.0 \text{ m}^2$  of the top supporting the food containers.

# 16 Specific requirements — Pasta/noodle cookers and rethermalizers

# 16.1 Temperature hazards and heat resistance

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

#### 16.2 Drain valve

Each vessel shall be equipped with a drain valve that where not concealed shall be protected against inadvertent operation.

Drain valves shall be—

- (a) of smooth bore and capable of being easily cleaned; and
- (b) durably marked with the word "Drain".

Indexeds Australia to the registered licensee solely for review in providing public comment.

The registered licensee may print once only. Further copying, storage, distribution or use on network is prohibited for a subprovided by the comment of the property of the prop

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

#### 16.3.1 Marking of normal water level

The normal water level shall be permanently marked in the cooking vessel.

#### 16.3.2 Caution regarding water level

The following notice shall be located on the outside of the appliance in a position where it can be easily read by the operator when the appliance is being used in the installed position.

CAUTION NEVER ALLOW BURNER TO OPERATE WITH THE APPLIANCE EMPTY. LIGHT ONLY WITH LIQUID AT OPERATING WATER LEVEL MARK.

# 16.4 Appliance strength — Applied load

When tested in accordance with Test Method B.46, pasta cookers and rethermalizers shall support without breakage or apparent damage, for a period of 15 min, a load of 50 kg.

# 17 Specific requirements — High temperature cookers

#### 17.1 Temperature hazards and heat resistance

#### 17.1.1 General

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

NOTE For appliances with a top access lid, the lid is considered to be a working surface, and any handle attached is required to conform to Clause 5.5.

#### 17.1.2 Maximum temperature

Where a thermostat is fitted, the maximum setting shall not exceed 400 °C.

#### 17.2 Design for use

#### 17.2.1 Provision of over-temperature cut-out device

The appliance shall be equipped with an over-temperature cut-out device which shall operate independently and override all other control devices.

#### 17.2.2 Design of over-temperature cut-out device

The over-temperature cut-out device shall—

- (a) be of the fail safe type; and
- (b) cause a non-volatile lockout.

#### 17.3 Drain valves

Where drain valves are used, they shall—

- (a) be of smooth bore and capable of being easily cleaned; and
- (b) where not concealed, be protected against inadvertent operation.

# 17.4 Markings

The manufacturer's recommended maximum load in kg shall be permanently marked on the appliance.

#### 17.5 Strength and stability

#### 17.5.1 Stability

When tested in accordance with Test Method B.53, the appliance shall not tip over on a level surface when loaded in any arrangement within the manufacturer's maximum rated load.

#### 17.5.2 Appliance strength — Applied load

When tested in accordance with Test Method B.53, the appliance shall support the manufacturer's maximum rated load +20 % distributed evenly over the hanging rack or support without breakage or damage for a period of 15 min.

#### 17.5.3 Drop down loading doors

When tested in accordance with Test Method B.38, any drop down loading doors while in the open position, shall be capable of sustaining without breakage or permanent deformation a loading equivalent to a mass of 90 kg evenly distributed over the inner surface for a period of 15 min. When installed according to manufacturer's instructions the appliance shall not tilt under these conditions.

#### 17.5.4 Side hinged loading doors

When tested in accordance with Test Method B.39, any side hinged loading doors while in the open position, shall be capable of sustaining without breakage or permanent deformation a loading equivalent to a mass of 25 kg applied within 25 mm of the outer top edge of the door

tmade available by Standards Australia to the registered lice cument is prohibited. The registered licensee may print once vailable at https://www.standards.org.au/home/public-comme

for a period of 15 min. When installed according to manufacturer's instructions the appliance shall not tilt under these conditions.

#### 17.5.5 Separation of sections

Where the appliance is made up of multiple joined sections, each section shall be secured to the base of the appliance to ensure any section cannot unintentionally separate.

# Specific requirements — Mobile serving appliances

# Temperature hazards and heat resistance

The appliance shall conform to Clauses 5.5 and 5.6 when tested in accordance with Test Method B.26.

NOTE For specific temperature limits for surfaces likely to be accidentally touched see Clause 5.5.4.

#### Design requirements

#### Maximum gas consumption

The appliance shall have a nominal gas consumption not exceeding 12 MJ/h.

#### Provision of hose and regulator assembly

A hose conforming to AS/NZS 1869 and an LP Gas regulator conforming to AS 4621 shall be fitted to the appliance. Hose length is to be as short as practicable.

#### Design of over-temperature protection device

If an over-temperature protection device is incorporated, the device shall—

- (a) be of the fail safe type; and
- (b) cause a non-volatile lockout.

#### Thermostat maximum temperature

Where a thermostat is fitted, the maximum setting shall not exceed 110 °C.

#### 18.2.5 Tip-over switch

A tip-over switch shall be incorporated which shuts off the burner if the appliance is tilted at a 45° angle.

#### Water vessel 18.2.6

Where a water vessel is present, it shall be secured to the appliance to prevent inadvertent dislodgement or movement.

#### 18.2.7 Drain valve

Where drain valves are used, they shall—

- (a) be of smooth bore and capable of being easily cleaned; and
- (b) where not concealed, shall be protected against inadvertent operation.

#### Mobility requirements 18.2.8

All appliances shall conform to the following mobility requirements:

- (a) Castors used for the mobility of the appliance shall have a minimum diameter of 95 mm.
- (b) Appliances shall be equipped with evenly distributed automatic braking, which shall maintain the position of the appliance when not being intentionally moved.
- (c) The braking system shall require a manual operation to disengage the brake.

#### 18.2.9 Provision of manual isolation valve

All gas to the appliance shall pass through a Type 1 manual isolation valve in accordance with AS 4617, that shall be accessible from the exterior of the appliance.

#### Gas cylinder and cylinder compartments

#### 18.2.10.1 Cylinder restraint

The gas cylinder shall be securely restrained within the gas cylinder compartment.

#### 18.2.10.2 Gas cylinder compartment

The appliance shall include a cylinder compartment that shall accommodate only one gas cylinder. The gas cylinder shall be in the upright position and have a maximum size of 11 L water capacity.

NOTE A cylinder of 11 L water capacity will hold approximately 4.5 kg of propane.

#### 18.2.10.3 Ventilation of cylinder compartments

The cylinder compartment shall have permanent openings ventilating directly to the outside of the appliance and consisting of one of the following:

- (a) Perforations, uniformly distributed over the height of the enclosure and with a total free area of not less than 25 % of the sidewall area.
- (b) Separate openings at high and low level, such that—
  - (i) the total free area at high level is not less than 20 000 mm<sup>2</sup> and is within 125 mm of the top of the cylinder compartment; and
  - (ii) the total free area at low level is not less than 20 000 mm<sup>2</sup>, and—
    - (A) at least 25 % of the required area is within 15 mm of the base of the cylinder compartment;
    - (B) the total required area is within 125 mm of the base of the cylinder compartment; and
    - (C) the openings cannot be obstructed by the cylinder.

#### 18.2.10.4 Separation of cylinder compartment

The cylinder compartment shall be permanently separated from any ignition source within the appliance combustion area to prevent the ignition of escaping gas within the cylinder compartment. The cylinder compartment shall incorporate an external door with means to secure the door in the closed position.

#### 18.2.10.5 Risk of ignition

A cylinder compartment shall not contain any potential sources of ignition.

#### 18.2.10.6 Accessibility of cylinder valve

The cylinder valve shall be readily accessible for manual operation.

A door in the cylinder compartment to gain access to the cylinder valve is acceptable provided it is non-locking and can be opened or removed without the use of tools.

#### 18.2.10.7 Protection from spillover

Means shall be provided to prevent spillover from a vessel on any burner from directly contacting the cylinder or regulator where these are located underneath a burner.

#### 18.2.10.8 Testing of cylinder connection

The appliance shall be designed such that the cylinder connection can be tested for soundness when the cylinder is inside the enclosure.

## 18.3 Performance requirements

#### 18.3.1 CO/CO<sub>2</sub> ratio limits

When tested in accordance with Test Method B.54, the CO/CO<sub>2</sub> ratio of the combustion products shall not exceed 0.01, 15 min after ignition.

#### 18.3.2 Containment of hot liquids

When the appliance is moving at a speed of 5 km/h and stopped suddenly in accordance with Test Method B.55, no liquids shall spill beyond the periphery of the appliance.

# 18.4 Strength and stability

#### 18.4.1 Appliance

When tested in accordance with Test Method B.56, the appliance shall support the load specified in Table 18.4.1, distributed evenly and without damage.

Table 18.4.1 — Body loading		
Weight of appliance kg	Load applied kg	
Up to 10	10	
10 to 35	25	
Over 35	50	

#### 18.4.2 Stability

When tested in accordance with Test Method B.57, an appliance, shall not tip over when it is inclined up to an angle of 15° in any direction. An appliance shall conform whether the cylinder is in place, full, empty, or absent, as well the water bath full and empty. An appliance with features such as doors, lids, or hoods shall conform whether open or closed.

## 18.5 Markings

The following permanent markings are required in addition to Clause 2.8, and shall be clear and readily accessible:

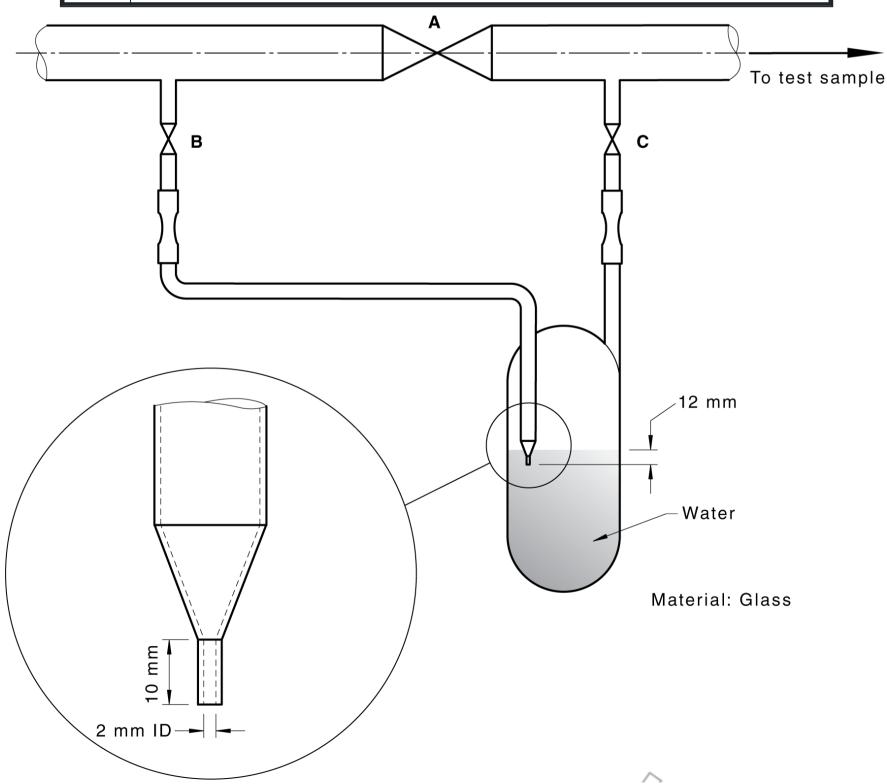
- (a) Isolation valve identification marking adjacent to the isolation valve.
- (b) The ignition procedure for all burners.
- (c) The shut down procedure.
- (d) Instructions for the change of cylinders.
- (e) Instructions to close the cylinder valve after use.
- (f) The warning: "USE ONLY IN A WELL VENTILATED AREA".
- (g) The warning not to use oil in the water vessel.
- (h) The warning: "FOR CYLINDER EXCHANGE, DISCONNECT THE CYLINDER ONLY. DO NOT DISCONNECT HOSE FROM THE APPLIANCE".

# Appendix A

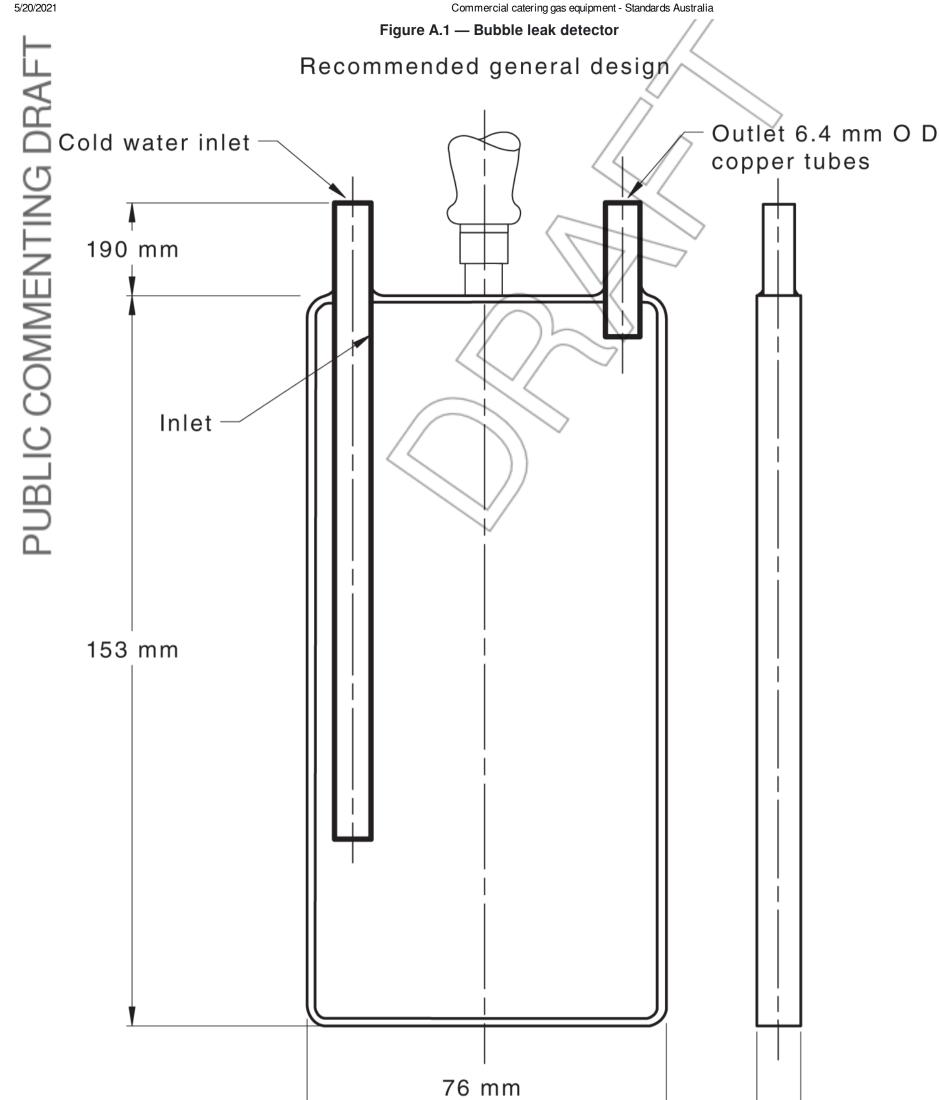
(normative)

Figures A.1 to A.9

Figure	Description
A.1	Bubble leak detector
A.2	Dew plate
A.3	Flue gas sampling hood — Rectangular
A.4	Flue gas sampling hood — Circular
A.5	Hood for boiling burners for vessels larger than 200 mm diameter
A.6	Flue gas sampling hood and vessel for open burner combustion tests
A.7	Flue gas sampling hood probe
A.8	Standard test vessel specifications
A.9	Test apparatus ignition at reduced pilot test



not not the final middle has been be

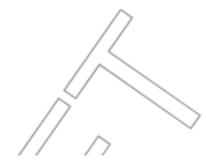


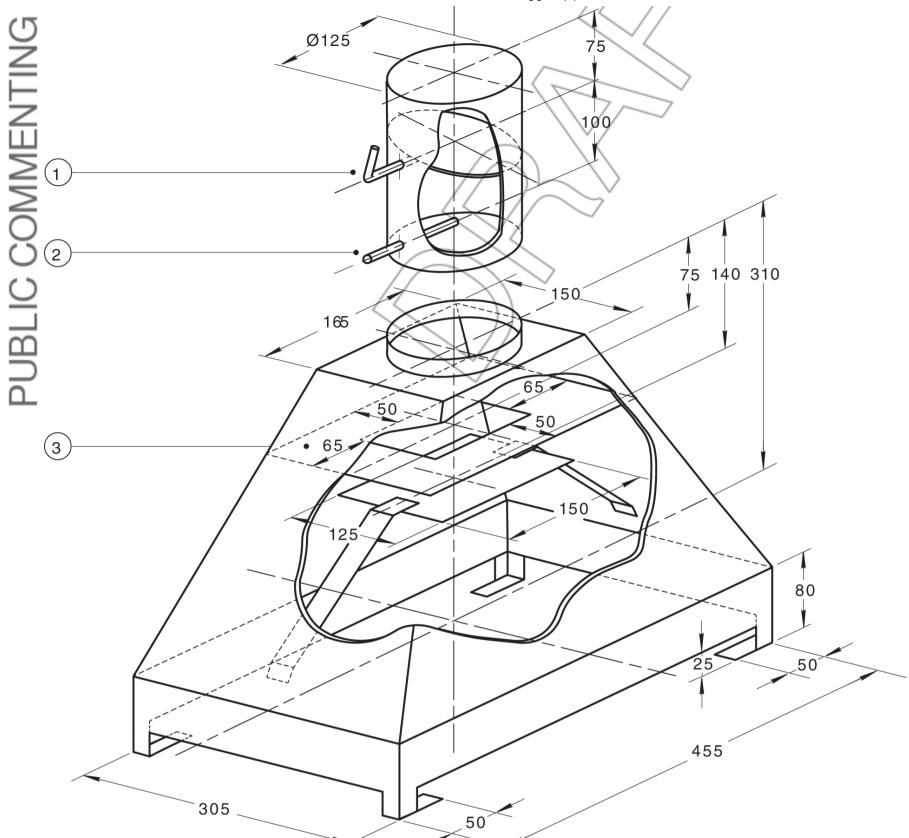
Material: 1.20 mm chrome plated copper or brass.

