AS/NZS 2918:2018

Australian/New Zealand Standard

Domestic solid fuel burning appliances—Installation

Superseding AS/NZS 2918:2001

AS/NZS 2918:2018

This joint Australian/New Zealand standard was prepared by joint Technical Committee CS-062, Solid Fuel Burning Appliances. It was approved on behalf of the Council of Standards Australia on 13 June 2018 and by the New Zealand Standards Approval Board on 6 June 2018.

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Applied Research Services (Testing Interests New Zealand)
Australasian Fire and Emergency Service Authorities Council
Australian Building Codes Board
Australian Chamber of Commerce and Industry
Australian Home Heating Association
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Australian/New Zealand Standard

Domestic solid fuel burning appliances—Installation

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CS-062, Solid Fuel Burning Appliances, to supersede AS/NZS 2918:2001.

The objective of this Standard is to provide manufacturers, installers and consumers with means for determining the requirements (including clearances from heat-sensitive materials) for the correct and safe installation of domestic solid fuel (wood) burning heating appliances and their associated floor protectors and flue systems. This revision includes the following:

(a) Changes to the minimum clearance requirement for heat shields for an untested installation and new figures changes to the requirement for heat shields for a tested appliance (see Clause 3.2).

(b) Changes to the minimum clearance requirement and minimum thickness for continuous heat-tolerant material for an untested floor protector installation (see Clause 3.3.3).

(c) Major revision to built-in appliance installation, including the addition of several new figures (see Clause 3.4.2).

(d) Change to stainless steel or Monel fasteners usage requirement to secure enamelled and stainless steel sections.

(e) Major changes to flues penetrating ceilings floors and walls including the addition of new diagrams displaying requirements for untested flue penetration (see Clause 4.6).

(f) Changes to the minimum horizontal radius to nearby structures (Clause 4.9.1).

(g) The addition of new text in Appendix B, Paragraph B8, which describes the requirements for testing water heating devices fitted to appliances.

(h) The addition of several new diagrams in Appendix F, Paragraphs F7 and F8, which display thermocouple placement requirements for testing.

(i) Inclusion of a number of minor changes and additions to clarify and support the requirements and specifications of this Standard.

The installation requirements for untested appliances and flue systems apply from the date of publication of this Standard.

Statements expressed in mandatory terms in Tables are deemed to be requirements of this Standard. In this Standard, Notes are for information and guidance only.

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

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the installation of domestic solid fuel burning appliances that can be fully assembled prior to being transported to the installation site. It does not cover the installation of appliances that need to be assembled in situ, or appliances with electrically driven fuel stoker systems.

NOTE: The requirements for the measurements of performance of solid fuel burning appliances in terms of heat output, efficiency and emissions are not covered in this Standard (see AS/NZS 4012 and AS/NZS 4013 for these topics).

This Standard applies to the installation of domestic solid fuel burning appliances, whether installed in domestic or commercial situations, including the following categories:

(a) Space heaters, including open fronted fireplace inserts and built-in fireplaces.

(b) Cooking appliances.

(c) Open-vented water-heating appliances.

(d) Central-heating appliances.

(e) Any combination of two or more of the appliance categories shown in Items (a) to (d) above.

NOTE: The installation of second-hand appliances as well as being in accordance with the requirements of this Standard may be subject to additional State or regional requirements.

1.2 EXCLUSIONS

This Standard does not apply to the following:

(a) Warm air distribution ducting systems beyond the primary wall, floor or ceiling penetration.

(b) Appliances with flue outlets greater than 100 000 mm^2.

(c) The long-term durability of materials.

(d) The durability of building materials in the vicinity of any appliance installation.

1.3 NORMATIVE REFERENCES

The following are the normative documents referenced in this Standard:

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS/NZS

1530 Methods for fire tests on building materials, components and structures

1530.3 Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release

3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)

3100 Approval and test specification—General requirements for electrical equipment

AS/NZS	
3500	Plumbing and drainage
3500.4	Part 4: Heated water services
4012	Domestic solid fuel burning appliances—Method for determination of power output and efficiency
4013	Domestic solid fuel burning appliances—Method for determination of flue gas emission
NZS	
3603	Timber structures Standard
4603	Installation of low pressure thermal storage electric water heaters with copper cylinders (open-vented systems)
EN	
60584	Thermocouples
60584-1	Part 1: EMF Specifications and Tolerances
ASTM	
D 1037	Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
ER 93	New Zealand Electricity Regulations 1993
C1/AS1	Acceptable Solution for Buildings with Sleeping (residential) and Outbuildings (Risk Group SH)

1.4 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.4.1 Appliance

A solid fuel burning unit intended for use in residential or commercial properties for the purpose of space heating, water heating or cooking.

1.4.2 Approved

Approved by the appropriate regulatory authority.

1.4.3 Attic

One, or a combination of, the following:

(a) *Attic (decorative)* A low storey or decorative parapet above the main cornice of a classical building, originally designed to hide the roof slope.

(b) *Attic (storage)* The accessible space within a sloping roof of a house, often used for storage.

(c) *Attic (habitable)* A habitable upper storey or room(s), built entirely within the roof space of a building, with stair access from the floor below and usually lit by dormers or skylights.

NOTE: In the case of a multistorey dwelling, the ceiling means the ceiling of each storey of the building.

1.4.4 Built-in appliance

An appliance designed to be in contact with or built into a heat-sensitive structure within a building.

NOTE: An appliance with a through-wall, ceiling or other similar hot air outlet should be considered as a built-in appliance (see Clause 3.4).

1.4.5 Central heating appliance

A heating appliance that is designed to be installed for space heating by means of transferring heat to the living area by ducted hot air, hot water, or other fluid.

NOTE: For the purposes of complying with New Zealand regulations, this also refers to a heating appliance that has a maximum heat output rate greater than 25 kW as measured for a period of not less than 6 min under high burn rate conditions set out in Section 6 of AS/NZS 4012.

1.4.6 Chimney chase/facade

Heat-sensitive structure within a building for the purpose of built-in appliance installation, including flue system used.

1.4.7 Clearance

The shortest distance between specific parts, surfaces, or objects.

1.4.8 Commonly used material

Material with a service temperature greater than 100ºC.

NOTE: Refer to Appendix C.

1.4.9 Cowl

A device on top of a flue or chimney that is designed to prevent the ingress of wind and rain from entering.

1.4.10 False chimney

Building structure made to surround a flue system.

NOTE: False Chimneychimney, also known as Chimney chimney Chasechase, may be made of non-combustible or combustible structures. False chimneys may be constructed for freestanding, masonry insert or built-in appliance installation.

1.4.11 Firebox

That part of the appliance in which combustion is designed to take place.

1.4.12 Firebricks

Bricks made from heat-resistant material (such as refractory ceramic material) to withstand exposure to high temperatures.

1.4.13 Fireplace

An open fronted masonry structure, incorporating a masonry chimney, in which solid fuel can be burned safely.

1.4.14 Fireplace insert appliance

An appliance designed to be installed in—

(a) a fireplace; or

(b) a flued masonry enclosure.

1.4.15 Floor protector

A construction designed to protect heat-sensitive floors or floor surfaces under and in front of the appliance from heat generated by the appliance, spilt ash, or embers.

1.4.16 Flue

A passage for conveying products of combustion from within an appliance to the outside atmosphere.

1.4.17 Flue damper

A device fitted into a flue pipe that can be adjusted to reduce the flow of gas through the pipe.

1.4.18 Flue guard

A device for preventing accidental contact with a flue pipe in a room or to maintain required clearances from the flue-pipe casing inside a cupboard, attic, or another living space other than the room within which the appliance is installed.

1.4.19 Flue pipe

A pipe that creates a flue.

1.4.20 Flue system

A series of interconnecting flue pipes and flue-pipe casings that form a safe passage (flue) for conveying products of combustion from within an appliance to the outside of a building or structure.