Figure A.2 — Dew plate

Dimensions in millimetres

9.5 mm



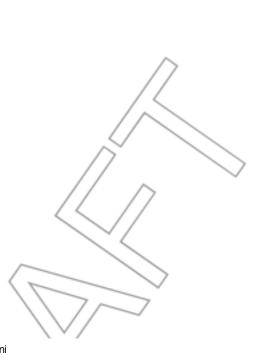


- (1) Regulator with friction spring
- 2 8 mm diameter sampling probe (aluminium or stainless steel)
- (3) Annular baffle

Figure A.3 — Flue gas sampling hood — Rectangular

Dimensions in millimetres

Material: 0.58 mm aluminium or stainless steel



articular purpose. Any user of the document should rely on the final published version.

draft document made available by Standards Australia to the registered licensee solely for review in providing public comment.

r use of the document is prohibited. The registered licensee may print once only. Further copying, storage, distribution or use on network is prohibited.

ce terms are available at https://www.standards.org.au/home/public-comment-licence-agreement.

Is Australia Limited does not warrant or represent that the draft document is accurate or complete or that it should be relied on for any particular purpose. Any

k is prohibited.

Dimensions in millimetres

purpose. Any user of the document should rely on the final published version. ublic comment. bution or use on network is prohibited. ed b

draft document made available by Standards Australia to the registered licensee solely for review in providing public comment.

r use of the document is prohibited. The registered licensee may print once only. Further copying, storage, distribution or use on networ ce terms are available at https://www.standards.org.au/home/public-comment-locument-licence-agreement.

Is Australia Limited does not warrant or represent that the draft document is accurate or complete or that it should be relied on for any p

purpose. Any user of the document should rely on the final published version. or review in providing public comment.

copying, storage, distribution or use on network is prohibited Flicence-agreement.

complete or that it should be relied on for any particular purpor

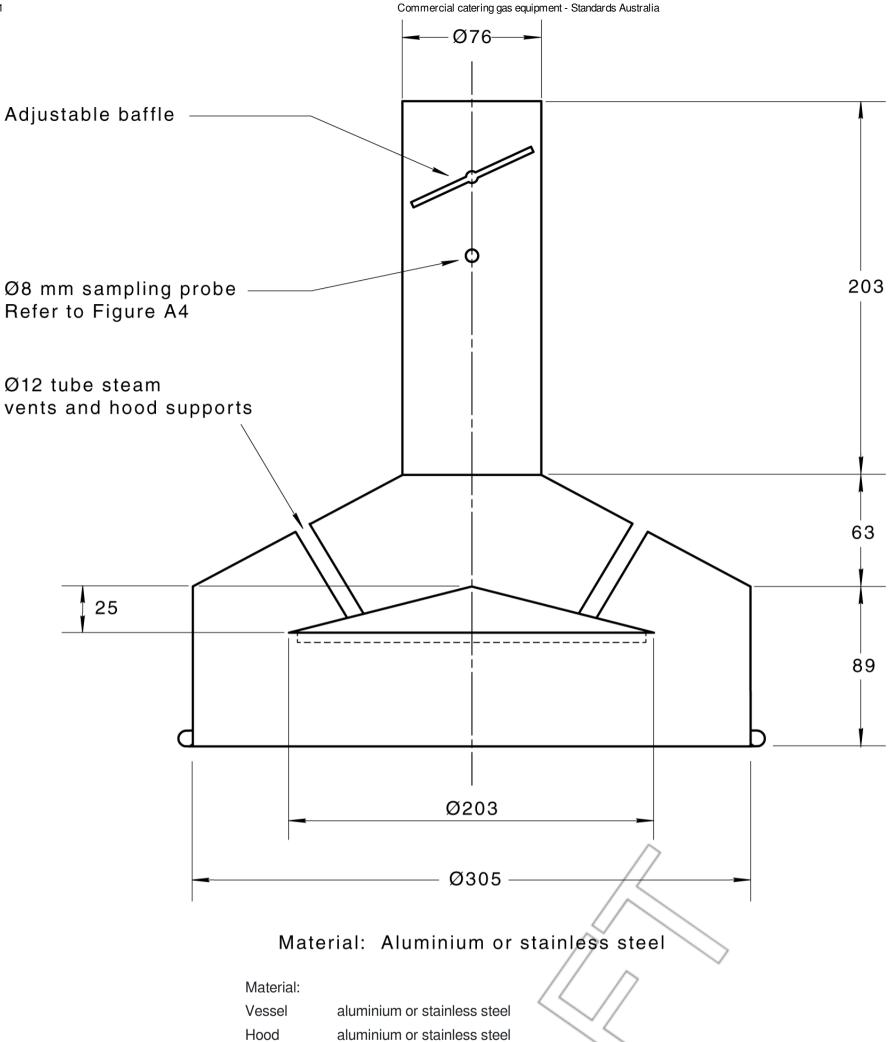


Figure A.6 — Flue gas sampling hood and vessel for open burner combustion tests

any particular purpose. Any user of the document shoule rely on the final published version. on network is prohibited. ģ istered licensee solely for review in providing public comment print once only. Further copying, storage, distribution or use colic-comment-document-licence-agreement.

**END VIEW** 

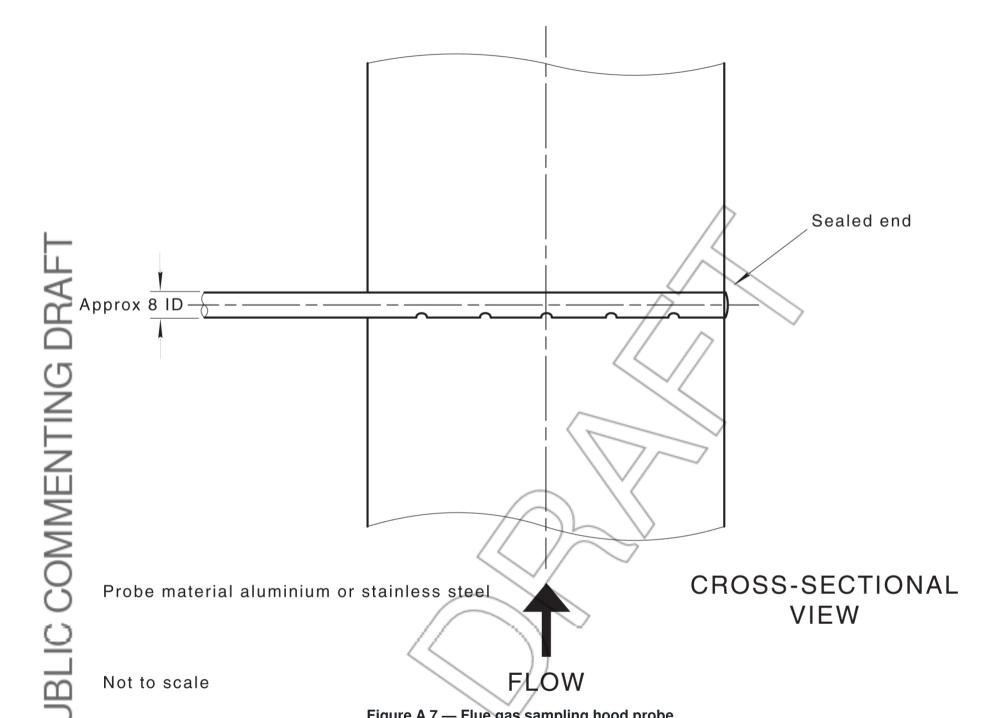


Figure A.7 — Flue gas sampling hood probe

Table A.8 — Standard test vessel specifications					
Burner	Vessel				
Gas consumption	Diameter	Height	Water depth		
MJ/h	mm	mm	mm		
0 to 12	195	140	85 ± 10		
Over 12 and up to 15	230	155	100 ± 10		
Over 15 and up to 20	315	190	125 ± 10		
Over 20	395	440	325 ± 10		

nat it should be relied on for any particular purpose. Any user of the document should rely on the final published version.

Figure A.9 — Test apparatus ignition at reduced pilot test

# Appendix B

(normative)

# Test methods

# Gas leakage test (MOT 3.3.1)

#### B.1.1 Scope

This method sets out the procedure to assess the gas leakage of an appliance.

#### B.1.2 **Principle**

The appliance is connected to a supply of air at the appropriate pressure and any leakage is observed and measured. The tests are carried out at ambient temperature and a pressure of 1.5 times rated working pressure or 14 kPa, whichever is the greater upstream of the appliance.

#### B.1.3 **Apparatus**

The following apparatus shall be used:

- (a) Leak detector capable of measuring 1 mL/min with an accuracy of ± 0.3 mL/min, e.g. bubble leak detector (see Figure A.1), electronic leak detector.
- (b) Pressure gauge with an appropriate range and an accuracy of  $\pm$  5 %.
- (c) Suitable timing device.

#### B.1.4 Materials

The following materials shall be used:

- (a) A supply of air at the appropriate pressure.
- (b) Suitable materials to seal injectors.

#### Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Check the leak detector and its fittings for gas tightness. If using a bubble leak detector, adjust to the correct water level.

#### **Procedure** B.1.6

The procedure shall be as follows:

- (a) Seal all injectors, including pilot injectors.
- (b) Connect the leak detector to the inlet gas connection of the appliance.
- (c) Connect a pressure gauge to the pressure test point.
- (d) Close all control valves on the appliance and supply air at the required pressure to the inlet of the leak detector.
- (e) Open the pressure regulator and any safety shut off valve by heating the actuating element or by other means, to simulate the appliance being in operation.
- (f) Allow approximately 1 min for pressures to stabilize.
- (g) Check and record the test point pressure.
- (h) If using a bubble leak detector, ensure valve "A" is closed and valves "B" and "C" are opened so that the air is directed through the dip tube (see Figure A.1).
- (i) Measure the leakage rate.

evailable by Standards Australia to the registered license is prohibited. The registered licensee may print once only at https://www.standards.org.au/home/public-comment-os not warrant or represent that the draft document is acc

All relevant observations shall be reported, including the maximum measured leakage rate.

# B.2 Gas consumption (MOT 3.4)

# B.2.1 Scope

This method sets out the procedure to determine the gas consumption of a burner or a set of burners of an appliance (or pilot).

# B.2.2 Principle

The appliance is supplied with the appropriate gas and the test point pressure is carefully set to the nominal value. The gas rate to all burners is measured accurately 15 min after ignition.

It is necessary to obtain heating value, dry relative density of the gas, the gas temperature and to note whether the gas is dry or saturated when passing through the gas meter, so that the correct gas consumption can be calculated.

B.2.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable timing device.

#### B.2.4 Materials

Supply of appropriate test gas at normal test gas pressure (see Clause 3.1).

B.2.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Ensure that the meter is nominally at room temperature.

#### B.2.6 Procedure

The procedure shall be as follows:

- (a) Turn on the gas fully to the burner, ignite the gas and if necessary set the test point pressure to the nominal value. Operate the burners for 15 min.
- (b) Measure the total gas rate  $(Q_m)$  within the next 2 min.
- (c) Calculate the determined gas consumption, R, using the following equation:

$$R = Q_{
m m} imes rac{(P_{
m a} + p)}{P_{
m s}} imes W_{
m r} imes \left[D_{
m t} imes rac{T_{
m s}}{T_{
m m}} rac{(P_{
m s} + h)}{(P_{
m a} + h)}
ight]^{1/2} imes \left[1 - rac{P_{
m w}}{(P_{
m a} + h)} imes \left(1 - rac{D_{
m w}}{D_{
m t}}
ight)
ight]^{1/2}$$

where

R = determined gas consumption (MJ/h)

 $Q_{\rm m}$  = measured total gas rate (m<sup>3</sup>/h)

p = measured meter inlet gauge pressure (kPa)

 $P_s$  = standard absolute pressure (barometer) (101.325 kPa)

 $P_a$  = measured absolute ambient pressure (barometer) (kPa)

 $W_r$  = Wobbe index of reference gas (see Table B.2.6) (MJ/m<sup>3</sup>)

 $D_{\rm t}$  = measured test gas relative density (dry) (air = 1.000)

 $T_s$  = standard absolute temperature (288.15 K)

t = measured meter temperature (°C)

 $T_{\rm m}$  = meter absolute temperature (273.15 + t)K

 $P_{\rm w}$  = water vapour absolute pressure (partial pressure) at t (kPa) (see Appendix C)

h = measured injector gauge pressure (nominal test point pressure) (kPa)

 $D_{\rm w}$  = water vapour relative density (0.622)

NOTE 1 For pilots, the effect of h is deemed to be negligible and its value is taken to be 0 kPa.

NOTE 2 The last term in the square brackets equals unity (1) for NG, TG and all dry gases.

Table B.2.6 — Wobbe index values (dry basis)			
Appliance gas type	Wobbe index (W <sub>r</sub> ) MJ/m <sup>3</sup>		
TG	26.0		
TLP	23.8		
Natural gas	50.0		
Propane	76.9		
Butane	87.2		
Universal LP Gas	76.9		

- (d) Where there is more than one independent burner, repeat Steps (a) to (c) for each independent burner in turn, including pilots.
- (e) Repeat Steps (a) to (c), with all burners turned on fully.

#### B.2.7 Test report

All relevant observations shall be reported, including the following:

- (a) The nominal gas consumption for each burner or pilot and gas type.
- (b) The determined gas consumption for each burner or pilot and gas type.
- (c) The percentage variation between the nominal and determined gas consumption of each burner or pilot and gas type.
- (d) The sum of the nominal gas consumption of all burners.
- (e) The total gas consumption of all burners operating together.
- (f) The percentage variation between the total gas consumption for all burners operating together and the sum of the nominal gas consumption of all burners for each gas type.

# B.3 Gas pressure regulator test (MOT 3.5)

## B.3.1 Scope

This method sets out the procedure to assess the performance of a gas pressure regulator.

#### B.3.2 Method

A test point pressure reference setting is established, then the test point pressure is measured while the appliance inlet pressure is varied through the range specified.

# B.3.3 Apparatus

Equipment specified in Appendix D shall be used.

#### B.3.4 Materials

Supply of appropriate test gas shall be used (see Clause 3.1).

# B.3.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Identify and note the location of the manufacturer's specified pressure test point(s).

#### B.3.6 Procedure

The procedure shall be as follows:

- (a) Light all burners or as stated in the manufacturer's instructions.
- (b) Adjust appliance inlet pressure to the minimum shown in Table 3.5.
- (c) For regulators that are intended to be adjusted, set regulator outlet pressure to the nominal test point pressure while maintaining the correct appliance inlet pressure.
- (d) Turn off burners to stabilize regulator, then turn burners on again and note test point pressure.
- (e) If necessary, repeat Steps (c) and (d) until the test point pressure can be reproduced within ± 5 % of nominal test point pressure.
- (f) If unable to obtain test point pressure within  $\pm$  5 % of nominal test point pressure, then discontinue test.

- (g) Turn on all burners.
- (h) Increase the inlet gas pressure gradually to the maximum shown in Table 3.5 and record the test point pressure and inlet pressure at intervals no greater than 0.5 kPa.
- (i) Decrease the inlet gas pressure gradually to the minimum shown in Table 3.5 and record the test point pressure and inlet pressure at intervals no greater than 0.5 kPa.
- (j) In the case of open burners, turn off all burners except the smallest, set this burner at turndown and repeat Steps (h) and (i).

## B.3.7 Test report

All relevant observations shall be reported including at least the following:

- (a) The maximum variation of the test point pressure and corresponding inlet pressure(s).
- (b) The position of the pressure test point (e.g. on regulator, on gas manifold etc.).
- (c) The commissioning procedure followed.

# B.4 Burner ignition — Pilot light back and blocked aeration (MOT 3.6.2.1/3.6.2.2/3.6.2.4)

#### B.4.1 Scope

This method sets out the procedure to assess the safe operation of an aerated pilot.

## B.4.2 Principle

The pilot is tested to determine if it can be operated in the light back condition. If so, it is then checked if ignition of the main burner is achieved or if the safety shut off valve closes.

The test is then repeated with the primary air opening closed.

#### B.4.3 Apparatus

Equipment as specified in Appendix D shall be used.

#### **B.4.4** Materials

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

## B.4.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.4.6 Procedure

The procedure shall be as follows:

- (a) Attempt to establish a light back condition at the pilot. If a light back condition cannot be established then skip to Step (e).
- (b) Supply gas to the main burner.
- (c) Observe that main burner ignites promptly, safely and without undue noise or that pilot causes the safety shut off valve to close.
- (d) Turn off main burner and pilot.
- (e) Close the pilot primary air opening and attempt to relight pilot. If the pilot cannot be established then skip to Step (g).
- (f) Repeat Steps (b) and (c).

# B.4.7 Test report

Report on the main burner ignition observations (promptness, safety and noise), the operation of the safety shut off valve and all other relevant observations when—

- (a) the pilot is operated in a light back condition; and
- (b) the pilot primary air opening is closed.

# B.5 Ignition at reduced pilot rate test

(MOT <u>3.6.2.3/3.6.3.4</u>)

## B.5.1 Scope

# B.5.2 Principle

The pilot is adjusted to just keep the flame safeguard system open. At this setting the ignition of the main burner is observed when tested at nominal gas consumption and at any other rate at which it can be operated automatically.

#### B.5.3 Apparatus

Equipment as specified in Figure A.9 and Appendix D shall be used.

#### B.5.4 Materials

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

#### B.5.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.5.6 Procedure

The procedure shall be as follows:

- (a) Light the gas at both pilot and main burners.
- (b) Set burner test point pressure(s) to the nominal value(s).
- (c) Turn off the main burner.
- (d) Reduce the gas rate to the pilot from the full rate in small steps. At each reduction, light the main burners, then turn off gas to main burner.
- (e) Continue to reduce the gas rate to the pilot in small steps until either—
  - (i) ignition of the main burner is unsatisfactory; or
  - (ii) the flame safeguard system shuts off the gas supply.
- (f) Repeat steps (d) and (e) with the main burner reduced to the lowest rate at which it can be controlled automatically.
- (g) Repeat the procedure with the appliance in the hot condition.

#### B.5.7 Test report

Report on the main burner ignition observations (promptness, safety and noise), ignition reliability and all other relevant observations when—

- (a) the pilot is operated at a rate just sufficient to keep the flame safeguard open;
- (b) all pilot flame ports, other than the one activating the flame safeguard sensor, are blocked (if applicable); and
- (c) the main burner is reduced to the lowest rate at which it can be controlled automatically.

# B.6 Holding time of thermoelectric flame safeguard test (MOT 3.6.2.6)

#### B.6.1 Scope

This method sets out the procedure to determine the time taken for a thermoelectric flame safeguard system to hold open.

#### B.6.2 Principle

The burner actuating the flame safeguard system is lit from a cold start. The manual reset control is released after the specified delay and the pilot flame observed to determine if the flame safeguard valve is held open.

# B.6.3 Apparatus

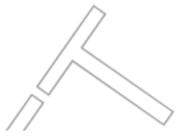
The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable timing device.

#### B.6.4 Materials

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

# B.6.5 Preparation of apparatus



- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.6.6 Procedure

The procedure shall be as follows:

- (a) Light the gas in accordance with manufacturer's instructions.
- (b) Start the timing device simultaneously with flame establishment.
- (c) Release the flame safeguard manual reset control at 60 s.
- (d) Note whether the flame remains alight.
- (e) Where applicable, turn on the main burner gas control, and check for satisfactory ignition.

#### B.6.7 Test report

All relevant observations shall be reported, including whether the flame safeguard holds open.

# B.7 Flame tracking at ignition test (MOT 3.6.2.7)

#### B.7.1 Scope

This method sets out the procedure to determine satisfactory flame tracking of a burner when an ignition source is applied in the normal manner.

#### B.7.2 Principle

The burner is observed for completeness of flame tracking at maximum and turndown gas consumption.

#### B.7.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Source of ignition, unless one is integral with the appliance.

#### B.7.4 Materials

The following apparatus shall be used:

- (a) Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.
- (b) Supply of cold water, where required.

#### B.7.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.7.6 Procedure

The procedure shall be as follows:

- (a) Set the burner control to the maximum position for ignition.
- (b) Light the gas in the normal manner.
- (c) Observe the burner for complete flame tracking across all burner ports.
- (d) Turn off the burner and allow sufficient time for complete flame extinction.
- (e) Repeat four times.
- (f) Where the burner can be ignited at turndown, set the burner control to turndown position and repeat Steps (b) to (e).

#### B.7.7 Test report

All relevant observations shall be reported, including whether complete flame tracking occurs across all burner ports.

# B.8 Shut off time for safety shut off system test

(MOT 3.6.2.14)

distribution or use on network is prohibited.

lar purpose. Any user of the document should rely on the final published

#### Scope

This method sets out the procedure to determine the time taken for a shut off system to operate after flame failure.

## Principle

The appliance is operated at nominal gas consumption. The gas is then turned off and the time taken for the gas valve to close is

## **Apparatus**

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Two-way valve.
- (c) Suitable timing device.
- (d) Air flow meter of adequate capacity.

#### B.8.4 Materials

The following apparatus shall be used:

- (a) Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.
- (b) Air at normal test gas pressure.

#### B.8.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Connect the two-way valve to the appliance inlet with one inlet connected to the gas supply and the other to the air supply.
- (d) Connect the air flow meter into the air supply.

#### B.8.6 Procedure

The procedure shall be as follows:

- (a) With the appliance at room temperature, light the gas.
- (b) For appliances that use flame rectification for flame supervision, operate for 10 min.
- (c) For all other appliances, operate for 1 h or until thermal equilibrium is reached.
- (d) Turn two-way valve from gas supply to air supply.
- (e) Observe actuating flame and start the timing device at the instant the flame extinguishes.
- (f) Stop the timing device at cessation of flow of air as indicated by flow meter.

#### B.8.7 Test report

All relevant observations shall be reported, including the time taken for the safety shut off system to operate.

# Ignition gas flow rate (delayed ignition) test

(MOT <u>3.6.3.1/3.6.4.2</u>)

#### Scope B.9.1

This method sets out the procedure to assess the safety of delayed main burner ignition.

#### **Principle** B.9.2

The normal start flame establishment period is timed. The automatic ignition system is then rendered inoperable so that the start gas flow and spark initiation are under manual control. Ignition tests are carried out at various delay periods up to twice the determined start flame establishment period and it is observed whether ignition is complete and effective.

#### B.9.3 **Apparatus**

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable timing device.



Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

## B.9.5 Preparation of apparatus

CAUTION BEFORE ATTEMPTING DELAYED IGNITION TESTS ENSURE THERE IS ADEQUATE EXPLOSION RELIEF OPENING (REFER TO AS 1375). FOR SAFETY REASONS, THE DELAY FROM ZERO SHOULD BE INCREASED IN SMALL INCREMENTS.

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Using the timing device, measure the start flame establishment period with the ignition system operating through the normal sequence without gas flow. Record the time.
- (d) Render the automatic ignition system inoperable in a manner which will provide manual control of the start gas flow and spark initiation.

#### B.9.6 Procedure

The procedure shall be as follows:

- (a) Initiate gas flow and ignition spark simultaneously.
- (b) Over successive tests, gradually increase the delay period between initiation of start gas flow and initiation of ignition spark until the time interval is twice the determined start flame establishment period.
- (c) Observe the extent of any flame rollout at the appliance perimeter and at the flue outlet.

#### B.9.7 Test report

All relevant observations shall be reported, including the following:

- (a) The measured start flame establishment period.
- (b) The extent of any flame rollout.
- (c) Any damage to the appliance.
- (d) Any resulting hazards to persons or adjacent property.

# B.10 Ignition cycles — Prior to lockout/after flame failure test (MOT <u>3.6.3.2/3.6.3.3/3.6.4.3/3.6.4.4</u>)

## B.10.1 Scope

This method sets out the procedure to assess the safety operation of automatic burner ignition systems.

## B.10.2 Principle

The ignition cycles are successively simulated up to the maximum allowable and the ignition is monitored.

# B.10.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Temperature-controlled room.
- (c) A system that allows the test laboratory to enable/disable the igniter as described below
- (d) Suitable timing device.

#### B.10.4 Materials

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

#### B.10.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.10.6 Procedure

The procedure shall be as follows:

storage, distribution or use on network is prohibited. greement. or that it should be relied on for any particular purpose. Any user of the document sho

- (a) Turn off the gas and activate the appliance. Count the number of ignition attempts and note the time delay between attempts, or if any purge function is provided.
- (b) Re-apply gas to the appliance.
- (c) Reset the appliance, and deactivate the ignition source. Activate the appliance and allow it to attempt ignition. During the second ignition attempt, reactivate the ignition source at the igniter test activation time. Observe the operation of the appliance and burner ignition.
- (d) If applicable, allow the heat exchanger to cool to a temperature of 5 °C or less.
- (e) Repeat Steps (c) and (d) enabling the ignition source during the third ignition attempt for systems with more than two ignition attempts, otherwise go to Step (i).
- (f) Repeat Steps (c) and (d) enabling the ignition source during the fourth ignition attempt for systems with more than three ignition attempts, otherwise go to Step (i).
- (g) Repeat Steps (c) and (d) enabling the ignition source during the fifth ignition attempt for systems with more than four ignition attempts, otherwise go to Step (i).
- (h) Repeat Steps (c) and (d) enabling the ignition source during the sixth ignition attempt for systems with more than five ignition attempts, otherwise go to Step (i).
- (i) Activate the appliance and time the period until a new ignition attempt is made.

#### B.10.7 Test report

All relevant observations shall be reported, including the following:

- (a) The total number of reignition attempts prior to lockout.
- (b) The time delay between ignition attempts, or any purge function.
- (c) The time delay between safety shut down and the next ignition attempt.
- (d) Burner ignition safety and noise.

# B.11 Determination of CO/CO<sub>2</sub> ratio for independent burners — Overload (MOT 4.2)

#### **B.11.1** Scope

This method sets out the procedure to determine the ratio of carbon monoxide to carbon dioxide (CO/CO<sub>2</sub>) in the combustion products of the appliance under test.

## B.11.2 Principle

The appliance is operated under specified conditions of fuel gas and level of overload. A representative sample of the combustion products is analysed for the CO and  $CO_2$  concentration after a specified period of operation. From the results obtained, the  $CO/CO_2$  ratio is calculated.

## B.11.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Carbon monoxide analyser, calibrated to give accurate and reproducible results.
- (c) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (d) Sampling apparatus (probe or hood, as appropriate, see Figures A.3, A.4, A.5, A.6 and A.7) known to not affect the representativeness of the sampled gases under prevailing conditions.
- (e) Sampling lines and conditioner (if used) known to be inert to CO and CO<sub>2</sub>
- (f) Suitable timing device.

#### B.11.4 Materials

#### B.11.4.1 General

The following materials shall be used:

- (a) Supply of appropriate test gas (see Clause 3.1).
- (b) Where necessary, a supply of cold water.

#### B.11.4.2 Additional materials for barbecues

A perforated sheet metal plate of 25 % free area to cover the entire open type grill area.

once only. Further copying, storage, distribution or use on network is prohibited. comment-document-licence-agreement.

#### B.11.5.1 General

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Where required, add water or the cooking medium (in this case only water is to be used) to the level specified by the manufacturer.
- (c) Set up test equipment.
- (d) Identify and note the location of the manufacturer's specified pressure test point(s).
- (e) Adjust the appliance in an attempt to achieve the overload gas rate as specified in Table 4.2.1. and corrected in accordance with Appendix C.

The specified overload conditions shall be obtained by adjusting the inlet pressure with the appliance regulator at its nominal setting. If the overload condition cannot be obtained with a maximum inlet pressure of 3.0 kPa then the appliance regulator shall be rendered inoperative.

- (f) Operate the appliance without further adjustment for 10 min from a cold start and measure the gas rate within the next 2 min. If the overload gas rate is not achieved repeat Step (e).
- (g) In the case of an open top burner, place over the burner a vessel as specified in Table A.8. The water is boiling during combustion analysis.
- (h) Turn off the burner and allow appliance to cool.
- (i) Place the appropriate sampling hood above the flueway outlet, or in the case of an open burner, place the appropriate sampling hood on the vessel, or other appropriate device in a position to obtain a satisfactory sample of the combustion products.
- (j) For an oven with a convection fan, turn off the fan if the burner can be operated with the fan off.

#### B.11.5.2 Additional preparation of apparatus for barbecues

In the case of open type barbecues, lay the perforated sheet metal plate of 25 % free area centrally on the grill.

#### B.11.6 Procedure

The procedure shall be as follows:

- (a) Light the burner(s) and ensure the controls are set to achieve the required overload condition.
- (b) Determine CO and CO<sub>2</sub> 10 min after ignition.
- (c) Allow the appliance to cool and repeat Steps (a) to (b) with the convection fan on (if applicable).

## B.11.7 Test report

All relevant observations shall be reported, including the following:

- (a) The recorded CO and CO<sub>2</sub> values.
- (b) The calculated CO/CO<sub>2</sub> ratio.
- (c) The overload gas consumption rate.

# B.12 Determination of CO/CO<sub>2</sub> ratio for permanent pilots — Overload (MOT 4.3)

#### B.12.1 Scope

This method sets out the procedure to determine the ratio of the carbon monoxide to carbon dioxide (CO/CO<sub>2</sub>) in the combustion products produced by the operating pilots of appliances fitted with permanent pilots.

#### B.12.2 Principle

The appliance is operated under specified conditions of fuel gas and level of overload. A representative sample of the combustion products is analysed for the CO and CO<sub>2</sub> concentration after a specified period of operation. From the results obtained, the CO/CO<sub>2</sub> ratio is calculated.

#### B.12.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Carbon monoxide analyser, calibrated to give accurate and reproducible results.
- (c) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (d) Sampling apparatus known to not affect the representativeness of the sampled gases under prevailing conditions.

Australia to the registered licensee solely for review in providing public comment. Hered licensee may print once only. Further copying, storage, distribution or use on network is prohibited. (f) Suitable timing device.

#### B.12.4 Materials

Supply of appropriate test gas (see Clause 3.1).

#### B.12.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Light the pilot burner.
- (d) Adjust the appliance inlet pressure in accordance with Table 4.3.
- (e) Turn off the pilot burner and allow it to cool.
- (f) Set the sampling device in place.

#### B.12.6 Procedure

The procedure shall be as follows:

- (a) Light the pilot.
- (b) Determine CO and CO<sub>2</sub> 10 min after ignition.

#### B.12.7 Test report

All relevant observations shall be reported, including the following:

- (a) The recorded CO and CO<sub>2</sub> values.
- (b) The calculated CO/CO<sub>2</sub> ratio.

# B.13 Determination of $CO/CO_2$ ratio and $O_2$ levels — Appliances for which Clause 4.2.1 is not applicable (MOT 4.2.2)

#### B.13.1 Scope

This method sets out the procedure to determine the ratio of carbon monoxide to carbon dioxide  $(CO/CO_2)$  and  $O_2$  levels in the combustion products.

## B.13.2 Principle

The appliance is operated on specified fuel gas under specified voltage. A representative sample of the combustion products is analysed for the CO,  $CO_2$  and  $O_2$  concentration after a specified period of operation. From the results obtained, the  $CO/CO_2$  ratio is calculated. The appliance is also operated under certain limiting condition to ascertain its flame characteristics and safe ignition.

# B.13.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Carbon monoxide analyser, calibrated to give accurate and reproducible results
- (c) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (d) Oxygen analyser, calibrated to give accurate and reproducible results.
- (e) Sampling apparatus known to not affect the representativeness of the sampled gases under prevailing conditions.
- (f) Sampling lines and conditioner (if used) known to be inert to CO and CO<sub>2</sub>.

#### B.13.4 Materials

Supply of appropriate test gas (see Clause 3.1).

## B.13.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

evailable by Standards Australia to the registered licensee solely for review in providing public comment.

Lis prohibited. The registered licensee may print once only. Further copying, storage, distribution or use on network is prohibit at https://www.standards.org.au/home/oublic-comment-document-licence-agreement.

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

- (c) Where required, add water or the cooking medium (in this case only water is to be used) to the level specified in the instructions.
- (d) Place an appropriate sample in a position to obtain a satisfactory sample of the combustion products.

#### B.13.6 Procedure

The procedure shall be as follows:

- (a) Connect to the test gas.
- (b) Operate the appliance for 10 min under nominal conditions (i.e. maximum setting, normal test pressure). Determine the CO, CO<sub>2</sub> and O<sub>2</sub>, and the actual gas consumption (see Appendix C) by the use of specified apparatus.
- (c) Repeat Step (b) for the minimum gas rate setting.
- (d) Turn off the burner and allow appliance to cool.

#### B.13.7 Test report

All relevant observations shall be reported, including the following:

- (a) The recorded CO, CO<sub>2</sub> and O<sub>2</sub> values.
- (b) The calculated CO/CO<sub>2</sub> ratios
- (c) The gas consumption rates.
- (d) The flame characteristics.
- (e) The conditions, if any, under which the safety shut down operated.
- (f) Ignition characteristics.

# B.14 Determination of CO/CO<sub>2</sub> ratio for independent surface combustion burners — Underload test (MOT 4.4)

#### B.14.1 Scope

This method sets out the procedure to determine the ratio of the carbon monoxide to carbon dioxide (CO/CO<sub>2</sub>) in the combustion products of surface combustion burners.

#### B.14.2 Principle

The appliance is operated under specified conditions of fuel gas and level of underload. A representative sample of the combustion products is analysed for the CO and  $CO_2$  concentration after a specified period of operation. From the results obtained, the  $CO/CO_2$  ratio is calculated.

## B.14.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Carbon monoxide analyser, calibrated to give accurate and reproducible results.
- (c) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (d) Sampling apparatus known to not affect the representativeness of the sampled gases under prevailing conditions.
- (e) Sampling lines and conditioner (if used) known to be inert to CO and CO<sub>2</sub>.
- (f) Suitable timing device.