1.4.21 Flue-mounted shield

A device, attached to the flue, that forms a barrier limiting the radiant or convective heat transfer.

1.4.22 Flue-pipe casing

One or more layers of pipe which that surround a flue pipe.

1.4.23 Freestanding appliance

An appliance designed to be installed as a solid fuel burning appliance in all areas except in a concrete or masonry fireplace, or recessed into a building structure or fitting.

1.4.24 Fuel chamber

That part of the appliance designed to contain the fuel.

1.4.25 Hearth

The floor area underneath the firebox of an appliance or fireplace.

1.4.26 Heat shield

A device that forms a barrier that limits the radiant or convective heat transfer.

1.4.27 Heat-resistant material

A material with an allowable service temperature of 600°C or greater.

1.4.28 Heat-sensitive material

A material with an allowable service temperature less than 150°C.

1.4.29 Heat-tolerant material

A material with an allowable service temperature greater than 150°C but less than 600°C.

1.4.30 Installer

The person or organization that contracts, or agrees to, the supply of equipment, to carry out an installation or to modify an existing installation.

1.4.31 Mantelpiece

The ornamental structure above and about a fireplace, usually having a shelf (mantelshelf) or projecting ledge.

1.4.32 Mantelshelf

The projecting part of a mantelpiece.

1.4.33 Masonry

A bonded construction using clay bricks, concrete bricks or blocks, pumice concrete, sand lime bricks, square dressed natural stone, terracotta or like materials laid manually unit by unit and set in mortar.

1.4.34 Masonry chimney

A masonry structure, usually vertical, containing a passage or flue by which smoke, gases and other products of combustion from a fire are carried to the outside of a building and by means of which a draught is created to assist combustion.

1.4.35 Masonry enclosure

An open fronted masonry structure not incorporating an integral masonry chimney, originally designed to surround a solid fuelled cooking and/or heating appliance.

1.4.36 Masonry fireplace

A fireplace constructed from masonry materials.

1.4.37 Masonry recess

A construction of masonry materials designed for use as a surround or recess for installation of a freestanding domestic solid fuel burning appliance.

1.4.38 Open-vented hot-water system

A hot water system that has an unobstructed venting to atmosphere with the highest point of the vent being not greater than 5 m above the lowest point of the system.

1.4.39 Penetrations

1.4.39.1 *Flat ceiling penetration*

Where the angle (slope) of the ceiling is 30° or less from the horizontal plane.

1.4.39.2 *Sloped ceiling penetration*

Where the angle (slope) of the ceiling is greater than 30° but less than 60° from the horizontal plane.

1.4.39.3 *Wall penetration*

Where the angle (slope) of the wall or ceiling is between 60° and 90° from the horizontal plane.

1.4.40 Regulatory authority

The authority having statutory control in respect of any work carried out in connection or association with a domestic solid fuel burning appliance installation in a particular locality.

1.4.41 Shall

Indicates that a statement is mandatory.

1.4.42 Should

Indicates a recommendation.

1.4.43 Tempering valve

A mixing valve that is temperature actuated and is used to temper a hot water supply with cold water to provide hot water at a lower temperature, e.g. 50°C, at one or more outlet fixtures.

1.4.44 Thermal resistance

For a particular material, the temperature difference divided by the density of heat flow rate.

NOTES:

1 Unit and symbol: square metre kelvin per watt (m^2K/W). Quantity symbol: *R*.

2 Although the term 'thermal resistance' and the symbol *R* are widely used in Australian and New Zealand industry, the International Organization for Standardization uses the terms 'thermal insulance' and 'coefficient of thermal insulation' and the symbol M for this quantity.

1.4.45 Zero-clearance box/cabinet

A cabinet intended for use with built-in installations designed to shield heat-sensitive materials.

1.5 INSTALLATION AND OPERATING INSTRUCTIONS

Installation and operating instructions shall be included with the appliance.

NOTES:

1 For guidance on the content for installation and operating instructions, see Appendix G.

2 Testing laboratories may require installation instructions including all minimum clearances, minimum ventilation area of flue casings and chimney cavity, as appropriate, and the means for excluding rain and wind-blown debris from the flue or chimney exit.

SECTION 2 MATERIALS

2.1 MATERIAL SERVICE TEMPERATURE

All materials used in the installation of solid fuel burning appliances shall be capable of withstanding the temperatures they are likely to be exposed to in service, without degradation.

The allowable service temperature of materials shall be determined by testing in accordance with the requirements of Appendix C. Materials required to be heat-resistant or heat-tolerant shall have an allowable service temperatures as follows:

(a) Heat-resistant material, greater than 600°C.

(b) Heat-tolerant material, in the range of 150°C to 600°C.

Materials determined to have a service temperature less than 150°C, when tested in accordance with Appendix C, shall be classified as 'heat-sensitive'.

2.2 FLOOR PROTECTOR MATERIALS

A floor protector shall be constructed from any material, or combination of materials, which ensures the protector is in accordance with or exceeds the requirements of Clause 3.3.2 (see Note 1).

All materials used in the construction shall be capable of withstanding the temperatures they are likely to be exposed to in service without degradation (see Note 2).

NOTES:

1 Where exposed metal components are employed in floor protector construction, they should be corrosion resistant and of a durable design.

2 Care should be exercised in the selection of insulating materials as some materials are not capable of withstanding the temperatures to which they may be exposed.

2.3 FLUE SYSTEM

A flue system, including any access port covers, shall be constructed from any of the following materials:

(a) Grades 301, 302, 304, 310, 316 or Grade 321 austenitic stainless steel having a minimum thickness of 0.52 mm. For non-corrugated flexible flue pipe, within a chimney, the minimum thickness shall be 0.25 mm. For corrugated flexible flue pipe only, within a chimney, the nominal thickness shall be not less than 0.13 mm, and the material shall be 316 grade austenitic stainless steel (see Note 1).

(b) Low carbon enamelling quality steel having a minimum thickness of not less than 0.8 mm, with a vitreous enamel coating over the entire inner and outer surfaces. Vitreous enamel flue sections shall have lock seams or continuously welded seams.

(c) Any other material and or thickness which has properties equal to or better than, Item (a) or Item (b) and is able to be used as a flue system (see Note 2).

NOTES:

1 The minimum thicknesses specified are actual, not nominal, thicknesses.

2 Item (c) is intended to allow for the introduction of new or improved materials.

2.4 FLUE-PIPE CASINGS

Flue-pipe casings shall be constructed from stainless steel, corrosion-protected steel, copper, aluminium or brass.

Casings shall have a minimum thickness (including coating, if any) of—

(a) not less than 0.52 mm for stainless steel; and

(b) not less than 0.55 mm for corrosion protected steel and non-ferrous materials.

SECTION 3 APPLIANCE INSTALLATION

3.1 GENERAL

Installation of an appliance or modification of an existing installation shall be in accordance with this Section.

NOTES:

1 The appliance should be assembled and installed in accordance with the manufacturer's instructions. All manufacturer's installation, operation, and maintenance instructions supplied with the appliance should be left with the appliance after work on the installation has been completed.

2 Appliances altered in any way from the original specification should be considered to be 'untested' appliances for purposes of installation (see Section 5).

3 Recommendations for installation and operating instructions should be included with the appliance (see Appendix G).

3.2 CLEARANCES AND HEAT SHIELDING

3.2.1 Access clearances

To provide the user with access to the appliance, the clearance between any part of the appliance and any adjacent fixed surface or object shall be not less than the following:

(a) For the appliance front surface ..... 1 m.

The clearance specified shall apply when any door or drawer is in its closed position with respect to the appliance surface.

(b) For any appliance surface (other than the appliance front surface) that includes an opening for fuelling or ash removal, or to which regular access by the user is otherwise necessary .....500 mm.

The clearance specified shall apply when any door or drawer is positioned at its fullest extent of protrusion from the appliance surface.

(c) For any part of the appliance (other than the surfaces described in Items (a) and (b) above) to which only hand access, occasional user access, or maintenance access is necessary .....100 mm.

The clearance specified shall apply when any knob or control is positioned at its fullest extent of protrusion from the appliance surface.

3.2.2 Safety clearance

Subject to the requirements of Clauses 3.2.1 and 3.4, and unless otherwise reduced by the provision of heat shielding (see Clause 3.2.3), the minimum clearance between any part of the appliance and any heat-sensitive material shall be one of the following, as appropriate:

(a) *Where a sample installation has been tested in accordance with Appendix B* A clearance where the temperature rise of any surface of the test enclosure shall not exceed the temperatures specified in Appendix B during the high fire or flash fire tests, whichever is applicable.

(b) *Where a sample installation has not been tested in accordance with Appendix B* A ceiling of not less than 1500 mm vertically above the appliance or 1200 mm in any other direction above the floor level.

Clearances specified shall be valid for commonly used building materials only.

NOTES:

1 Materials with high heat-sensitivity, may necessitate an increase in specified clearances to prevent any adverse heat effects on the material.

2 Consideration should be given to clearances between the installation and window curtains and drapes; and to the proximity of window drapes and curtains, which should be restrained to maintain the minimum clearances for heat-sensitive materials.

3.2.3 Shielding for appliances

The safety clearances, specified in Clause 3.2.2, Items (a) and (b), between a tested, or an untested, appliance and a heat sensitive material, may be reduced by the provision of a heat shield. A heat shield may be made of a heat tolerant material as per Clause 3.2.4. A heat shield made of a heat-resistant material shall be constructed in accordance with Items (a) (b) and (c) or, alternatively, Item (d):

(a) Except where the heat shield's size is restricted by an abutment with the floor, a wall or another heat shield (refer Clauses 3.3.2 and 3.3.3), the size of a heat shield shall either—

(i) extend in all directions such that the unobstructed straight-line distance between the appliance and the heat sensitive material is not less than the safety clearance established under Appendix B testing [see Figure 3.1(b)]; or

(ii) where the appliance has not been tested in accordance with Appendix B, a distance not less than 450 mm either side of the appliance and extending vertically to within 100 mm, but not less than 50 mm, of the ceiling having regard to the ventilation requirements of Clause 3.2.3(c) [see Figure 3.1(a)].

(b) Subject to—

(i) access requirements of Clause 3.2.1; and

(ii) insert and built-in requirements of Clause 3.4,

the minimum allowable clearance between an appliance and heat-sensitive material shall be calculated by multiplying the safety clearance, specified in Clause 3.2.2(a) or (b), by the clearance factor that corresponds with the heat shield's construction specified in Tables 3.1 or 3.2 [see Figures 3.1(a) and 3.1(b)].

(c) Where an air gap separates a heat shield from a heat-sensitive surface, or an adjacent layer of a heat shield having more than one layer, the top and bottom air gaps shall be vented. Where the heat shield is not horizontal, the opposite upper and lower air gap openings shall be vented. The ventilation openings shall be not less than half the cross-sectional area of the air gap behind the shield.

(d) Alternatively, heat shield constructions, including safety clearances, between the appliance and a heat-sensitive surface shall be determined by either Appendix A or Appendix B testing.

NOTE: Clause 4.5.2, sets out additional wall-mounted shield requirements for flue systems.

TABLE 3.1

CONSTRUCTIONS AND CLEARANCE FACTORS FOR APPLIANCE HEAT SHIELDS THAT ARE WITHIN 45° OF THE VERTICAL

Heat shield construction	Minimum air gap dimension(s) mm	Clearance factor
Single layer of continuous material	12	0.40
Single layer of continuous material	25	0.30
Two spaced layers of continuous material	12 + 12	0.20

NOTES:

1 Masonry may be used as a heat shield material.

2 Where heat shields are used to reduce appliance clearance dimensions, additional flue shielding may also be required (see Clause 4.5.2).

TABLE 3.2

CONSTRUCTIONS AND CLEARANCE FACTORS FOR APPLIANCE HEAT SHIELDS THAT ARE MORE THAN 45° OF THE VERTICAL

Heat shield construction	Minimum air gap dimension(s) mm	Clearance factor
Single layer of continuous material	12	0.80
Single layer of continuous material	25	0.60

NOTES:

1 Masonry may be used as a heat shield material.

2 Where heat shields are used to reduce appliance clearance dimensions, additional flue shielding may also be required (see Clause 4.5.2).

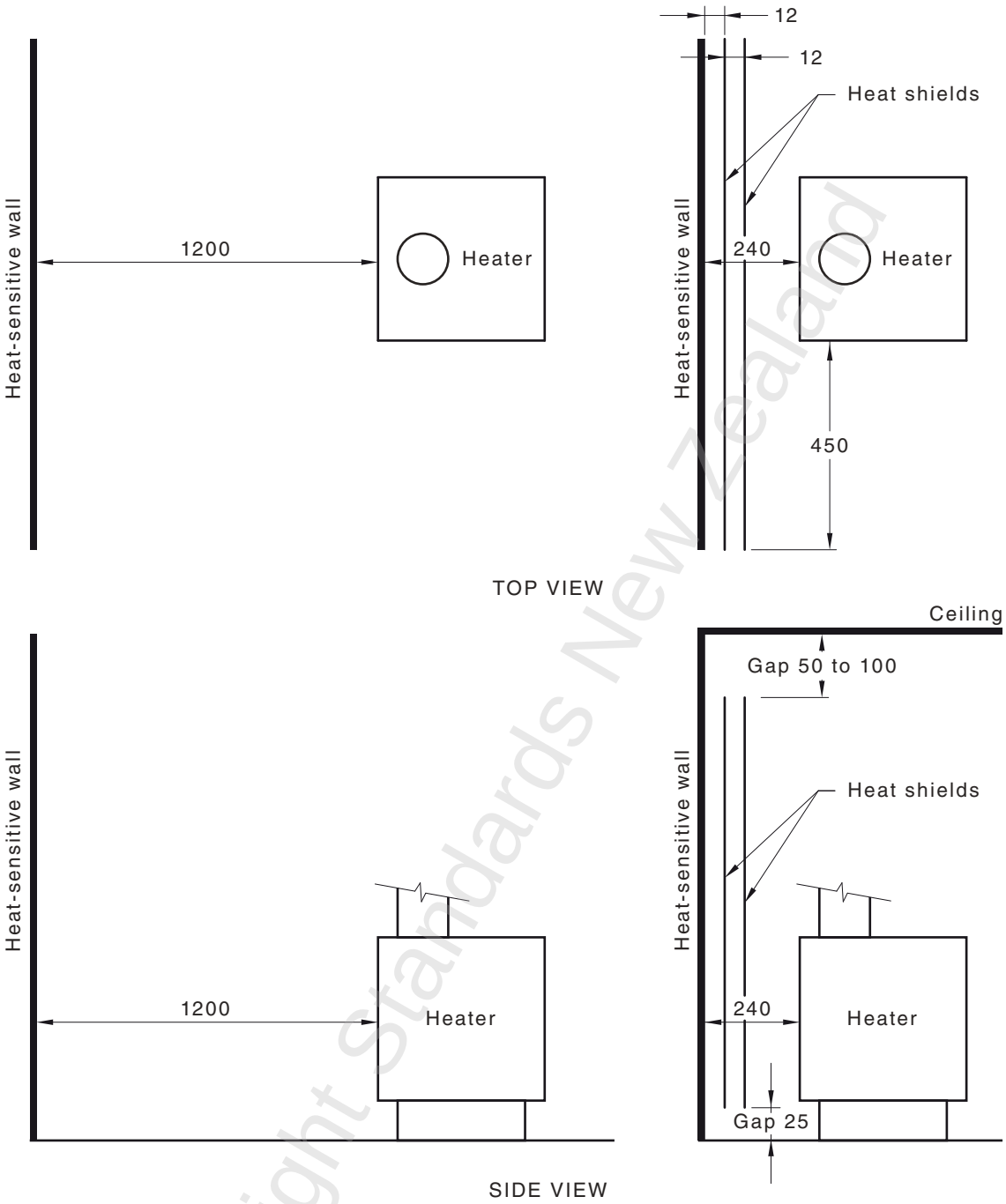


Figure not to scale

(a) Untested appliance double heat shield—2 × 12 mm ventilated air gaps

NOTE: The safety clearance of an untested appliance multiplied by clearance factor for double heat shield equals reduced clearance, e.g. 1200 mm [see Clause 3.2.2(b)] × 0.2 (see Table 3.1) = 240 mm. In this case, the heat shield is less than 250 mm from the appliance and so is constructed of heat-resistant material.