#### B.14.4 Materials

Supply of appropriate test gas (see Clause 3.1).

#### B.14.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Light all appliance burners.
- (d) Adjust the appliance inlet pressure in accordance with Table 4.4.
- (e) Turn off the appliance and allow it to cool.
- (f) Set the sampling device in place.

tribution or use on network is prohibited.

#### B.14.6 Procedure

The procedure shall be as follows:

- (a) Light the surface combustion burner.
- (b) Adjust the burner to its minimum setting.
- (c) Determine CO and CO<sub>2</sub> 10 min after ignition.

#### B.14.7 Test report

All relevant observations shall be reported, including the following:

- (a) The recorded CO and CO<sub>2</sub> values.
- (b) The calculated CO/CO<sub>2</sub> ratio.

# Flame characteristics at maximum and minimum Timiting conditions (MOT 4.5)

# Scope

This method sets out the procedure to assess flame characteristics at minimum and maximum limiting conditions of appliance burners.

#### Principle

The appliance is tested at minimum and maximum limiting conditions at both ambient and hot conditions, with all appropriate test gases. Burner flames are observed for any abnormalities.

Open burners shall be tested with and without a vessel in place.

#### **Apparatus** B.15.3

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable timing device.
- (c) Means of observing the burner flames (mirror or glass panel) if necessary.
- (d) For open flued appliances, updraught and downdraught apparatus.
- (e) Standard test vessel, where applicable.

#### B.15.4 Materials

Supply of appropriate test gas specified in accordance with Table 4.5, at pressures to satisfy the limiting conditions shall be used.

#### B.15.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Where required, add water or cooking medium (in this case only water is to be used) to the level specified in the manufacturer's instructions.
- (d) Operate the appliance and adjust to the appropriate liming conditions.
- (e) Turn off the appliance and allow it to cool.
- (f) For an oven with a convection fan, turn off the fan if the burner can be operated with the fan off.

#### Procedure B.15.6

#### B.15.6.1 All burners

The procedure shall be as follows:

- (a) Turn on water, if applicable.
- (b) Light the burner and check that the test point pressure is at the appropriate level as shown in Table 4.5.
- (c) Observe the burner and appliance operation for any abnormality.
- (d) Repeat the procedure with each test gas and under each limiting condition.
- (e) In the case of open burners, place standard test vessel containing specified quantity of water over the open burner (see Table A.8) and repeat Steps (b) to (d).

#### B.15.6.2 Open flued appliances, fitted with a draught diverter

In addition to Clause B.15.6.1, observe the burner flames for any abnormality while proceeding as follows:

- (a) Block the flue for 5 min.
- (b) Unblock the flue and apply a downdraught with a velocity head starting at zero and gradually increasing over 5 min to 7.5 Pa (3.5 m/s). Maintain the downdraught for a further 5 min.
- (c) Apply an updraught to the secondary flue with a velocity head starting at zero and gradually increasing over 5 min to 7.5 Pa (3.5 m/s). Maintain the updraught for a further 5 min.
- (d) Repeat the procedure with each test gas and under each limiting condition.
- (e) Allow the appliance to cool and repeat Steps (a) to (d) with the convection fan on (if necessary).

#### B.15.6.3 Open flued appliances, without a draught diverter

In addition to Clause B.15.6.1, observe the burner flames for any abnormality while proceeding as follows:

- (a) Block the flue for 5 min.
- (b) Unblock the flue and apply a back pressure of 140 Pa for 5 min.
- (c) Repeat the procedure with each test gas and under each limiting condition.
- (d) Allow the appliance to cool and repeat Steps (a) to (c) with the convection fan on (if necessary).

#### B.15.7 Test report

All relevant observations shall be reported, including the following, at each limiting condition:

- (a) The flame characteristics and appliance operation.
- (b) The flame characteristics when exposed to blocked flue, downdraught and updraught (where applicable).
- (c) The flame characteristics when exposed to blocked flue and back pressure (where applicable).
- (d) The conditions, if any, under which the safety shut down operated.

# B.16 Burner ignition at maximum and minimum limiting conditions (MOT 4.6)

## B.16.1 Scope

This method sets out the procedure to assess the safe ignition of any burners (other than pilots) at minimum and maximum limiting conditions.

## B.16.2 Principle

The normal lighting procedure is carried out and burner is observed for completeness of ignition at both ambient and hot conditions, with all appropriate test gases.

Open burners shall be tested with and without a vessel in place.

# B.16.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable timing device.
- (c) Means of observing the burner flames (mirror or glass panel) if necessary.
- (d) Means to deliver a supply voltage variable between 85 % and 110 % of rated voltage of the appliance.
- (e) A voltmeter with an accuracy of ± 1 %.
- (f) Standard test vessel, where applicable.

#### B.16.4 Materials

Supply of appropriate test gas specified in accordance with Table 4.6, at pressures to satisfy the limiting conditions shall be used.

# B.16.5 Preparation of apparatus

The apparatus shall be prepared as follows:

(a) Install the appliance in accordance with Clause 3.2.

draft document made available by Standards Australia to the registered licensee solely for review in providing public comment.

r use of the document is prohibited. The registered licensee may print once only. Further copying, storage, distribution or use on a centernal are available at https://www.standards.org.au/home/public-comment-document-licence-agreement.

ly on the final published version

- (c) Where required, add water or cooking medium (in this case only water is to be used) to the level specified in the manufacturer's instructions.
- (d) In the case of mains ignition systems a voltage equivalent to both 85 % and 110 % of the nominal supply voltage is applied to the appliance.
- (e) For battery-operated ignition systems remove batteries and apply a power source equivalent to 80 % of the nominal voltage to the supply contacts of the battery holder.
- (f) Operate the appliance and adjust to the appropriate limiting condition.

#### B.16.6 Procedure

The procedure shall be as follows:

- (a) Initially test with the appliance in ambient condition.
- (b) Turn on water, if applicable.
- (c) Purge the gas line to the control valve.
- (d) Turn on gas control valve and start the timing device at the same time.
- (e) Operate the ignition system in accordance with the manufacturer's instructions.
- (f) Test five times allowing 1 min between tests.
- (g) Repeat the procedure with the appliance in the hot condition.

#### B.16.7 Test report

All relevant observations shall be reported, including the following, at each limiting condition:

- (a) The number of times ignition was effective.
- (b) Average time for ignition.
- (c) Ignition characteristics.

# B.17 Delayed ignition at maximum and minimum limiting conditions (MOT 4.7)

#### **B.17.1** Scope

This method sets out the procedure to assess the safety of delayed ignition of any manually ignited burners (other than pilots) at minimum and maximum limiting conditions.

## B.17.2 Principle

The normal lighting procedure is carried out with a delay and the burner is observed for safety and completeness of ignition at both ambient and hot conditions, with all appropriate test gases.

Open burners shall be tested with and without a vessel in place.

## B.17.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable timing device.

#### B.17.4 Materials

Supply of appropriate test gas specified in accordance with Table 4.7, at pressures to satisfy the limiting conditions shall be used.

#### B.17.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.17.6 Procedure

The procedure shall be as follows:

(a) Initially test with the appliance in ambient condition.



point pressure as shown in Table 4.7.

CAUTION ENSURE THAT THE APPLIANCE IS ADEQUATELY PURGED OF GAS BEFORE ATTEMPTING ANY LIGHTING OF THE APPLIANCE.

- (c) Darken the room, turn on gas control and start the timing device at the same time.
- (d) After 5 s, apply source of ignition.
- (e) Repeat the test in each limiting condition.
- (f) Repeat the procedure with the appliance in the hot condition.

#### B.17.7 Test report

All relevant observations shall be reported, including the following, at each limiting condition:

- (a) The effect on other burners (other burners extinguished)
- (b) The effect on the appliance (damage, carbon deposits).
- (c) The extent of any flame roll-out from the appliance perimeter and flue.
- (d) Ignition characteristics (complete ignition, remaining alight, light back, noise).

# B.18 Unburnt gas release from burner system (MOT 4.8)

## Scope

This method sets out the procedure to determine if unburnt gas can be released to the atmosphere from any part of the burner system other than the burner ports.

#### B.18.2 Principle

This test is performed by applying a high voltage spark to the primary air ports and to any potential release points of the burner system other than the burner ports. Any ignition of release gas is reported.

Open burners shall be tested with and without a vessel in place.

#### B.18.3 **Apparatus**

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable device for producing a continuous series of high voltage sparks.

#### B.18.4 Materials

Supply of appropriate test gas specified in accordance with Table 4.8, at pressures to satisfy the limiting conditions shall be used.

#### B.18.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.18.6 Procedure

The procedure shall be as follows:

- (a) Operate the appliance.
- (b) Adjust to any limiting conditions as specified in Table 4.8.
- (c) Using the high voltage spark generator, scan the primary air ports and potential release points of the burner system.
- (d) Readjust gas control to minimum setting that will support a flame on the burner ports.
- (e) Repeat Step (c).

#### B.18.7 Test report

All relevant observations shall be reported, including any observations on the ignition of released gas at primary air ports or any part of the burner system up to the burner ports, at any limiting condition.

# Combustion air supply test (MOT 5.1.6)

Scope

This method sets out the procedure to determine the response to an inadequate air supply, for appliances equipped with fan assisted combustion systems.

## B.19.2 Principle

Combustion air inlets into the appliance are progressively reduced while at the same time the products of combustion are sampled for CO and CO<sub>2</sub> determinations until safety shut down occurs.

## B.19.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Carbon monoxide analyser, calibrated to give accurate and reproducible results.
- (c) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (d) Sampling apparatus known to not affect the representativeness of the sampled gases under prevailing conditions.
- (e) Means for progressively reducing combustion air, if not incorporated in the equipment.
- (f) Suitable timing device.

#### B.19.4 Materials

The following materials shall be used:

- (a) Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.
- (b) Supply of cold water, if applicable.

#### B.19.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.19.6 Procedure

The procedure shall be as follows:

- (a) Operate the appliance in accordance with manufacturer's instructions and adjust manifold pressure to nominal test point pressure. Allow to operate for 10 min.
- (b) Progressively block the openings into the appliance that provide air for combustion.
- (c) Monitor CO and CO<sub>2</sub> by use of specified apparatus.
- (d) Continue Steps (b) and (c) until safety shut down occurs.
- (e) Remove the air restricting means and check that a restart does not occur without a full start cycle.
- (f) Where an appliance has multiple fan speeds, repeat Steps (a) to (d) at all fan settings.

#### B.19.7 Test report

All relevant observations shall be reported, including at least the following:

- (a) If the appliance shuts down.
- (b) The recorded CO and CO<sub>2</sub> values.
- (c) The calculated CO/CO<sub>2</sub> ratio.
- (d) The flame characteristics.
- (e) The extent (percentage) of air inlet blockage at shut down.
- (f) The position and type of material used to achieve the blockage.

# B.20 Spillage of combustion products test (MOT 5.2.1)

# B.20.1 Scope

This method sets out the procedure to determine if there is any spillage of combustion products from the flue system or draught diverter.

#### ZB.20.2 Principle

The presence of spillage is determined by carbon dioxide analysis or use of a dew plate.

# B.20.3 Apparatus

or use on network is prohibited.

The following apparatus shall be used:

- (a) Flue of the minimum length specified in the manufacturer's instructions or 0.6 m in length if there is no minimum specified.
- (b) Carbon monoxide analyser, calibrated to give accurate and reproducible results.
- (c) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (d) Sampling apparatus known to not affect the representativeness of the sampled gases under prevailing conditions.
- (e) Dew plate (see Figure A.2).
- (f) Suitable timing device.

#### B.20.4 Materials

The following materials shall be used:

- (a) Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.
- (b) Supply of cold water for dew plate (if used).

#### B.20.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Fit the appropriate flue. Seal the points between the appliance flue spigot and the flue, or if applicable, between the flue spigot and the flue elbow and between the flue elbow and the flue.

#### B.20.6 Procedure

The procedure shall be as follows:

- (a) Operate the appliance in accordance with manufacturer's instructions.
- (b) Five minutes after ignition, check the unit for combustion product spillage by use of a dew plate or carbon dioxide and monoxide analysis. If sampling combustion products, note the background level of carbon dioxide in the ambient air.
- (c) Position sampling probe or dew plate at all locations where leakage or spillage of combustion products might occur, such as the following:
  - (i) Draught diverter relief openings.
  - (ii) Spigots.
  - (iii) Flue connection.
  - (iv) Base of flue product collection hoods.
  - (v) Ensure that the sample probe does not interfere with the normal operation of the appliance.
- (d) If partial disassembly is required to access the sample point locations, ensure that the operation of the appliance is not altered so as to cause spillage/leakage. Check that the appliance is correctly reassembled before proceeding with further testing.
- (e) Repeat Steps (a) to (c) with the appliance fan at each speed (if applicable).

# B.20.7 Test report

All relevant observations shall be reported, including at least the following:

- (a) Any spillage detected.
- (b) Location of any spillage detected.
- (c) The method used.

# B.21 Performance with updraught, downdraught and blocked flue tests (MOT 5.2.2)

# B.21.1 Scope

This method sets out the procedure to determine the ratio of carbon monoxide to carbon dioxide (CO/CO<sub>2</sub>) in the combustion products of an open flued appliance when the flue is subjected to downdraught, updraught and flue blockage.

## B.21.2 Principle

The flue gases are sampled and analysed for CO and  $CO_2$  under conditions of updraught, downdraught and flue blockage. The  $CO/CO_2$  ratio is then calculated.

B.21.3 Apparatus

roviding public comment.
sge, distribution or use on network is prohibited.
sement.

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

The following apparatus shall be used:

(a) Equipment as specified in Appendix D.

- (b) Carbon monoxide analyser, calibrated to give accurate and reproducible results.
- (c) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (d) Sampling apparatus known to not affect the representativeness of the sampled gases under prevailing conditions.
- (e) Micro manometer accurate to ± 0.5 Pa or better and ranging to at least 20 Pa or an anemometer accurate to ± 0.2 m/s or better and ranging up to at least 6 m/s, or other suitable means to measure updraught and downdraught velocity.
- (f) A draught machine capable of applying up and downdraughts of 10 Pa for appliances with atmospheric burners and up to 15 Pa downdraught and 20 Pa updraught for appliances with fan-assisted combustion systems.
- (g) Suitable timing device.
- (h) 0.6 m of appropriate flue.

#### Materials B.21.4

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

#### Preparation of apparatus B.21.5

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Attach 0.6 m of appropriate flue.
- (d) Attach the means to measure downdraught or updraught to the flue.
- (e) Place flue gas sampling probe into the appliance primary flue outlet.

#### B.21.6 Procedure

#### Open flued appliances with a draught diverter or alternative system B.21.6.1

The procedure shall be as follows:

- (a) Begin continuous sampling of the flue gases and recording of CO/CO<sub>2</sub>.
- (b) Operate the appliance in accordance with manufacturer's instructions on the highest setting with normal test gas pressure at appliance inlet.
- (c) Block off the secondary flue outlet.
- (d) At 10 min after ignition, measure the CO and CO<sub>2</sub>.
- (e) Unblock the secondary flue.
- (f) With the appliance in the hot condition apply a downdraught with a velocity head starting at zero and gradually increasing over 5 min to 7.5 Pa (3.5 m/s). Maintain the downdraught for a further 5 min.
- (g) With the appliance in the hot condition apply an updraught with a velocity head starting at zero and gradually increasing over 5 min to 7.5 Pa (3.5 m/s). Maintain the updraught for a further 5 min.
- (h) For appliances with a turndown setting, repeat Steps (f) and (g) at the low setting.

# B.21.6.2 Open flued appliances without a draught diverter or similar device

The procedure shall be as follows:

- (a) Begin continuous sampling of the flue gases and recording of CO/CO<sub>2</sub>.
- (b) Operate the appliance in accordance with manufacturer's instructions on the highest setting with normal test gas pressure at appliance inlet.
- (c) Wait until 10 min after ignition.
- (d) Block off the flue progressively until lockout occurs.
- (e) Unblock the flue, reset the appliance and determine the velocity head in the flue with the appliance in operation.
- (f) With the appliance in the hot condition apply an updraught with a velocity head starting at zero and gradually increasing over 5 min to 7.5 Pa (3.5 m/s) in excess of that measured in Step (e). Maintain the updraught for a further 5 min.
- (g) For appliances with a turndown setting, repeat Steps (c) to (f) at the low setting

#### B.21.7 Test report

All relevant observations shall be reported, including at least the following:

(b) The extent of flue blockage at the point of conclusion of the test, together with the position and type of material used to achieve the blockage.

# B.22 Burner stability to draught test (MOT 5.3.1/5.3.2)

#### B.22.1 Scope

This method sets out the procedure to determine the response to a draught, and the changing of setting for appliances on turndown setting.

#### B.22.2 Principle

The main burner(s) is set to turndown in accordance with manufacturer's instructions. A 5 km/h horizontal draught is applied to the appliance at stipulated angles. The gas to the burner is turned off and on. The flame shall completely reignite when the draught is removed.

## B.22.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A calibrated draught machine capable of delivering a 5 km/h draught over an area of 1.0 m<sup>2</sup>.
- (c) Suitable timing device.