DIMENSIONS IN MILLIMETRES

FIGURE 3.1 (in part) EXAMPLES OF THE USE OF HEAT SHIELDS TO REDUCE APPLIANCE CLEARANCE WHERE THE SHIELDING IS WITHIN 45° OF THE VERTICAL

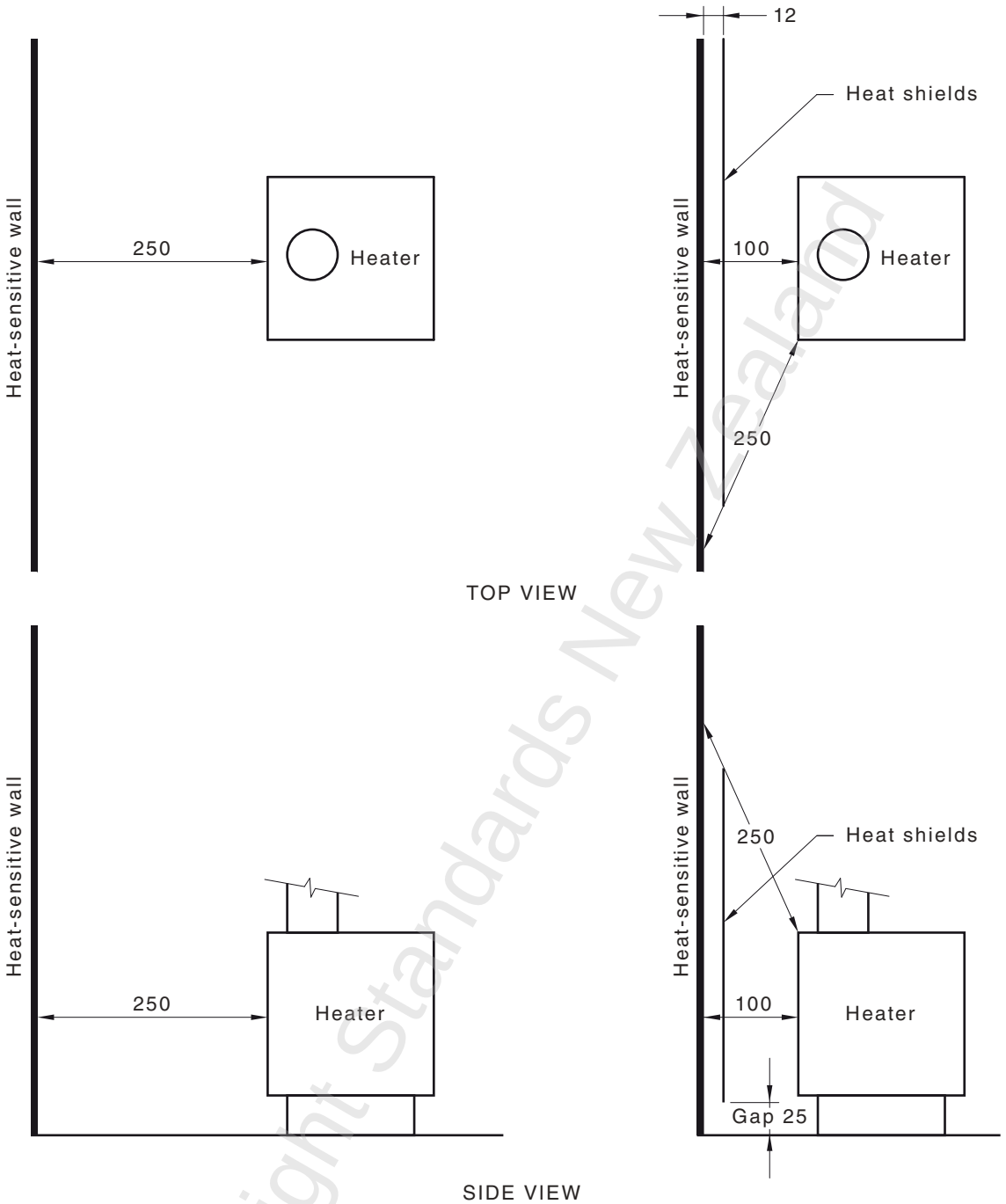


Figure not to scale

(b) Tested appliance single heat shield—12 mm ventilated air gaps

NOTE: Safety clearance, as specified for a particular appliance by test, multiplied by clearance factor for a single heat shield equals reduced clearance, e.g. 250 mm [see Clause 3.2.2(a)] × 0.4 (see Table 3.1) = 100 mm, in this case, the heat shield is less than 250 mm from the appliance and so it is constructed of heat-resistant material.

DIMENSIONS IN MILLIMETRES

FIGURE 3.1 (in part) EXAMPLES OF THE USE OF HEAT SHIELDS TO REDUCE APPLIANCE CLEARANCE WHERE THE SHIELDING IS WITHIN 45° OF THE VERTICAL

3.2.4 Heat tolerant and non-continuous materials

The minimum allowable clearance between the appliance and either a heat-sensitive wall or a heat-shield, when using heat-tolerant or non-continuous materials, shall be determined by either Appendix A testing, or further reduced by Appendix B testing, whenever the shield's material is—

(a) made of a heat-tolerant material where Appendix C testing establishes a safe service temperature of less than 250ºC; or

(b) made of a heat-tolerant material located less than 250 mm from the appliance; or

(c) not continuous, such as perforated materials.

NOTE: See Table 3.1 or 3.2 for requirement for continuous materials.

In each case, the shield's material safe service temperature, as established by Appendix C testing, shall not be exceeded.

Unless otherwise determined by testing, the shield's construction, in terms of sizing, air gap and ventilation, shall be in accordance with Clause 3.2.3.

NOTES:

1 Appendix A uses a hot plate at 500ºC during the test, whereas Appendix B uses the actual appliance, which may yield more favourable results.

2 Ensure that the heat shield's service temperature will not exceed the allowable service temperature of the shield's protective finish (e.g. powder coatings).

3.3 FLOOR PROTECTOR

3.3.1 General requirements

Where any part of the floor area where the appliance is to be installed includes a heat-sensitive material that would be under the appliance or within 500 mm of the appliance, the appliance shall be installed on a floor protector.

NOTE: The floor protector may be an integral part of the appliance.

Distances shall be measured horizontally from the external surface of the appliance with any doors and ash-removal trays closed, disregarding knobs, controls, ash spill trays, and other minor projections. The floor protector shall be horizontal or inclined upwardly away from the appliance.

Where the floor protector consists of a number of components, it shall include a continuous layer of heat-resistant material extending under the appliance to the perimeter of the floor protector. All joints shall be fixed to prevent accidental separation, and shall be sealed to prevent any spilt ash or embers contacting any heat-sensitive material.

3.3.2 Performance and construction requirements for a floor protector where a sample installation has been tested

The maximum surface temperature rises specified in Appendix B shall apply for commonly used flooring materials only. Alternative floor protector, heat-resistant material may be used, provided the thermal properties are equivalent to or better than the tested material.

NOTE: Flooring materials with high heat-sensitivity, e.g. plastics materials, may necessitate a reduction of the specified maximum temperatures.

For an appliance other than a fireplace insert appliance, the floor protector shall extend under the appliance and not less than 300 mm beyond the front of the fuel-loading and ash-removal openings. The width of the floor protector shall be not less than the width of the appliance and shall extend not less than 200 mm from each side of any ash-removal or fuel-loading openings unless the floor protector forms an abutment with a wall or heat shield at a lesser distance. For a fireplace insert appliance, the floor protector shall extend not less than 300 mm beyond the front of the fuel-loading and ash removal openings. The width of the floor protector shall be not less than the width of the appliance and shall extend not less than 200 mm from each side of any ash-removal or fuel-loading openings unless the floor protector forms an abutment with a wall or heat shield at a lesser distance.

For an appliance having a ventilated airspace of not less than 100 mm between the base of the firebox and the floor protector, a heat-resistant material shall be used for the top surface of the floor protector.

NOTE: Heat-tolerant material may be used for other components.

The floor protector shall be constructed of heat-resistant material.

3.3.3 Construction requirements for a floor protector where a sample appliance installation (or prototype appliance installation) has not been tested

Where a sample appliance installation has not been tested, the floor protector shall extend either to a distance of not less than 1000 mm beyond any part of the appliance or a lesser distance at which it forms an abutment with a wall or heat shield (subject to the requirements of Clause 3.2), and shall be constructed as follows:

(a) For an appliance having a ventilated airspace not less than 50 mm between the base of the firebox and the floor protector, the floor protector shall conform to either of the following:

(i) It shall be in accordance with the requirements of Appendix D.

or

(ii) It shall be constructed to a thickness of not less than 75 mm (see Clause 3.3.4) of masonry or concrete laid on a supporting sheet of continuous heat-resistant material. The floor protector shall be separated from the floor by means of heat-resistant spacers forming an air gap of not less than 25 mm between the floor protector and the floor or floor covering. Total plan area of the air gap shall be not less than 90% of the area of the floor protector. Openings shall be provided along at least one pair of opposite edges of the floor protector to ventilate the air gap. The total opening area at each edge of the floor protector along which openings are provided shall be not less than that determined from the following equation:

$$A = s \times 3 \quad \ldots 3.3.3(1)$$

where

A = minimum total opening area along one edge of the floor protector, in square millimetres

s = perimeter of the floor protector, in millimetres

NOTES:

1 For example, a 2 m × 2 m floor protector has a perimeter of 8000 mm. The minimum open area along one edge is $8000 \times 3 = 24\,000$ mm^2. For a 25 mm air gap, the length has to be not less than 960 mm (i.e. about half the length of the edge of the hearth).

2 For a typical installation, see Figure 3.2.

(b) For a fireplace insert appliance, the front floor protector shall conform to either of the following:

(i) It shall be in accordance with the requirements of Appendix D and of the same construction as that beneath the appliance.

or

(ii) It shall be constructed of continuous heat-tolerant material not less than 30 mm thick. The top surface of the floor protector shall be of heat-resistant material not less than 0.2 mm thick. The floor protector shall be separated from the floor by means of heat-resistant spacers forming an air gap of not less than 25 mm between the floor protector and the floor or floor covering. Total plan area of the air gap shall be not less than 90% of the area of the floor protector. Openings shall be provided along at least one pair of opposite edges of the floor protector to ventilate the air gap. The total opening area at edge of the floor protector along which openings are provided shall be not less than that determined from the following equation:

$$A = s \times 2 \quad \ldots 3.3.3(2)$$

where

A = minimum total opening area along one edge of the floor protector, in square millimetres

s = perimeter of the floor protector, in millimetres

(c) Where the appliance operates with a fire built directly on the floor protector, or the airspace between the base of the firebox and the floor protector is less than 50 mm, the floor protector shall be constructed of hollow concrete blocks laid in two courses each of height not less than 90 mm and arranged so that the hollow cores in the two courses are at right angles to each other and will allow air circulation through them. A sheet of continuous heat-resistant material shall be placed on top of or between the two courses.

NOTES:

1 For a typical installation, see Figure 3 4.

2 A floor protector shown to be equivalent when tested in accordance with Appendix D may be used.

3.3.4 Decorative finishing

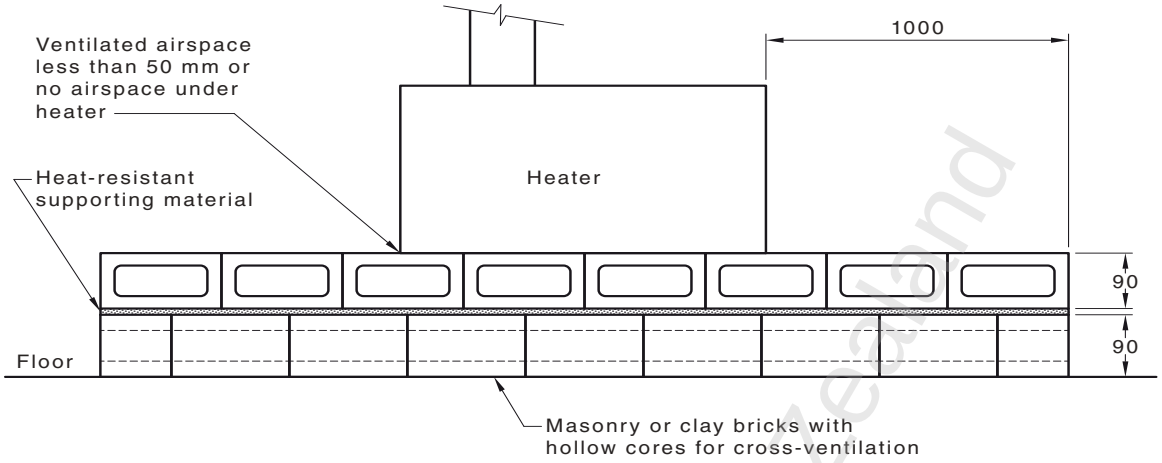
Excluding any area where a fire may be built directly on the floor protector, the top and sides of the floor protector may be finished with a decorative surface, provided the materials from which the decorative surface is constructed are heat-resistant.

Air gaps relative to the floor protector shall not be enclosed.

NOTE: Where the top of the floor protector is finished with a decorative surface, the thickness of the decorative surface may be regarded as contributory to the total thickness of the floor protector for the purpose of determining conformity with the requirements of Clause 3.3.3.

3.3.5 Design load capacity

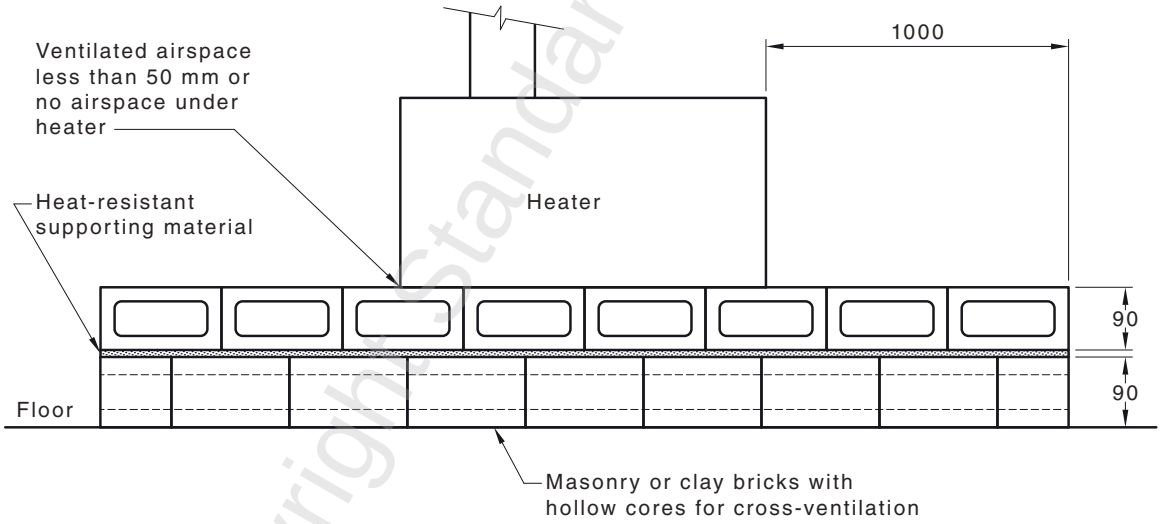
The strength of the floor protector shall support the heater installed on it without damage or distortion.