#### B.22.4 Materials

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

#### B.22.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.22.6 Procedure

The procedure shall be as follows:

- (a) Connect to appropriate gas.
- (b) Light the main burner(s).
- (c) Place the draught machine so that the appliance is located centrally in the area of 1.0 m<sup>2</sup>.
- (d) Turn on the draught machine and subject the appliance to a horizontal draught of 5 km/h for periods of 1 min directed from the front, sides and intermediate points at 15° intervals.
- (e) Turn off the draught machine and observe the main burner.
- (f) Change the setting to full-on, then change from full-on to turndown setting
- (g) Repeat 5 times.

#### B.22.7 Test report

All relevant observations shall be reported, including at least the following:

- (a) The ignition characteristics of the burner(s).
- (b) The stability subject to draught.
- (c) The reignition with the draught removed.
- (d) The stability when changing settings.

# B.23 Pilot stability to draught test (MOT 5.3.3)

# B.23.1 Scope

This method sets out the procedure to determine the response and stability of pilots to a draught.

## B.23.2 Principle

The pilot flame is ignited in accordance with manufacturer's instructions. A 5 km/h horizontal draught is applied to the appliance at stipulated angles. The gas to the pilot is turned off and on. The flame shall completely reignite when the draught is removed.

# B.23.3 Apparatus

ed licensee may print once only. Further copying, storage, distribution or use on network is prohibited. org.su/home/public-comment-document-licence-agreement.

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A calibrated draught machine capable of delivering a 5 km/h draught over an area of 1.0 m<sup>2</sup>.
- (c) Suitable timing device.

#### B.23.4 Materials

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

#### Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.23.6 Procedure

The procedure shall be as follows:

- (a) Connect to appropriate gas.
- (b) Light the pilot(s).
- (c) Place the draught machine so that the appliance is located centrally in the area of 1.0 m<sup>2</sup>.
- (d) Turn on the draught machine and subject the appliance to a horizontal draught of 5 km/h for periods of 1 min directed from the front, sides and intermediate points at 15° intervals.
- (e) Turn off the draught machine and turn the pilot on and off five times in the normal manner.

#### B.23.7 Test report

All relevant observations shall be reported, including at least the following:

- (a) The ignition of the pilot(s).
- (b) The stability subject to draught.
- (c) The stability with the pilot switching on and off.

# B.24 Effect of appliance door operation on flame stability test (MOT 5.3.4)

#### Scope B.24.1

This method sets out the procedure to determine the effect of the opening and closing of any associated door(s) on the appliance burners.

#### B.24.2 **Principle**

The appliance is operated at turndown gas consumption. The effect of normally opening and closing the appliance doors on the burner flames is observed.

#### B.24.3 **Apparatus**

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Standard test vessels in accordance with Table A.8, where applicable

#### B.24.4 Materials

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure.

#### Preparation of apparatus B.24.5

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

#### B.24.6 Procedure

The procedure shall be as follows:

- (a) Light the burner(s) and adjust to turndown gas consumption. Open burners are tested with a standard test vessel placed centrally over the burner.
- (b) Open and close the appliance door(s) and observe whether the burner flames extinguish. In addition, allow the appliance doors to close by self-closing action through their full arc of travel.
- (c) For open burners the test is repeated with no standard vessels in position.

#### B.24.7 Test report

All relevant observations shall be reported, including at least the flame response to opening and closing doors.

# B.25 Blocked condensate drain test (MOT 5.4.3)

#### **B.25.1** Scope

This method sets out the procedure to assess the safety of an appliance with a blocked condensate drain.

#### B.25.2 Principle

The appliance is checked for safe operation under conditions that simulate the accumulation of condensate within the appliance as the result of a blocked drain outlet.

#### B.25.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Flue gas sampling hood (see Figures A.3, A.4, A.5, A.6 and A.7) or other device of stainless steel or aluminium.
- (c) Carbon monoxide analyser, calibrated to give accurate and reproducible results.
- (d) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (e) Suitably sized funnel, hose and beaker for pouring water into the appliance via the condensate drain outlet.
- (f) Suitable timing device.

#### B.25.4 Materials

Supply of appropriate test gas (see Clause 3.1) at normal test gas pressure shall be used.

# B.25.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.
- (c) Connect a suitable hose and funnel to the condensate drain opening of the appliance.
- (d) Place appropriate sampling hood or averaging probe in a suitable position to collect flue gas samples from the flue outlet of the appliance.
- (e) Elevate the hose and funnel sufficiently so that the water will flow smoothly into the appliance (against the pressure developed by the appliance combustion fan) without causing pressure pulses which may disturb the normal function of the combustion airflow proving device.

#### B.25.6 Procedure

The procedure shall be as follows:

- (a) Operate the appliance in accordance with the manufacturer's instructions and adjust it to operate at the maximum heating capacity/test point pressure.
- (b) Continuously monitor the CO and CO<sub>2</sub> and observe the flame for evidence of abnormality. When equilibrium is reached record the CO and CO<sub>2</sub> values.
- (c) Gradually pour water into the appliance (through the appliance drain opening) at a rate which will not disturb the normal function of the combustion airflow proving device and is sufficiently slow to permit continuous observation of the flame and monitoring of the CO/CO<sub>2</sub> values. Periodically assess the external cabinet of the appliance for evidence of temperature hazards by touch. If necessary attach and monitor thermocouples on the surface of the appliance in areas of potential temperature hazard.
- (d) Continue to pour water into the appliance and observe the flame and record the CO/CO<sub>2</sub> and surface temperature until the appliance shuts down or reaches an equilibrium condition.
- (e) Immediately following shut down, and without draining any water from the appliance, attempt to restart the appliance by cycling the appliance thermostat. Observe the appliance for any ignition hazards.
- (f) If applicable, manually reset any limiting device and again attempt to restart the appliance while observing the appliance for ignition hazards. If necessary, remove a small quantity of water to permit the appliance to restart.

(g) If applicable, drain the water from the appliance and repeat Steps (a) to (f) with the appliance controls adjusted to the minimum gas

rate setting and or any other discrete operating condition in between as deemed necessary by the certification body.

# B.25.7 Test report

All relevant observations shall be reported, including the following:

- (a) The recorded CO and CO<sub>2</sub> values.
- (b) The maximum CO/CO<sub>2</sub> ratio.
- (c) The recorded temperatures.
- (d) The flame ignition characteristics.

# Temperature hazards test (MOT 5.5.1)

#### Scope B.26.1

This method sets out the procedure to determine the temperature of the appliance and its surrounds during operation.

#### B.26.2 **Principle**

The appliance is operated under specified conditions and the temperatures of specified parts of the appliance and the surroundings are measured.

#### B.26.3 **Apparatus**

#### B.26.3.1 General

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Adequately sized area with ambient temperature between 10 °C and 35 °C, and not varying by more than 4 °C during the test.
- (c) A test rig consisting of a wooden floor with detachable side and back walls. The rear wall shall be approximately 2 m high and the side wall shall be adjustable for height. When tested with the manufacturer's clearances, the rear and side panels shall be 25 mm thick wood walls, the floor being hardwood. Holes of 8 mm diameter shall be drilled from the back of the panels at no more than 75 mm centres on a grid pattern. These holes shall be flat bottomed. 0.51 mm diameter (24 AWG) thermocouples are placed in the holes and bent at right angles to lie as flat as possible on the bottom of the holes. The point at which the wires first make electrical contact to form the junction shall be at least 4 mm from the bend. Each thermocouple shall be held in place to within 1.5 mm of the front surface by an electrically insulating cement. The thermocouples shall have an accuracy of  $\pm$  2 °C or better.

Bench surface and overhead test boards shall be fitted with thermocouples as above. If there are direct points of contact with the test boards, ensure that adequate thermocouples are fitted at these locations.

For built-in appliances an enclosure shall be constructed to fit the appliance as tightly as possible and fitted with thermocouples as described above.

Any appliance whose design is not compatible with the test rig, including a mobile appliance, shall be tested in a modified test rig as deemed necessary.

- (d) Thermocouples with an accuracy of ± 2 °C or better shall be used on the appliance surfaces.
- (e) A temperature recorder with an accuracy of  $\pm$  2 °C.
- (f) Ambient temperature recorder with an accuracy of ± 2 °C.
- (g) Contact thermometer with an accuracy of ± 2 °C.
- (h) Suitable timing device.

#### B.26.3.2 Additional apparatus for boiling tables — Open and closed top Chinese cooking tables

Appropriate standard test vessels as per Table A.8.

#### B.26.3.3 Additional apparatus for fryers

A water cooled heat exchanger which, when immersed in the cooking oil, is capable of removing heat at a sufficient rate to maintain the cooking oil temperature at 180 ± 5 °C while the burner(s) are operating at nominal gas consumption.

#### **Materials** B.26.4

#### B.26.4.1 General

The following materials shall be used:

- (a) Supply of available gas (see Clause 3.1) at normal test gas pressure.
- (b) Where necessary, a supply of cold water.

72/100

### B.26.4.2 Additional materials for barbecues

A perforated sheet metal plate of 25 % free area to cover the entire open grill area (for open grill type only).

# B.26.4.3 Additional materials for fryers

Cooking oil as specified by the manufacturer.

# B.26.4.4 Additional materials for mobile serving trolleys

Full fuel container(s) as specified by the manufacturer

# B.26.5 Preparation of apparatus

# B.26.5.1 General

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2 in the test rig. In the case of built-in appliances, these shall be installed as tightly as physically possible in a normal enclosure regardless of the clearances specified. Any clearances required shall be guaranteed by the fitting of clearance channels or spacers.
- (b) Set up test equipment.
- (c) Where required, the overhead test boards shall be installed above the appliance at the minimum height and maximum projection, if specified in the manufacturer's instructions.
- (d) Where required, add water or the cooking medium to the level specified in the instructions.

# B.26.5.2 Additional preparation of apparatus for barbecues

In the case of open type barbecues, lay the perforated sheet metal plate of 25 % free area centrally on the grill.

# B.26.5.3 Additional preparation of apparatus for fryers

- (a) Place a temperature measuring device 25 mm below the surface of the cooking oil in the centre of each pan. Install a water cooled heat exchanger in each pan.
- (b) Adjust the cooking oil to the normal working level.

# B.26.6 Procedure — Appliance operation

# B.26.6.1 Boiling tables — Open and closed top, Chinese cooking tables

The procedure shall be as follows:

- (a) Turn on gas and light burners, and operate the appliance at nominal gas consumption.
- (b) Place an open vessel containing 60 ± 10 mm of water on each open burner. These vessels shall be—
  - (i) standard test vessel(s) size (see Table A.8); or
  - (ii) wok(s); or
  - (iii) special purpose vessel(s) specified or supplied by the manufacturer; or
  - (iv) rectangular pan(s), when in position, that does not protrude over the edges and covers at least 85 % of the area of the section of a solid enclosed top burner.
- (c) Bring water to the boil and turn the burners down to simmer for the duration of the test. In the case of a wok maintain at full boil.
- (d) Top up water in vessels as necessary to maintain a depth of  $60 \pm 10$  mm.
- (e) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.26.6.2 Salamanders, grillers and toasters

The procedure shall be as follows:

- (a) Turn on the gas and light the burners.
- (b) Fill the grill tray to a quarter of its depth with water and operate the appliance at nominal gas consumption.
- (c) Top up the water in the grill tray as necessary to maintain the required depth.
- (d) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.26.6.3 Solid grill plates and griddles

The procedure shall be as follows:

- (a) Turn on the gas and light the burners.
- (b) Adjust the gas consumption to maintain the temperature of the plate at 200  $\pm$  6 °C.
- (c) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.26.6.4 Barbecues

The procedure shall be as follows:

- (a) Turn on the gas and light the burners.
- (b) Operate the appliance for not less than 2 h, until thermal equilibrium is reached, with the following conditions:
  - (i) An open flame grill section of appliance at full rate.
  - (ii) An enclosed flame solid griddle plate section of appliance, as specified in B.26.6.2
  - (iii) For an appliance specified by the manufacturer with different configuration options of open grill and solid griddle plate sections, each option shall be tested at its maximum size specified.
  - (iv) A covered/hooded cooking type appliance at the maximum cooking condition specified by the manufacturer.
  - (v) For an appliance specified by the manufacturer for both open and covered/hooded cooking, successive tests shall be conducted in accordance with the operating conditions specified in Items (i), (ii), (iii) and (iv).

### B.26.6.5 Ovens

The procedure shall be as follows:

- (a) Turn on the gas and light the burners.
- (b) Set the thermostat to 260 °C or maximum operating temperature, whichever is higher.
- (c) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.26.6.6 Boiling water units, stockpots, brat pans, atmospheric steamers and pasta cookers

The procedure shall be as follows:

- (a) Fill with water to the normal operating level.
- (b) Turn on the gas and light the burners.
- (c) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

### B.26.6.7 **Fryers**

The procedure shall be as follows:

- (a) Confirm cooking oil is at the normal operating level with the heat exchanger in position.
- (b) Light the gas and set the thermostat to maximum temperature setting.
- (c) Start a small flow of water through the heat exchanger(s) and increase the flow when the temperature of the cooking oil approaches 180 °C.
- (d) By adjusting the water flow and if necessary the depth of immersion of the heat exchanger, maintain the cooking oil temperature at 180 ± 5 °C throughout the test.
- (e) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

### B.26.6.8 Food warmers and bains marie

The procedure shall be as follows:

- (a) Turn on gas and light the burners.
- (b) Operate the appliance for not less than 2 h, until thermal equilibrium is reached at the gas consumption required to maintain 82 ± 6 °C.

# B.26.6.9 High temperature cookers

The procedure shall be as follows:

- (a) Turn on the gas and light the burner(s).
- (b) Operate the appliance for not less than 2 h, until thermal equilibrium is reached with the thermostat (if fitted) set to maximum.

### B.26.6.10 Mobile serving trolleys

The procedure shall be as follows:

- (a) If relevant, fill with water to the normal operating level.
- (b) Turn on gas supply and light the burner.
- (c) Top up water level as required.
- (d) Operate the appliance for not less than 1 h, until thermal equilibrium is reached.

# B.26.6.11 Procedure — Temperature measurements

- (c) Measure the temperatures of the side and back walls.
- (d) Measure the temperatures of surfaces intended to be handled.
- (e) Measure the temperatures of surfaces likely to be accidentally touched
- (f) Measure the temperature rise above ambient of surfaces of functional components (e.g. valves, thermostats, regulators, etc.) and record the highest value on each. Record all temperature values as follows:

$$t_{\rm c}=t_{\rm m}+25$$

where

- = corrected temperature (°C)
- = measured temperature rise above ambient (°C)
- (g) Measure the temperatures of any LP Gas cylinders.
- (h) Record the maximum temperatures attained during the test.

### B.26.7 Test report

All relevant observations shall be reported, including the following:

- (a) The nature of any special installation conditions as indicated by a permanent marking on the appliance, otherwise the statement "No special conditions".
- (b) The maximum and minimum ambient temperature during the test period.
- (c) The highest recorded temperature rise above ambient on the following:
  - (i) The floor, rear and side walls, overhead, bench surfaces trolleys and surrounds when installed in accordance with the manufacturer's instructions.
  - (ii) For each material type, on surfaces intended to be handled and the material type.
  - (iii) For each material type, on surfaces likely to be accidentally touched and the material type.
  - (iv) Each component containing non-metallic diaphragms.
  - (v) Each main gas and pilot lines of materials susceptible to sulphide attack, e.g. copper.
  - (vi) Each component containing zinc based alloy.
  - (vii) Each wooden component.
  - (viii) Any LP Gas cylinder
- (d) The highest corrected temperatures on the following:
  - (i) Each gas valve, thermostat, flame safeguard, ignition device, etc.
  - (ii) Each flexible hose.
  - Joints sealed with jointing compound or similar materials.
  - (iv) Electrical wiring.
  - (vi) Each glass component.

# B.27 Temperature hazards — Zero clearance test (MOT 5.5.6)

### Scope B.27.1

This method sets out the procedure to determine the temperature of rear surfaces adjacent to a commercial catering gas appliance during operation.

### Principle B.27.2

The appliance is operated under specified conditions and the temperatures of specified parts of the appliance and the surroundings are measured.

### B.27.3 **Apparatus**

General

The following apparatus shall be used:

(a) Equipment as specified in Appendix D.

distribution or use on network; is prohibited.

75/100

solely for review in providing public comment.

Further copying, storage, distribution or use on network is prohibi cument-licence-agreement.

(b) Adequately sized area with ambient temperature between 10 °C and 35 °C, and not varying by more than 4 °C during the test.

(c) A test rig consisting of a wooden floor with detachable side and back walls. The rear wall shall be approximately 2 m high and the side wall shall be adjustable for height. When tested with the manufacturer's clearances, the rear shall be 25 mm thick wood walls, the floor being hardwood. Holes of 8 mm diameter shall be drilled from the back of the panels at no more than 75 mm centres on a grid pattern. These holes shall be flat bottomed. 0.51 mm diameter (24 AWG) thermocouples are placed in the holes and bent at right angles to lie as flat as possible on the bottom of the holes. The point at which the wires first make electrical contact to form the junction shall be at least 4 mm from the bend. Each thermocouple shall be held in place to within 1.5 mm of the front surface by an electrically insulating cement. The thermocouples shall have an accuracy of ± 2 °C or better.

The apparatus may be modified for improved longevity due to the elevated temperatures, with any and all such modifications required to be reported along with the test results.

NOTE The maximum temperature imposed on the rear surface is typically above the installed appliance, due to heated products of combustion impinging on the surface after they are discharged from the appliance flueway terminal(s).