NOTE: Seismic restraints may be required (see Clause 3.8).

DIMENSIONS IN MILLIMETRES

FIGURE 3.2 TYPICAL FLOOR PROTECTOR CONSTRUCTION FOR AN APPLIANCE NOT TESTED IN ACCORDANCE WITH APPENDIX B WHERE THE FIREBOX BASE IS NOT LESS THAN 50 mm ABOVE THE FLOOR PROTECTOR



NOTE: Seismic restraints may be required (see Clause 3.8).

DIMENSIONS IN MILLIMETRES

FIGURE 3.3 TYPICAL FLOOR PROTECTOR CONSTRUCTION FOR AN APPLIANCE NOT TESTED IN ACCORDANCE WITH APPENDIX B WHERE A FIREBOX BASE IS LOCATED DIRECTLY ON THE FLOOR PROTECTOR

3.4 PARTICULAR REQUIREMENTS FOR FIREPLACE INSERT AND BUILT-IN APPLIANCES

3.4.1 Fireplace insert appliances

3.4.1.1 *Fireplace inserts in fireplaces*

Before installing the appliance, the fireplace and chimney shall be thoroughly cleaned and inspected to ensure they are in a sound condition.

NOTE: The relevant building code should be used as a guide when assessing the condition of the fireplace and chimney.

In Australia, a flue pipe shall be installed within the chimney in accordance with the requirements of Clause 4.11.

In New Zealand, a flue pipe shall be installed within the chimney in accordance with the requirements of Clause 4.11. Where compliance with the *New Zealand Building Code* requirements in relation to separation between the outer surfaces of the chimney and heat-sensitive materials cannot be confirmed, the appliance and flue system shall be tested to, and be in accordance with the requirements of, Appendix E, but need not be tested to Appendix B.

3.4.1.2 *Fireplace inserts in masonry enclosures*

Before installing the appliance, the enclosure shall be thoroughly cleaned and inspected to ensure it is in a sound condition.

The top of the enclosure shall be capped, and the capping shall be at least 5 mm thick steel plate or at least 12 mm thick heat-resistant material.

Where the flue system passes through the capping of the enclosure, the flue shall be double cased and ventilated through the capping, the ventilation coming from inside the enclosure. The lower end of the outer casing shall be close fitting against the enclosure capping.

Ventilation of not less than 10 000 mm^2 shall be provided near the base of the enclosure to allow a through-flow of cooling air into the enclosure and up through the flue casing.

The outer casing shall have the clearances to heat-sensitive material, as specidied in Clause 4.5.

NOTE: For a typical installation, see Figure 3.4.

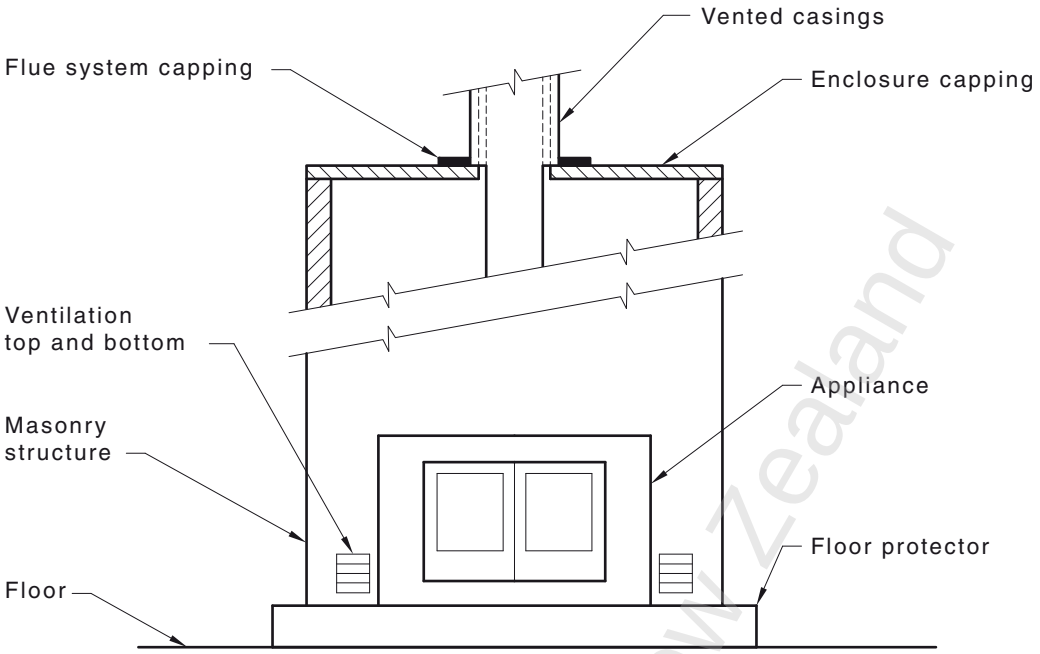


FIGURE 3.4 TYPICAL INSERT APPLIANCE INSTALLATION INTO A MASONRY ENCLOSURE

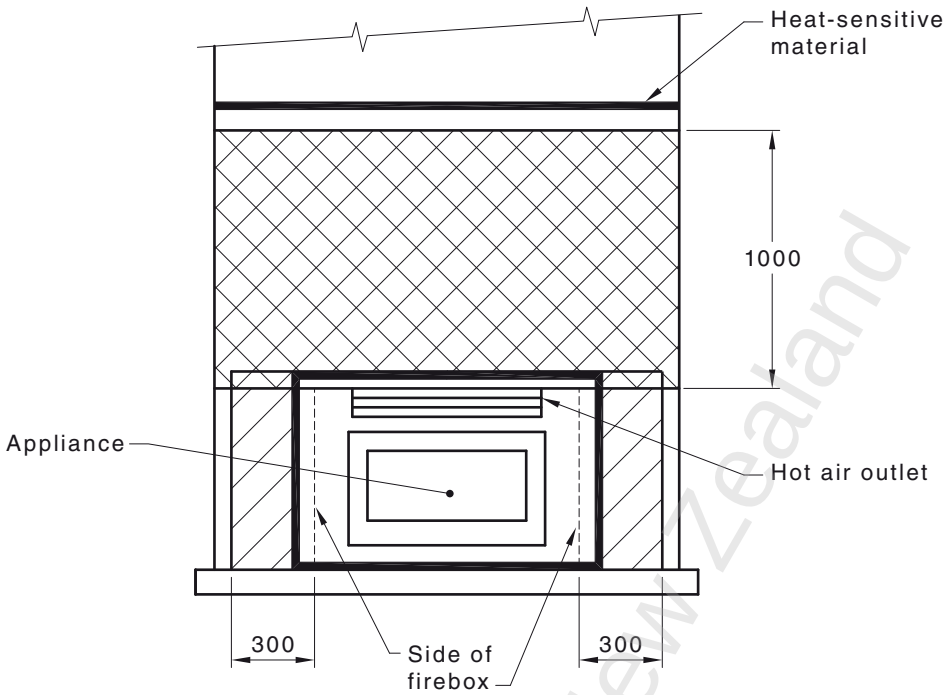
3.4.1.3 *Safety clearances for fireplace inserts*

Unless reduced by the provision of heat shielding (see Clause 3.2.3), the clearance between the appliance and any heat-sensitive material shall be one of the following, as appropriate:

(a) Where a sample installation has been tested in accordance with Appendix B or Appendix E, as appropriate, any clearance that does not allow the temperature rise of the corresponding surface of the structure to exceed the temperature specified in Appendix B, Paragraph B10, for Australia or Appendix E, Paragraph E10, for New Zealand, as appropriate, during the high fire and flash fire tests, as applicable.

(b) Where a sample installation has not been tested in accordance with Appendix B or Appendix E, not less than 1000 mm from the top of the hot air outlet of the appliance to any heat-sensitive material, e.g. a mantelshelf, situated above the appliance, and not less than 300 mm from the outside surface of the appliance firebox

NOTE: For an illustration of the above, see Figure 3.5.



DIMENSIONS IN MILLIMETRES

FIGURE 3.5 HEAT-SENSITIVE MATERIALS EXCLUSION ZONES

3.4.1.4 *Heat shield*

Safety clearances specified in Clause 3.4.1.3 may be reduced, providing heat shielding is provided in accordance with Clause 3.2.3

3.4.1.5 *Mantelshelf heat shield*

Heat shields under a mantelshelf shall extend over and beyond the appliance for at least 200 mm towards each end of the mantelshelf or to the ends of the mantelshelf, whichever is the lesser. The heat shielding shall abut the wall and extend to the front edge of the mantelshelf. The heat shielding shall be manufactured from heat-tolerant or heat-resistant materials.

3.4.2 Built-in appliance installations

3.4.2.1 *General*

In general, a built-in appliance design shall imitate a fireplace and involve open fronted steel insert type or enclosed slow combustion wood burning appliance.

NOTE: A typical design involves installation of a wood burning appliance into an additional enclosure made of metal or non-combustible material called zero-clearance box/cabinet. This additional enclosure may be designed to be in contact with the heat-sensitive structure of the building (see Figure 3.9 for examples of built-in cavities)

Built-in appliance installations shall be tested in accordance with Appendix B and shall be in accordance with the temperature limits specified in Paragraph B10, Appendix B. If a zero clearance box/cabinet is used when testing a built-in appliance to Appendix B, the results are applicable to only that particular built-in appliance. A zero clearance box/cabinet shall be tested with each model appliance with which it is to be installed.

3.4.2.2 *Ventilation requirement for chimney chase/facade or false chimney*

A chimney chase structure shall have obstruction-free, vermin-proof air vents to supply obstruction-free air both at the bottom and the top termination point in order to ventilate the chimney chase cavity. Ventilation openings of not less than 10 000 mm^2 free space shall be provided near the base and the top of the enclosure. Flue casing ventilation shall not be considered part of the free space requirement. Any external vent shall be weatherproof.

There shall be no combustibles on top of chimney chase terminations.

NOTES:

1 For typical chimney chase construction for built-in appliance, termination chase vented through casing and termination chase vented through side vent, see Figures 3.6, 3.7 and 3.8.

2 Air-tight chimney structure can accumulate rising hot air leading to fire hazard. 10 000 mm^2 is based on insert installation rule.