Any appliance whose design is not compatible with the test rig, including a mobile appliance, shall be tested in a modified test rig as deemed necessary.

- (d) Thermocouples with an accuracy of  $\pm$  2 °C or better shall be used on the appliance surfaces.
- (e) A temperature recorder with an accuracy of ± 2 °C.
- (f) Ambient temperature recorder with an accuracy of ± 2 °C.
- (g) Contact thermometer with an accuracy of ± 2 °C.
- (h) Suitable timing device.

# B.27.3.2 Additional apparatus for boiling tables — Open and closed top, Chinese cooking tables

Appropriate standard test vessels as per Table A.8.

# B.27.3.3 Additional apparatus for fryers

A water cooled heat exchanger which, when immersed in the cooking oil, is capable of removing heat at a sufficient rate to maintain the cooking oil temperature at  $180 \pm 5$  °C while the burner(s) is operating at nominal gas consumption.

# B.27.4 Materials

### **B.27.4.1** General

The following materials shall be used:

- (a) Supply of available gas (see Clause 3.1) at normal test gas pressure.
- (b) Where necessary, a supply of cold water.

### B.27.4.2 Additional materials for barbecues

A perforated sheet metal plate of 25 % free area to cover the entire open grill area (for open grill type only).

# B.27.4.3 Additional materials for fryers

Cooking oil as specified by the manufacturer.

# B.27.4.4 Additional materials for mobile serving trolleys

Full fuel container(s) as specified by the manufacturer

# B.27.5 Preparation of apparatus

### B.27.5.1 General

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2 in the test rig, except that built-in appliances shall be installed as tightly as physically possible in a normal enclosure regardless of the clearances specified. Any clearances required shall be guaranteed by the fitting of clearance channels or spacers. Any such clearance channels or spacers shall be permanent components of the appliance.
- (b) Set up test equipment.
- (c) Where required, the overhead test boards shall be installed above the appliance at the minimum height and maximum projection, if specified in the manufacturer's instructions.
- (d) Where required, add water or the cooking medium to the level specified in the instructions.

# B.27.5.2 Additional preparation of apparatus for barbecues

In the case of open type barbecues, lay the perforated sheet metal plate of 25 % free area centrally on the grill.

# B.27.5.3 Additional preparation of apparatus for fryers

(a) Place a temperature measuring device 25 mm below the surface of the cooking oil in the centre of each pan.

- (b) Install a water cooled heat exchanger in each pan.
- (c) Adjust the cooking oil to the normal working level.

# Procedure — Appliance operation

# Boiling tables — Open and closed top, Chinese cooking tables

The procedure shall be as follows:

- (a) Turn on gas and light burners, and operate the appliance at nominal gas consumption.
- (b) Place an open vessel containing 60 ± 10 mm of water on each open burner. These vessels shall be—
  - (i) standard test vessel(s) size from Table A.8; or
  - (ii) wok(s); or
  - (iii) special purpose vessel(s) specified or supplied by the manufacturer; or
  - (iv) rectangular pan(s), when in position, that does not protrude over the edges and covers at least 85 % of the area of the section of a solid enclosed top burner.
- (c) Bring water to the boil and turn the burners down to simmer for the duration of the test. In the case of a wok maintain at full boil.
- (d) Top up water in vessels as necessary to maintain a depth of  $60 \pm 10$  mm.
- (e) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.27.6.2 Salamanders, grillers and toasters

The procedure shall be as follows:

- (a) Turn on the gas and light the burners.
- (b) Fill the grill tray to a quarter of its depth with water and operate the appliance at nominal gas consumption.
- (c) Top up the water in the grill tray as necessary to maintain the required depth.
- (d) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.27.6.3 Solid grill plates and griddles

The procedure shall be as follows:

- (a) Turn on the gas and light the burners.
- (b) Adjust the gas consumption to maintain the temperature of the plate at 200  $\pm$  6 °C.
- (c) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.27.6.4 Barbecues

The procedure shall be as follows:

- (a) Turn on the gas and light the burners.
- (b) Operate the appliance for not less than 2 h, until thermal equilibrium is reached, with the following conditions:
  - (i) An open flame grill section of appliance at full rate.
  - (ii) An enclosed flame solid griddle plate section of appliance, as per B.26.6.3.
  - (iii) For an appliance specified by the manufacturer with different configuration options of open grill and solid griddle plate sections, each option shall be tested at its maximum size specified.
  - (iv) A covered/hooded cooking type appliance at the maximum cooking condition specified by the manufacturer.
  - (v) For an appliance specified by the manufacturer for both open and covered/hooded cooking, successive tests shall be conducted in accordance with the operating conditions specified in Items (i), (ii), (iii) and (iv).

### B.27.6.5 **Ovens**

The procedure shall be as follows:

- (a) Turn on the gas and light the burners.
- (b) Set the thermostat to 260 °C or maximum operating temperature, whichever is higher.
- (c) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.27.6.6 Boiling water units, stockpots, brat pans, atmospheric steamers and pasta cookers

The procedure shall be as follows:

(a) Fill with water to the normal operating level.

77/100

of the document should rely on the final published version distribution or use on network is prohibited.

(c) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

# B.27.6.7 Fryers

The procedure shall be as follows:

- (a) Confirm cooking oil is at the normal operating level with the heat exchanger in position.
- (b) Light the gas and set the thermostat to maximum temperature setting.
- (c) Start a small flow of water through the heat exchanger(s) and increase the flow when the temperature of the cooking oil approaches 180 °C.
- (d) By adjusting the water flow and if necessary the depth of immersion of the heat exchanger, maintain the cooking oil temperature at  $180 \pm 5$  °C throughout the test.
- (e) Operate the appliance for not less than 2 h, until thermal equilibrium is reached.

### B.27.6.8 Food warmers and bains marie

The procedure shall be as follows:

- (a) Turn on gas and light the burners.
- (b) Operate the appliance for not less than 2 h, until thermal equilibrium is reached at the gas consumption required to maintain 82 ± 6 °C.

# B.27.6.9 High temperature cookers

The procedure shall be as follows:

- (a) Turn on the gas and light the burner(s).
- (b) Operate the appliance for not less than 2 h until thermal equilibrium is reached with the thermostat (if fitted) set to maximum.

# B.27.6.10 Procedure — Temperature measurements

The procedure shall be as follows:

- (a) The appliance shall be kept operating while temperatures are being checked.
- (b) Measure the temperature of the rear surface.
- (c) Record the maximum temperatures attained during the test.

# B.27.7 Test report

All relevant observations shall be reported, including the following:

- (a) The nature of any special installation conditions indicated by a permanent marking on the appliance, otherwise the statement "No special conditions".
- (b) The maximum and minimum ambient temperature during the test period.
- (c) The highest recorded temperature rise above ambient on the rear surfaces when installed with zero rear clearances.
- (d) When applicable, record details of any appliance clearance channels or spacers.
- (e) The relative position of the maximum readings, the location of the thermocouple array to the installed appliance position.
- (f) Any and all modifications made to the standard temperature hazard apparatus (boards).

# B.28 Heat resistance (MOT 5.6.1

# B.28.1 Scope

This test method sets out the procedure to assess the heat resistance of the appliance when subjected temperature hazard testing.

# B.28.2 Principle

The appliance is examined for damage after the completion of temperature hazard testing as required in Clause B.26 in order to confirm that when installed and operated as will be expected, appliances are not damaged.

# B.28.3 Test report

All relevant observations shall be reported, including at least the following:

- (a) Any structural damage or permanent distortion.
- (b) Operation of controls, thermostats, etc.
- (c) Any refractory deterioration.
- (d) Flue passages restriction or expansion or movement.

ent-licence-agreement. or complete or that it should be relied on for any particular purpase. Any user of the document should rely on the final published ve

solely for review in providing public comment.
Further copying, storage, distribution or use on network is prohibited.
cument-licence-agreement.

78/100

- (f) Wiring insulation scorching or melting.
- (g) Any doors, shelves and other movable fittings function.
- (h) Where applicable, leakage of cooking fluid or water out of the vessel, and/or through attached components.
- (i) Where applicable, closed tops distortion.

# B.29 Heat resistance — Light back condition (MOT 5.6.2)

# **B.29.1** Scope

This test sets out the procedure to access the heat resistance of the burner(s) when subjected to light back conditions.

# B.29.2 Method

Each burner is tested to establish if it can be operated in the light back condition.

If the light back condition can be established, the burner is allowed to operate in this condition for 1 h at the maximum gas rate at which the light back condition can be maintained but at no more than the nominal gas rate.

# B.29.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable timing device.

# B.29.4 Materials

The following materials shall be used:

- (a) Supply of available test gas (see Clause 3.1).
- (b) Supply of cold water, if applicable.

# B.29.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Install the appliance in accordance with Clause 3.2.
- (b) Set up test equipment.

# B.29.6 Procedure

The procedure shall be as follows:

- (a) Operate the appliance in accordance with the manufacturer's instructions.
- (b) Ascertain if a light back condition can be established, at any achievable gas rate, by applying and removing an ignition source at the burner injector. If a light back condition cannot be established initially, allow the burner to operate normally for 15 min and repeat the light back test.
- (c) If a light back condition is established allow the burner to operate in this condition for a period of 1 h at the maximum gas rate at which the light back condition can be maintained but at no more than the nominal gas rate.
- (d) Allow the burner to cool and examine all components for evidence of melting or distortion.

# B.29.7 Test report

All relevant observations shall be reported, including at least the conditions including any sign of melting or distortion of all burner components.

# B.30 Electrical supply variation test (MOT 5.7)

# B.30.1 Scope

This test sets out the process to assess the safety of the appliance when subjected to electrical supply variations.

### B.30.2 Method

The electricity supply to the appliance is varied and the appliance operation is observed.

# B.30.3 Apparatus

ution or use on network is prohibited. censee may print once only, au/home/public-comment-d The following apparatus shall be used:

- (a) Means to supply an AC voltage variable between 85 % and 110 % of rated voltage of the appliance.
- (b) A voltmeter with an accuracy of ± 1 %.

# B.30.4 Materials

The following materials shall be used:

- (a) Supply of available test gas (see Clause 3.1).
- (b) Supply of cold water, if applicable.

# B.30.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) For an appliance with a fan, connect a switch in the fan circuit or other mechanical device so that the fan can be stopped without stopping supply of electricity to other components.
- (b) Install the appliance in accordance with Clause 3.2.
- (c) Set up test equipment.
- (d) Set the transformer output voltage to the nominal value.
- (e) Operate the appliance and check for normal performance.

# B.30.6 Procedure

The procedure shall be as follows:

- (a) With the appliance in operation increase the supply voltage to 110 % in steps of 2.5 % of nominal, observing after each step for any flame abnormality or other unsafe condition. If results are satisfactory proceed to Step (b), if not, stop test and report.
- (b) Reduce the voltage to nominal, then reduce the voltage to 85 % in steps of 2.5 % of nominal observing for any flame abnormality or other unsafe conditions. If results are satisfactory proceed to Step (c).
- (c) Increase the voltage to nominal.
- (d) Connect the electricity supply and operate the appliance for 5 min. Open the switch in the circuit of the fan to stop the fan only and watch for flame abnormality or safe shut down.
- (e) Close the switch and connect the electricity supply and operate the appliance. By means of the variable transformer reduce the voltage until shut down occurs. Watch for unsafe conditions.

# B.30.7 Test report

All relevant observations shall be reported, including at least the following:

- (a) Any flame abnormality is observed.
- (b) Any unsafe conditions created by disconnection and subsequent reconnection.
- (c) Any unsafe conditions created by fan failure.
- (d) The voltage at which shut down occurred and any unsafe conditions observed.

# B.31 Zinc based alloy test (MOT 5.8.1)

# B.31.1 Scope

This method sets out the procedure to assess the durability of zinc based alloys.

# B.31.2 Method

Three test samples are suspended above heated water for 10 days and checked for deterioration.

# B.31.3 Apparatus

The following apparatus shall be used.

A chamber of suitable size to enclose the test samples suspended above a quantity of water heated to a temperature of 97 ± 2 °C such that:

- (a) The water level is maintained automatically; and
- (b) The pressure in the chamber is maintained at atmospheric pressure via a water filled S trap.

# B.31.4 Materials

Supply of cold water shall be used.

# B.31.5 Preparation of apparatus

by Standards Australia to the registered licensee solely for review in providing public comment.
ited. The registered licensee may print once only. Further copying, storage, distribution or use on network is prohibit
//www.standards.org.su/home/public-comment-document-licence-agreement.

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

# B.31.6 Procedure

The procedure shall be as follows:

- (a) Suspend the three samples above the water.
- (b) Maintain the water temperature at 97  $\pm$  2 °C for 10 days.
- (c) Inspect samples for deterioration at the conclusion of Step (b).

# B.31.7 Test report

All relevant observations shall be reported, including at least the condition of the samples at the conclusion of the test.

# B.32 Permanent markings test (MOT 5.8.2)

# B.32.1 Scope

This method sets out the procedure to assess the durability of permanent markings.

# B.32.2 Principle

The legibility of all markings and labels is checked by rubbing with material soaked in water and kerosene before and after a heat soak test in an oven. The adhesion of self-adhesive labels is checked before and after the heat test and immersion in water.

# B.32.3 Apparatus

The following apparatus shall be used:

- (a) Oven suitable for maintaining a temperature of 120  $\pm$  5 °C and 175  $\pm$  5 °C.
- (b) Water bath.
- (c) Suitable timing device.

# B.32.4 Materials

The following materials shall be used:

- (a) Water.
- (b) Kerosene.
- (c) Suitable material such as cotton or linen.
- (d) Three sets of markings and labels, affixed to suitable backing plates e.g. enamelled steel, if of the self-adhesive type.

# B.32.5 Procedure

The procedure shall be as follows:

- (a) Check self-adhesive labels for good adhesion and no lifting at edges.
- (b) Rub markings for 15 s with finger pressure applied to material soaked in water and check for legibility.
- (c) Rub markings for 15 s with finger pressure applied to material soaked in kerosene and check for legibility.
- (d) Place one sample of markings and label in an oven at a temperature of 120 °C (175 °C if the markings or label are to be in a hot zone e.g. the grill compartment or oven of a cooker) for 72 h.
- (e) Remove samples from oven, allow to cool and check for adhesion and legibility as in Steps (a) to (c).
- (f) Immerse one sample of markings and label in water for 24 h.
- (g) Remove sample from water, dry and check for adhesion and legibility as in Steps (a) to (c).

# B.32.6 Test report

All relevant observations shall be reported, including the following:

- (a) The legibility of markings.
- (b) The adhesion of labels.

# B.33 Strength of boiling tables (MOT 6.2)

# B.33.1 Scope

This method sets out the procedure to determine if a boiling table is able to withstand a specified load.

# B.33.2 Principle

cument made available by Standards Australia to the regist the document is prohibited. The registered incensee may page available at https://www.standards.org.su/home/publis

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

# B.33.3 Apparatus

The following apparatus shall be used:

- (a) Weights totalling 68 kg or 140 ± 1 kg respectively.
- (b) 150 mm wooden beam.
- (c) Suitable timing device.

# B.33.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.33.5 Procedure

The procedure shall be as follows:

- (a) Remove the open burner grids and solid plates.
- (b) Place a 150 mm wooden beam across the two weakest members of the cross frame at their centres.
- (c) Apply a load of 140 kg without impact at the centre of the beam.
- (d) After 15 min remove weight and inspect the boiling table.
- (e) Replace the open burner grids and solid plates.
- (f) Apply a load of 68 kg evenly and without impact over an area of 225 mm in diameter at the centre of the grid in case of open boiling tables.
- (g) Apply a load of 68 kg evenly and without impact over an area of 400 mm in diameter at the centre of the top in case of closed top burners.
- (h) After 15 min remove load and inspect for any breakage or apparent damage.

# B.33.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any detrimental damage or permanent deformation,

# B.34 Effect of spillover on ignition systems test (MOT 6.3)

# B.34.1 Scope

This method sets out the procedure to determine the effect of spillover on the pilots and ignition system of open and closed boiling tables.

# B.34.2 Principle

Burners are subjected to simulated spillover conditions, then tested for complete ignition.

# B.34.3 Apparatus

The following apparatus shall be used:

- (a) Standard test vessel (see Table A.8).
- (b) Graduated measuring cylinder 200 mL.

# B.34.4 Materials

Available gas at normal test pressure.

# B.34.5 Preparation of apparatus

Set up the appliance in accordance with Clause 3.2.

# B.34.6 Procedure

The procedure shall be as follows:

- (a) Place the appropriate standard vessel filled to the brim with water, over one burner and light the gas.
- (b) Before boiling point is reached (approximately 95 °C) fill vessel to the brim with extra water.
- (c) Add another 140 mL of water to the vessel in 2 to 3 s to cause overflow.

stribution or use on network is prohibited. draft document made available by Standard r use of the document is prohibited. The reg ce terms are available at https://www.stand

- (d) Observe pilot for extinction.
- (e) Turn burner off and wipe up all spillage accessible without the use of tools.
- (f) Turn burner on again and check for positive ignition.
- (g) Repeat Steps (a) to (f) for all burners.

# B.34.7 Test report

All relevant observations shall be reported, including the following:

- (a) If the pilots remain alight.
- (b) If the burners remain alight.
- (c) If any burner has been extinguished because of the action of a flame supervisions device.
- (d) If all burners can be reignited.

# B.35 Strength test — Shelves — Salamanders and grillers (MOT 7.3)

B.35.1 Scope

This method sets out the procedure to determine if appliance shelves are able to withstand a specified load.

# B.35.2 Principle

A specified weight is applied without impact to the appliance shelves and any breakage or damage is observed.

# B.35.3 Apparatus

The following apparatus shall be used:

- (a) Weights totalling  $50 \pm 1$  kg.
- (b) Suitable timing device.

# B.35.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.35.5 Procedure

The procedure shall be as follows:

- (a) Place shelf in full in position.
- (b) Apply the load equivalent to 50 kg/m<sup>2</sup> of shelf area over a central strip two-thirds of the width and the full depth of the shelf.
- (c) Remove the weights after 5 min.
- (d) Examine shelf for damage or distortion.
- (e) Place shelf in position withdrawn to stops.
- (f) Reapply load.
- (g) Remove the weights after 15 min.
- (h) Examine shelf for damage or distortion.

# B.35.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any detrimental damage or permanent deformation.

# B.36 Strength of ovens (MOT 10.4.1)

# B.36.1 Scope

This method sets out the procedure to determine if an oven is able to withstand a specified load.

# B.36.2 Principle

A specified weight is applied without impact to the appliance and any breakage or damage is observed.

# B.36.3 Apparatus

The following apparatus shall be used:

- (a) Weights totalling 180 ± 1 kg.
- (b) Suitable timing device.

# B.36.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.36.5 Procedure

The procedure shall be as follows:

- (a) Uniformly apply the load to the top of the oven without impact.
- (b) After 15 min remove weight and inspect the oven.

# B.36.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any detrimental damage or permanent deformation.

# B.37 Strength test — Shelves — Ovens (MOT 10.4.2)

# B.37.1 Scope

This method sets out the procedure to determine if appliance shelves are able to withstand a specified load.

# B.37.2 Principle

A specified weight is applied without impact to the appliance shelves and any breakage or damage is observed.

# B.37.3 Apparatus

The following apparatus shall be used:

- (a) Sufficient weights to make up the specified loads.
- (b) Suitable timing device.

# B.37.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.37.5 Procedure

The procedure shall be as follows:

- (a) Place shelf in full in position.
- (b) Apply the load equivalent to 100 kg/m² of shelf area over a central strip two-thirds of the width and the full depth of the shelf.
- (c) Remove the weights after 5 min.
- (d) Examine shelf for damage or distortion.
- (e) Place shelf in half withdrawn position.
- (f) Reapply load.
- (g) Remove the weights after 15 min.
- (h) Examine shelf for damage or distortion.

# B.37.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any detrimental damage or permanent deformation.

# B.38 Strength test — Drop down doors — Ovens (MOT 10.4.3/17.5.3)

B.38.1 Scope

This method sets out the procedure to determine if appliance drop down doors are able to withstand a specified load.

behalf und raw on the final published

# B.38.2 Principle

A specified weight is applied to the appliance doors and any breakage or damage is observed.

# B.38.3 Apparatus

The following apparatus shall be used:

Weights totalling 90  $\pm$  1 kg.

Suitable timing device.

# B.38.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.38.5 Procedure

The procedure shall be as follows:

- (a) Open the drop down door(s).
- (b) Apply the load uniformly to the inner surface of each door(s).
- (c) Remove the weights after 15 min.
- (d) Examine door for damage or distortion.

# B.38.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any detrimental damage or permanent deformation.

# B.39 Strength test — Side hinged doors — Ovens (MOT 10.4.4/17.5.4)

# **B.39.1** Scope

This method sets out the procedure to determine if side hinged appliance doors are able to withstand a specified load.

# B.39.2 Principle

A specified weight is applied to the appliance doors and any breakage or damage is observed.

# B.39.3 Apparatus

The following apparatus shall be used:

- (a) Weights totalling  $25 \pm 1 \text{ kg}$ .
- (b) Suitable timing device.

# B.39.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.39.5 Procedure

The procedure shall be as follows:

- (a) Open the door(s) 90°.
- (b) Apply the load within 25 mm of the outer top edge of the door(s).
- (c) Remove the weights after 15 min.
- (d) Examine door(s) for damage or distortion.

# B.39.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any detrimental damage or permanent deformation.

# B.40 Strength of atmospheric steamers (MOT 12.3)

# red incensee solely for review in providing public comment. It ance only. Further copying, storage, distribution or use on network is prohibited comment-document-licence-agreement. ment is accurate or complete or that it should be relied on for each particular purport.

# B.40.1 Scope

This method sets out the procedure to determine if an atmospheric steamer is able to withstand a specified load

# B.40.2 Principle

A specified weight is applied without impact to the appliance and any breakage or damage is observed.

# B.40.3 Apparatus

The following apparatus shall be used:

- (a) Weights totalling 50 ± 1 kg.
- (b) Suitable timing device.

# B.40.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.40.5 Procedure

The procedure shall be as follows:

- (a) Uniformly apply the load to the top of the appliance without impact.
- (b) After 15 min remove weight and inspect the steamer.

# B.40.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any detrimental damage or permanent deformation.

# B.41 Temperature of surfaces and cooking oil (MOT 13.1.2/14.1.2)

# **B.41.1** Scope

This method sets out the procedure to measure the temperature difference between the highest temperature of any appliance surface likely to come into contact with cooking oil and the cooking oil.

# B.41.2 Principle

The temperature of appliance surfaces which may come in contact with cooking oil are measured when the appliance is operated under thermostatic control.

# B.41.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A temperature measuring device suitable for measuring the temperature of the cooking oil.
- (c) A temperature measuring device suitable for measuring surface temperatures.

# B.41.4 Materials

The following materials shall be used:

- (a) Available gas (see Clause 3.1) at normal test gas pressure.
- (b) Supply of cooking oil.

# B.41.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) Fill the appliance with cooking oil to the normal working level.
- (c) Place the cooking oil temperature sensing device 25 mm below the surface of the cooking oil in the centre of the pan.

# B.41.6 Procedure

The procedure shall be as follows:



- (a) Light the appliance burners.
- (b) Set the thermostat to its maximum setting or for brat pans to 210
- (c) Operate the appliance until thermal equilibrium is reached.
- (d) Locate and determine the highest temperature of any surface that may come in contact with the cooking oil.
- (e) Measure the cooking oil temperature.

# B.41.7 Test report

All relevant observations shall be reported, including the following:

- (a) The location of the highest surface temperature that may come in contact with the cooking oil.
- (b) The highest surface temperature that may come in contact with the cooking oil.
- (c) The temperature of the cooking oil.

# B.42 Operation of low water level safety device (MOT 13.4)

### B.42.1 Scope

This method sets out the procedure to assess the operation of a low water level safety device.

### B.42.2 Principle

The stockpot is operated to simulate a low water level condition and the operation of the safety device is checked to ensure the gas is shut off before damage occurs to the appliance.

### B.42.3 **Apparatus**

Equipment as specified in Appendix D.

### B.42.4 Materials

The following materials shall be used:

- (a) Available gas (see Clause 3.1) at normal test gas pressure.
- (b) Supply of cold water.

# Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) Fill the appliance with water to just above the low level safety device.

### B.42.6 Procedure

The procedure shall be as follows:

- (a) Light the appliance burners.
- (b) Set the operating control to maximum setting.
- (c) Operate the appliance until the safety devices cut off the gas. If damage to the appliance is evident before cut-off occurs, turn off gas manually.
- (d) Inspect the appliance for damage.

# B.42.7 Test report

All relevant observations shall be reported.

# Strength of stockpots (MOT 13.9.

चि B.43.1 Scope

This method sets out the procedure to determine if a stockpot is able to withstand a specified load.

# This method sets out the process B.43.2 Principle

A specified weight is applied without impact to the appliance and any breakage or damage is observed.

### B.43.3 Apparatus

The following apparatus shall be used:

- (a) A wooden board approximately 50 mm wide by 25 mm thick and suitable length.
- (b) Weights with a total mass equal to 25 % of the rated capacity less the mass of the wooden board.

# B.43.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.43.5 Procedure

The procedure shall be as follows:

- (a) Remove or open the lid.
- (b) Place the beam centrally over the stockpot.
- (c) Uniformly apply the load to the centre of the beam without impact.
- (d) After 15 min remove weight and inspect.

# B.43.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any damage or permanent deformation.

# B.44 Automatic control — Fryers (MOT 14.3.1)

# **B.44.1** Scope

This method sets out the procedure to assess the operation of fryer thermostatic controls.

# B.44.2 Principle

The appliance is operated under thermostatic control and the cooking oil temperature is compared with the temperature setting

# B.44.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A temperature measuring device suitable for measuring the temperature of the cooking oil.

# B.44.4 Materials

The following materials shall be used:

- (a) Available gas (see Clause 3.1) at normal test gas pressure.
- (b) Supply of cooking oil.

# B.44.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) Fill the appliance with cooking oil to the normal working level.
- (c) Place the cooking oil temperature sensing device 25 mm below the surface of the oil in the centre of the pan.

# B.44.6 Procedure

The procedure shall be as follows:

- (a) Light the appliance burners.
- (b) Set the thermostat to 180 °C.
- (c) Operate the appliance until thermal equilibrium is reached.
- (d) Measure the cooking oil temperature.

# B.44.7 Test report

All relevant observations shall be reported, including the cooking oil temperature.

# B.45 Over-temperature device — Fryers (MOT 14.3.2)

draft document made available by Standards Australia to the registered licensee solely for review in use of the document is prohibited. The registered licensee may print once only. Further copying, ce terms are available at https://www.standards.org.au/home/public-comment-document-licence-

tilicence-agreement. complete or that it should be relied on for any particular purpose. Any user of the document should rely on the final pu

prohibited

### B.45.1 Scope

This method sets out the procedure to assess the operation of the over-temperature device.

### B.45.2 Principle

The appliance is operated with its thermostatic control disabled and the cooking oil temperature is measured.

### B.45.3 **Apparatus**

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A temperature measuring device suitable for measuring the temperature of cooking oil.

# B.45.4 Materials

The following materials shall be used:

- (a) Available gas (see Clause 3.1) at normal test gas pressure.
- (b) Supply of cooking oil.

# Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) Render the thermostat inoperative by any convenient means, e.g. by removing sensing element from pan.
- (c) Fill the appliance with cooking oil to the normal working level.
- (d) Place the cooking oil temperature sensing device 25 mm below the surface of the oil in the centre of the pan.

### B.45.6 Procedure

The procedure shall be as follows:

- (a) Light the appliance burners.
- (b) Set the thermostat to maximum setting.
- (c) Operate the appliance, continually monitoring cooking oil temperature until the over-temperature device shuts off the gas.
- (d) If the over-temperature device has not shut off the gas or the cooking oil temperature reaches 250 °C, stop test and report as a failure to conform to this requirement.
- (e) If the over-temperature device has shut off the gas, record oil temperature at the time of shut off.

# B.45.7 Test report

# All relevant observations shall be reported, including the cooking B.46 Strength of fryers, pasta cooker and " 145)

### ≥ B.46.1 Scope

This method sets out the procedure to determine if an appliance is able to withstand a specified load.

# B.46.2 Principle

A specified weight is applied without impact to the appliance and any breakage or damage is observed.

# B.46.3 Apparatus

The following apparatus shall be used:

- (a) A wooden board approximately 50 mm wide by 25 mm thick and suitable length.
- (b) Weights with a total mass equal to  $50 \pm 1$  kg less the mass of the wooden board.

### B.46.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

### B.46.5 Procedure

The procedure shall be as follows:

solely for review in providing public comment.
Further copying, storage, distribution or use on network is prohibited.
cument-licence-agreement.

- (a) Remove or open the lid.
- (b) Place the board centrally over the stockpot.
- (c) Uniformly apply the load to the board without impact.
- (d) After 15 min remove weight and inspect.

# B.46.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any damage or permanent deformation.

# B.47 Temperature control and maintenance — Wet bains marie (MOT 12.2.2.1/15.2.2/15.2.3)

# **B.47.1** Scope

This method sets out the procedure to assess the heating temperature of wet bains marie.

# B.47.2 Principle

The appliance is operated at nominal gas consumption and the water level and temperatures are monitored.

# B.47.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A temperature measuring device suitable for water.
- (c) A suitable timing device.
- (d) Suitable water containers.
- (e) Means to heat supply water for the bain marie containers.

# B.47.4 Materials

The following materials shall be used:

- (a) Available gas at normal test gas pressure.
- (b) Supply of cold water.

# B.47.5 Preparation of apparatus

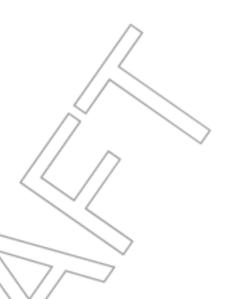
The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) Fill the well of the bain marie with water at 15  $\pm$  1 °C to the manufacturer's recommended level.
- (c) For fitted container type bains marie, fit the containers with lids in place. The containers are left empty. An open well type bain marie is tested without any cover.
  - In the absence of manufacturer's instructions an open well type bain marie shall be filled to nominally 10 mm above the perforated plate. For a fitted container type bain marie the base of the containers shall be immersed approximately 10 mm in the water.
- (d) Install one temperature measuring device for each 0.6 mm length of the well.

# B.47.6 Procedure

The procedure shall be as follows:

- (a) Record the average water temperature.
- (b) Light the appliance and start the timing device.
- (c) Set the thermostat (if fitted) to maximum.
- (d) When the average water temperature reaches 80 °C record the elapsed time.
- (e) Remove the lids of the containers, where fitted.
- (f) Measure the temperatures of the base of each fitted container or the temperature of the water of open well types.
- (g) Observe and record temperatures periodically over a period of 2 h.
- (h) Turn off the appliance at the end of 2 h, or earlier if the water in the well boils dry.



Standards Australia to the registered licensee solely for review in providing public comment.

The registered licensee may print once only. Further ecpying, storage, distribution or use on network is prohibits vw.standards.org.su/home/public-comment-document-licence-agreement.

# All relevant observations shall be reported, including at least the following:

- (a) The time taken for the water to reach 80 °C.
- (b) The recorded temperatures during the 2 h test period.
- (c) The volume of water remaining at the end of the test.
- (d) The thermostat setting (if fitted).

# B.48 Automatic temperature control — Food warmers and bains marie (MOT 15.2.2.3)

### B.48.1 Scope

This method sets out the procedure to assess the operation of thermostatic controls.

### B.48.2 **Principle**

The appliance is operated at nominal gas consumption and the range of temperature variation is observed.

### B.48.3 **Apparatus**

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A suitable temperature measuring device.

# B.48.4 Materials

The following materials shall be used:

- (a) Available gas at normal test gas pressure.
- (b) Supply of cold water for wet food warmers and bains marie.

# Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) For a wet food warmer or bain marie, position the temperature measuring device 50 mm below the container covers.
- (c) For a dry food warmer or bain marie, position the temperature measuring device in the geometric centre of each cabinet.

# Procedure — Wet food warmer or wet bain marie

The procedure shall be as follows:

- (a) Fill each container with boiling water to within 25 mm of the top and allow the water to cool until the average temperature is  $74 \pm 3$  °C.
- (b) Operate the appliance in accordance with manufacturer's instructions.
- (c) Set the thermostat to minimum setting.
- (d) Allow the appliance to reach equilibrium and record the water temperature.
- (e) Repeat Steps (c) and (d) for two other ascending settings of a variable thermostat.

# B.48.7 Procedure — Dry food warmer or dry bain marie

The procedure shall be as follows:

- (a) Operate the appliance in accordance with manufacturer's instructions.
- (b) Set the thermostat to minimum setting.
- (c) Allow the appliance to reach thermal equilibrium and record the cabinet temperature.
- (d) Repeat Steps (b) and (c) for two other ascending settings of a variable thermostat.

### Test report B.48.8

All relevant observations shall be reported, including at least the following:

- (a) The thermostat temperature settings for each test.
- (b) The measured temperatures over the period of each test.

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

# B.49 Temperature maintenance — Dry bain marie (MOT 15.2.2.4)

### Scope B.49.1

This method sets out the procedure to assess the heating temperature and performance of dry bains marie.

### Principle B.49.2

The appliance is operated at nominal gas consumption to cook porridge, the porridge condition and temperatures are observed.

### B.49.3 **Apparatus**

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A suitable temperature measuring device.
- (c) A suitable timing device.
- (d) Means to cook porridge in containers separate from the tested appliance.
- (e) Graduated 1 L measure.
- (f) Stirrers for the porridge.
- (g) Suitable scales for weighing the porridge.

### B.49.4 **Materials**

The following materials shall be used:

- (a) Available gas at normal test gas pressure.
- (b) Supply of cold water.
- (c) Supply of rolled oats.

# Preparation of apparatus

Set up the appliance in accordance with Clause 3.2.

### B.49.6 Procedure

The procedure shall be as follows:

- (a) Remove the food containers from the bain marie and cover the openings with lids.
- (b) Operate the appliance.
- (c) Allow the bain marie to heat for 45 min.
- (d) Prepare porridge in the containers by adding rolled oats in the proportions of 1 L to 100 g.
- (e) Fill the containers to 25 mm from the top.
- (f) Cook and simmer the mixture using the separate heating means.
- (g) Cool the porridge to  $85 \pm 3$  °C.
- (h) Transfer the containers to the bain marie under test and cover with the lids.
- (i) Stir the porridge every 10 min for the first 60 min.
- (j) Leave the porridge undisturbed for a further 30 min and measure the temperature in each container.
- (k) Empty the containers and examine for sticking and scorching.

# B.49.7 Test report

All relevant observations shall be reported, including at least the following:

- (a) The recorded temperatures during the test period.
- (b) The condition of the porridge.

### Heating time — Hot press (MOT 15.2.2.5) B.50

### B.50.1 Scope

This method sets out the procedure to assess the time taken to heat each compartment.

### **Principle** B.50.2

stribution or use on network is prohibited. draft document made available by Standards A r use of the document is prohibited. The regists ce terms are available at https://www.standard

http://localhost:5000/Pdf/e5001044-74fc-492c-a047-91e27c5112fb?sectionView=SinglePageView&pdfUserName=Baini

# B.50.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) A suitable temperature measuring device.
- (c) A suitable timing device.

# B.50.4 Materials

Available gas at normal test gas pressure.

# B.50.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) Place thermocouples in suitable positions to determine the average temperature of each compartment.

# B.50.6 Procedure

The procedure shall be as follows:

- (a) Adjust the thermostat to maximum setting (unless fixed) and start the timing device.
- (b) Operate the appliance at the nominal gas consumption.
- (c) Set the thermostat to minimum setting.
- (d) When the average temperature of the hot press has risen to 60 °C, stop the timing device and turn off the appliance.

# B.50.7 Test report

All relevant observations shall be reported, including at least the following:

- (a) The elapsed time for the test.
- (b) The ambient temperature.
- (c) The measured temperature rise in each compartment.

# B.51 Temperature maintenance and variation — Food warmers (MOT 15.2.2.6)

# B.51.1 Scope

This method sets out the procedure to assess the heating temperature and setting accuracy of food warmers.

# B.51.2 Principle

The appliance is operated to maintain a temperature in excess of 80 °C, and operating temperatures are monitored.

# B.51.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Suitable temperature measuring devices.
- (c) A suitable timing device.

# B.51.4 Materials

The following materials shall be used:

- (a) Available gas at normal test gas pressure.
- (b) Adequate number of 240 mm to 250 mm dinner plates.

# B.51.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) Position measuring devices to measure the average temperature of each compartment.

draft document made a r use of the document is ce terms are available s

- (c) Cover all shelves with a single layer of dinner plates.
- (d) If the top is heated, mark three test points on the horizontal plane along the centre line of the appliance, one at the centre, and the other two halfway between the centre and each side of the appliance.

# B.51.6 Procedure

The procedure shall be as follows:

- (a) Operate the food warmer.
- (b) Where fitted, set the thermostat to the minimum marked food storage setting.
- (c) Allow the appliance to reach equilibrium.
- (d) Measure the average temperature in each cabinet.
- (e) Measure the temperature at each test point of the heated top.

# B.51.7 Test report

All relevant observations shall be reported, including at least the following:

- (a) The average temperature of each cabinet during the test period.
- (b) The recorded heated top temperatures during the test period.

# B.52 Strength test — Shelves, food warmers and ⊆bains marie (MOT 15.3)

Scope **m** B.52.1

This method sets out the procedure to determine if appliance shelves are able to withstand a specified load.

### Principle B.52.2

A specified weight is applied without impact to the appliance shelves and top and any breakage or damage is observed.

### B.52.3 **Apparatus**

The following apparatus shall be used:

- (a) Sufficient weights to make up the specified loads.
- (b) Suitable timing device.

### B.52.4 Materials

Supply of cold water.

### B.52.5 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

### B.52.6 Procedure

The procedure shall be as follows:

- (a) Fill the water compartments and the food containers with the maximum possible amount of water.
- (b) Successively and evenly apply to each shelf and the top of the appliance if it is flat a load equivalent to 100 kg/m<sup>2</sup> of shelf area and top area.
- (c) Remove the water and weights after 15 min.
- (d) Place a load of 34 kg evenly, and in turn, on each square metre of the top of the serving shelf (where fitted) of the appliance.
- (e) Remove the weights after 5 min.
- (f) Examine shelf for damage or distortion.

# B.52.7 Test report

All relevant observations shall be reported, including any damage, displacement or permanent deformation, and its location.

# Stability and strength test — High temperature ovens (MOT 17.5.1/17.5.2)

Scope B.53.1



# B.53.2 Principle

A specified weight is placed upon the appliance food supports and is observed.

# B.53.3 Apparatus

The following apparatus shall be used:

- (a) Sufficient weights to make up the specified load in masses to represent the food type to be used in the appliance.
- (b) A suitable timing device.

# B.53.4 Preparation of apparatus

Set up the appliance in accordance with the manufacturer's instructions on a firm, level base.

# B.53.5 Procedure

The procedure shall be as follows:

- (a) Successively hang or place required weights on appliance food supports.
- (b) Observe appliance and any stabilization means for movement.
- (c) Remove the weights after 15 min.
- (d) Examine hangers and supports for damage or distortion.

# B.53.6 Test report

All relevant observations shall be reported, including any tipping, damage, displacement or permanent deformation, and its location.

# B.54 Determination of CO/CO<sub>2</sub> ratio for independent burners — Mobile serving appliance (MOT 18.3.1)

# **B.54.1** Scope

This method sets out the procedure to determine the ratio of carbon monoxide to carbon dioxide (CO/CO<sub>2</sub>) in the combustion products of the appliance under test.

# B.54.2 Principle

The appliance is operated. A representative sample of the combustion products is analysed for the CO and CO<sub>2</sub> concentration after a specified period of operation. From the results obtained the CO/CO<sub>2</sub> ratio is calculated.

# B.54.3 Apparatus

The following apparatus shall be used:

- (a) Equipment as specified in Appendix D.
- (b) Carbon monoxide analyser, calibrated to give accurate and reproducible results.
- (c) Carbon dioxide analyser, calibrated to give accurate and reproducible results.
- (d) Sampling apparatus (probe or hood, see Figures A.3, A.4, A.5, A.6 and A.7, as appropriate) known to not affect the representativeness of the sampled gases under prevailing conditions.
- (e) Sampling lines and conditioner (if used) known to be inert to CO and CO<sub>2</sub>.
- (f) Suitable timing device.

# B.54.4 Materials

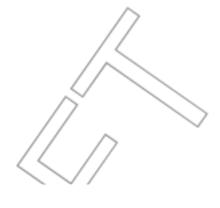
The following materials shall be used:

- (a) Supply of appropriate test gas at normal test gas pressure (see Clause 3.1).
- (b) Where necessary, a supply of cold water.

# B.54.5 Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Set up the appliance in accordance with Clause 3.2.
- (b) Where required, add water to the level specified by the manufacturer.
- (c) Set up test equipment.



# B.54.6 Procedure

The procedure shall be as follows:

(a) Light the burner(s).

products.

(b) Determine CO and CO<sub>2</sub> 10 min after ignition.

# B.54.7 Test report

All relevant observations shall be reported, including the following:

- (a) The recorded CO and CO<sub>2</sub> values.
- (b) The calculated CO/CO<sub>2</sub> ratio.

# B.55 Containment of hot liquids — Mobile serving appliance (MOT 18.3.2)

### B.55.1 Scope

This method sets out the procedure to assess the ability of an appliance to retain liquids within the appliance perimeters.

# B.55.2 Principle

A moving appliance is stopped suddenly and liquid containment is assessed.

### B.55.3 **Apparatus**

The following apparatus shall be used:

- (a) Suitable means to move appliance at constant speed.
- (b) Suitable means to measure speed of movement.
- (c) Suitable means to stop the appliance suddenly, this may be the appliance brakes.

# Preparation of apparatus

Add water to the fill level specified by the manufacturer.

### B.55.5 Procedure

The procedure shall be as follows:

- (a) Initiate appliance movement.
- (b) Stop appliance movement suddenly.
- (c) Observe the appliance and its contents.

### B.55.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The means of stopping the appliance.
- (b) Any detrimental damage or permanent deformation.
- (c) The details of any water spillage

# B.56 Strength test — Mobile serving appliance

(MOT 18.4.1)

\$ B.56.1 Scope

This method sets out the procedure to assess the strength of stability of an appliance and its supports when subjected to a specified load.

# B.56.2 Principle

A load relative to the appliance weight is applied for a period of 5 min and the appliance inspected for permanent distortion or damage.

### B.56.3 **Apparatus**

The following apparatus shall be used:

etwork is prohibited.

- (b) Rigid board or steel plate 100 mm wide and of a length just exceeding the largest dimensions of the top of the appliance.
- (c) A suitable timing device.
- (d) Scale of suitable range to weigh the appliance.

# Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) Inspect the appliance for any structural defect.
- (b) Place the appliance on a firm, level base.

# B.56.5 Procedure

The procedure shall be as follows:

- (a) Place board in position on top of the appliance.
- (b) Apply the weight uniformly without impact for 5 min.
- (c) Examine the appliance for any permanent damage or deformation.

# B.56.6 Test report

All relevant observations shall be reported, including at least the following:

- (a) The applied weight.
- (b) Any detrimental damage or permanent deformation.

# B.57 Stability test — Mobile serving appliance (MOT 18.4.2)

### Scope B.57.1

This method sets out the procedure to assess the stability on an appliance on an inclined plane.

### B.57.2 **Principle**

The appliance is inclined at an angle to the horizontal in all directions and it is observed whether the appliance tips over.

### B.57.3 Apparatus

The following apparatus shall be used:

- (a) An incident plane, set at 15° included angle to the horizontal and rotatable about an axis normal to the plane.
- (b) The gas container(s) recommended by the manufacturer.

# Preparation of apparatus

The apparatus shall be prepared as follows:

- (a) If the appliance is fitted with a brake or stabilizer which is operated manually, this shall be engaged before the tests.
- (b) If an appliance is fitted with castors, the castors shall be placed in the position that results in the least stability.
- (c) Where required, add water to the level specified by the manufacturer.

# B.57.5 Procedure

The procedure shall be as follows:

- (a) Place the appliance in the centre of the inclined plane with any appliance lids closed.
- (b) Fit a full self-contained LP Gas supply in the appliance.
- (c) Rotate the inclined plane through 360°.
- (d) Repeat Steps (a) to (c) with any attached appliance lids open.
- (e) Repeat Steps (a) to (d) with any gas supply container empty.

NOTE The use of a wedge is permitted to avoid the appliance sliding.

### B.57.6 Test report

All relevant observations shall be reported, including at least the following:

(a) The stability of the appliance.

purpose. Any user of the distribution or use on network is prohibited.

(c) Any closure of the appliance lid.



(normative)

# Meter volume correction factors

In this Standard, heating value and test gases are defined on a dry gas basis at metric standard conditions (MSC). Therefore, when measuring gas volumes or rates for calculation purposes, as in determining the thermal efficiency of an appliance, these should be corrected back to MSC taking cognisance of the barometric or atmospheric pressure, the gas temperature and pressure, whether the heating value of the gas at the time of testing is declared wet or dry, and whether a wet or dry gas meter is used.

NOTE If a wet gas meter is used, then a saturator upstream of the meter should also be used to ensure saturation of the gas.

The formulae to be applied for obtaining corrected gas rates or volumes (heating value on a dry basis) are as follows:

### Using wet meter

$$Q \, = \, V \, imes \, \left( rac{P_{
m b} + P_{
m m} - P_{
m w}}{101.325} 
ight) \, imes \, \left( rac{288.15}{273.15 + t} 
ight)$$

### **Using dry meter**

$$Q \,=\, V \, imes\, \left(rac{P_{
m b}+P_{
m m}}{101.325}
ight) \, imes\, \left(rac{288.15}{273.15+t}
ight)$$

### <u>where</u>

corrected gas rate or gas volume (m<sup>3</sup>/h or m<sup>3</sup>) Q

V metered gas rate or gas volume (m<sup>3</sup>/h or m<sup>3</sup>)

barometric pressure (kPa)

meter gauge pressure (kPa)

saturated water vapour pressure at meter temperature *t* (kPa)

meter temperature (°C)

The corrected heat input to the appliance may then be obtained from:

 $H = Q \times C$ 

<u>where</u>

Η heat input (MJ or MJ/h)

Cdry heating value (MJ/m<sup>3</sup>)

The saturated water vapour pressure  $P_{\rm w}$  at temperature t may be obtained from Table C.1.

	Table C.1 — Saturated water vapour pressure					
	t	$P_{w}$	t	$P_{w}$	t	P <sub>w</sub> //
L	°C	kPa	°C	kPa	°C	kPa
ŀ	15	1.704	20	2.337	25	3.167
ŀ	15.5	1.760	20.5	2.411	25.5	3.263
	16	1.817	21	2.486	26	3.361
	16.5	1.876	21.5	2.564	26.5	3.462
	17	1.936	22	2.643	27	3.565
Ŀ	17.5	1.999	22.5	2.725	27.5	3.671
ŀ	18	2.063	23	2.809	28	3.780
	18.5	2.129	23.5	2.895	28.5	3.892
	19	2.196	24	2.983	29	4.006
	19.5	2.266	24.5	3.074	29.5	4.123
					30	4.244

These values for water vapour pressure are derived from the Antoine equation (for further information refer to Lange's Handbook of Chemistry):

 $P_{\rm W} = 0.13333 \times 10^{\rm X} \, ({\rm kPa})$ 

where where

# Appendix D

(normative)

# Pressure and gas volume test equipment

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

(a) A wet or dry gas meter.

NOTE A graph should be provided showing the error or correction factor of the meter over a range as wide as possible.

The following also applies to the test gas meter:

- (i) A saturator shall be used with a wet test gas meter to ensure saturation of the gas.
- (ii) It is permitted to use a calibrated dry gas meter on dry gas or a calibrated flow meter for test purposes, but in case of dispute, the wet meter shall be the reference standard.
- (b) An adjustable regulator of adequate capacity fitted to the meter inlet.
- (c) Pressure gauges connected to meter inlet, appliance inlet and pressure test point, to read to the nearest 10 Pa.
- (d) A thermometer, graduated to at least 0.5 °C installed to measure the gas temperature. The meter water temperature gives a sufficiently accurate figure.
- (e) A barometer, to measure atmospheric pressure in the laboratory correct to 30 Pa.
- (f) A means of determining within 1 % the heating value of the gas being used.
- (g) A means of determining within 2 % the relative density of the gas being used.

# Appendix E

(informative)

# Diagrammatic representation of an operating system for automatic burners

Figure E.1 shows an example of one method of representing the operating sequence of an automatic burner system where  $t_n$  is time in seconds.

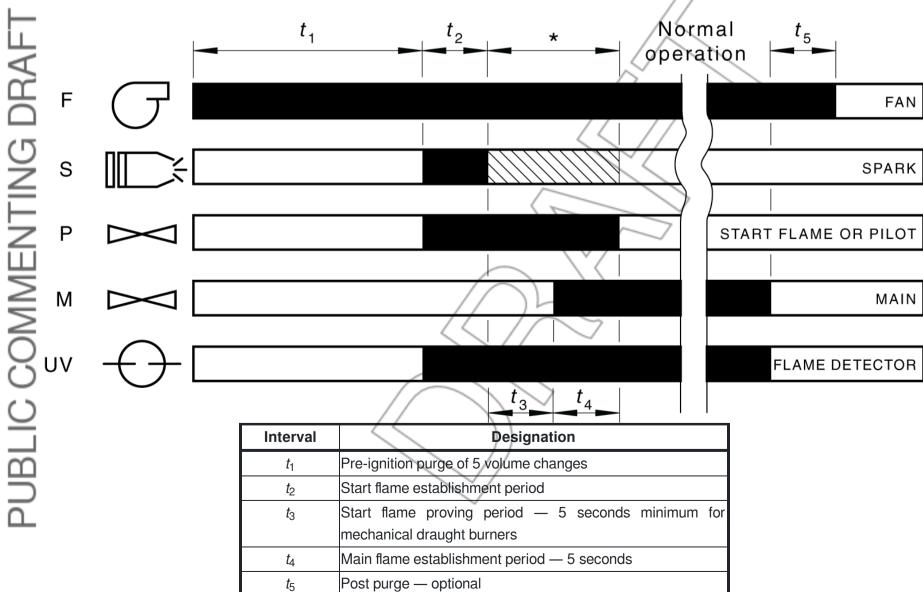


Figure E.1 — Operating sequence for automatic burners

Refer to Clause 3.6.2.7

8

on for any particular purpose. Any user of the document should rely on the final published version.

AS 1375, Industrial fuel-fired appliances

AS 2030.1, Gas cylinders, Part 1: General requirements

AS 3645, Essential requirements for gas equipment

AS 3688, Water supply and gas systems — Metallic fittings and end connectors

AS 4564, Specification for general purpose natural gas

AS 4623, Jointing compounds and materials for use in gas pipe joints

AS 4670, Commercial propane and commercial butane for heating purposes

AS/NZS 3500.0, Plumbing and drainage — Part 0: Glossary of terms

AS/NZS 5601.1, Gas installations, Part 1: General installations

AS/NZS 5601.2, Gas installations, Part 2: LP Gas installations in caravans and boats for non-propulsive purposes

ISO 6976, Natural gas — Calculation of calorific values, density, relative density and Wobbe indices from composition

ISO 23551-2, Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 2: Pressure regulators

SPEIGHT J Lange's Handbook of Chemistry, McGraw-Hill Education Europe. 2016