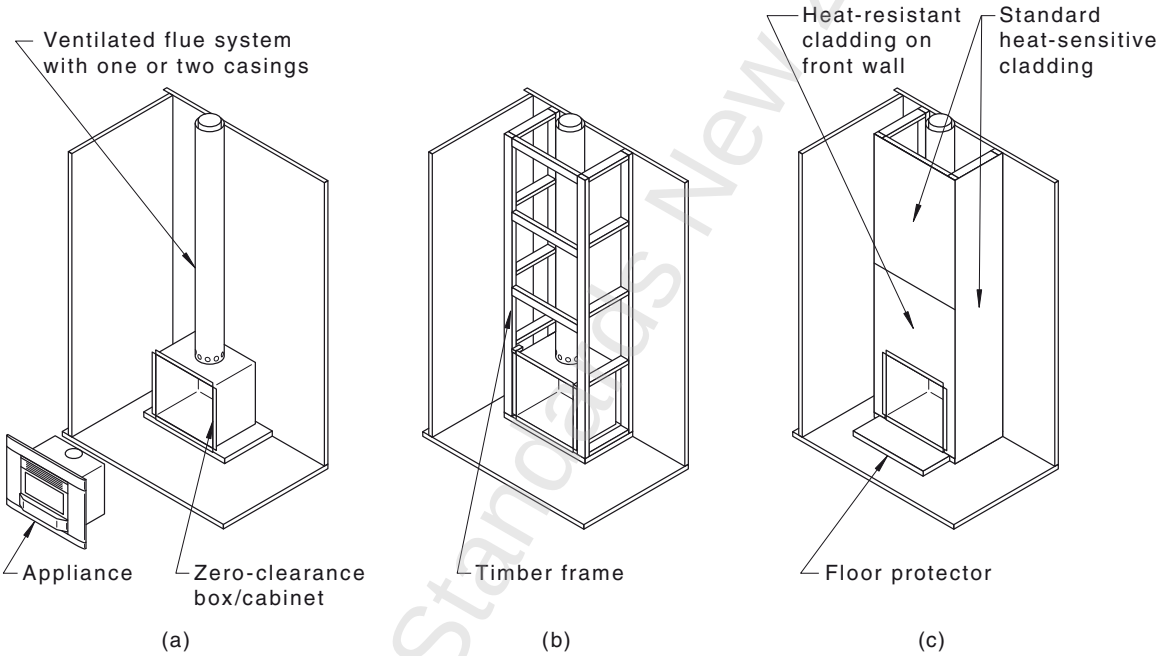


FIGURE 3.6 TYPICAL CHIMNEY CHASE CONSTRUCTION FOR BUILT-IN APPLIANCE

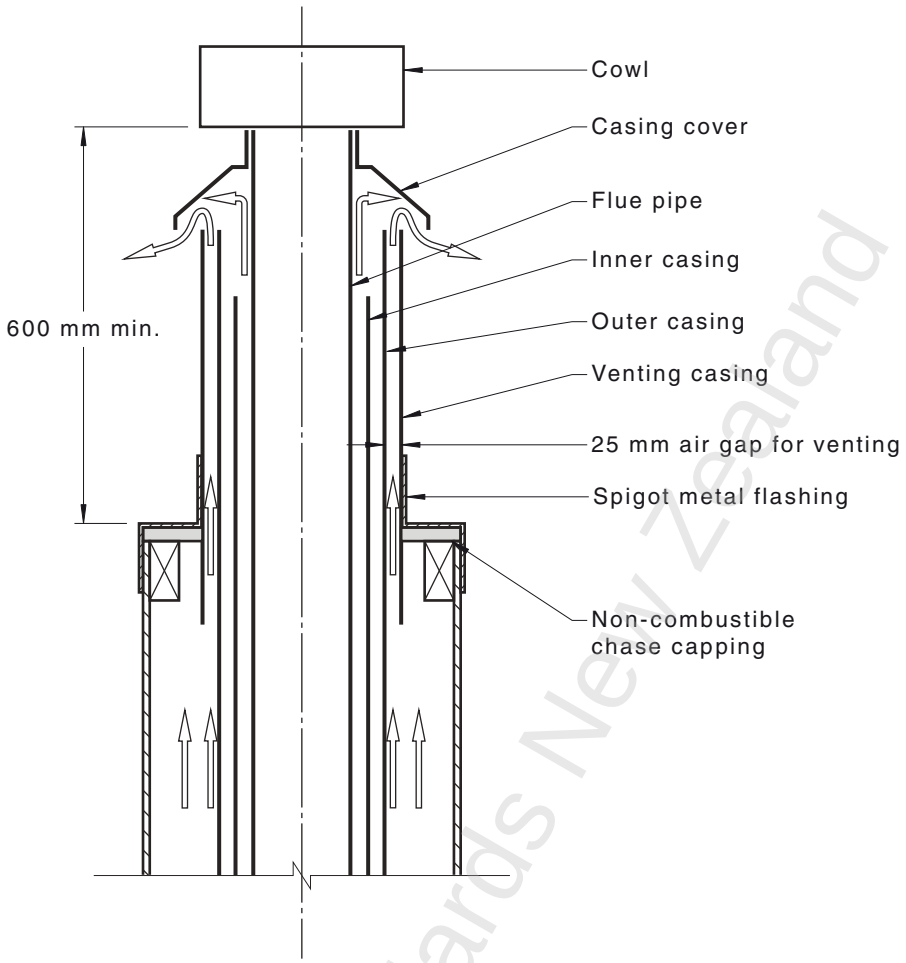


FIGURE 3.7 TYPICAL TERMINATION CHASE
VENTED THROUGH CASING

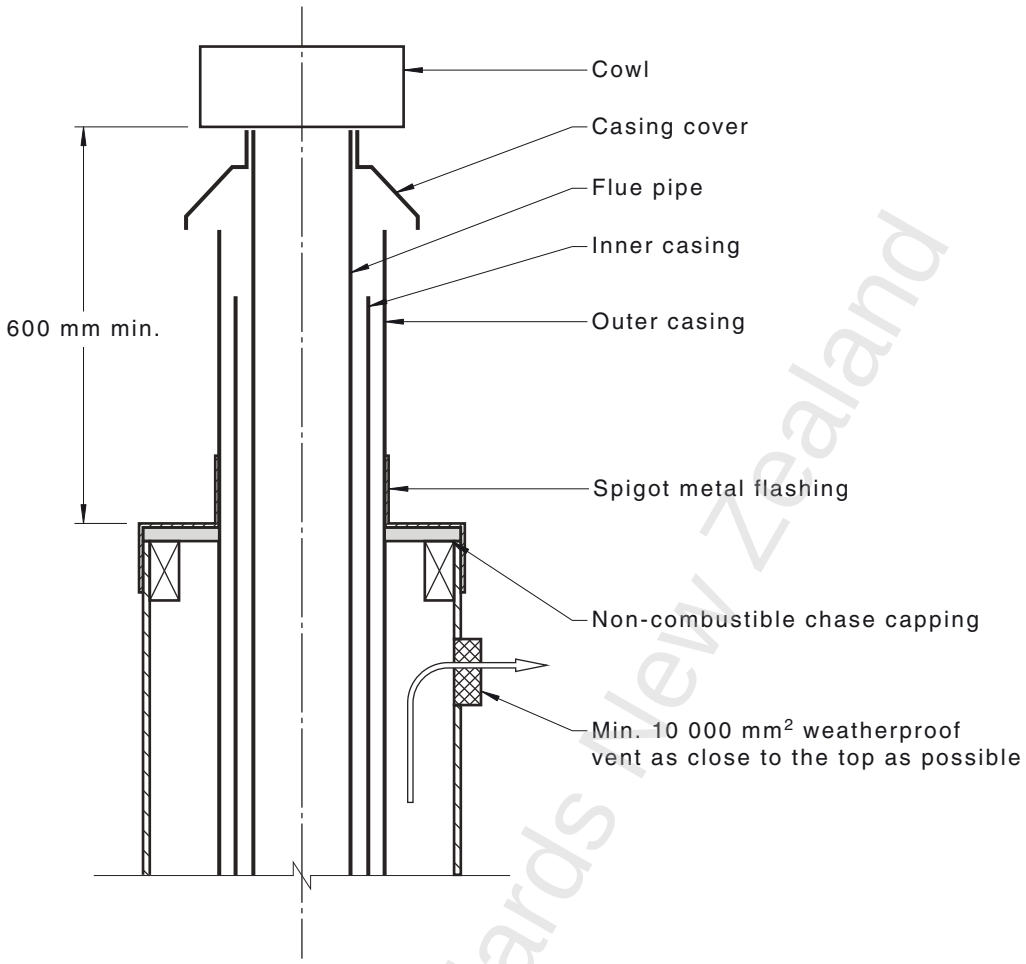
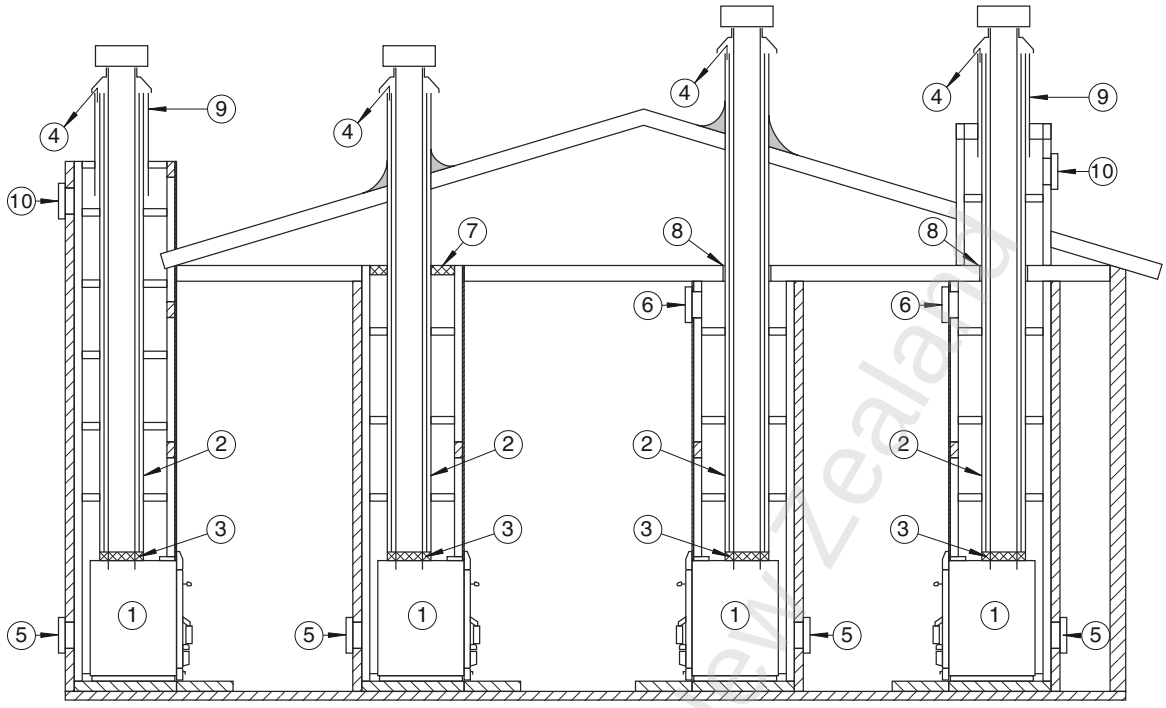


FIGURE 3.8 TYPICAL TERMINATION CHASE VENTED THROUGH SIDE VENT



(a) Exterior cavity (b) Interior cavity open to roof space (c) Interior cavity closed at ceiling (d) Interior cavity closed at ceiling and additional termination cavity

LEGEND:

1	Appliance with zero-clearance cabinet	6	Room vent—interior hot air outlet
2	Vented flue system with two casings	7	Ceiling vent—vermin proof mesh
3	Flue system air inlet	8	Vented ceiling penetration
4	Flue system air outlet	9	Venting through casing
5	Bottom vent—cool air inlet	10	Top side vent to built-in structure

FIGURE 3.9 SCHEMATIC DIAGRAM FOR BUILT-IN CAVITIES

3.4.2.3 *Flue systems for built-in appliance installation*

A flue system for a built-in appliance shall be in accordance with one of the following requirements:

(a) When tested in accordance with Appendix F, the temperature rise above ambient temperature of monitored surfaces shall not exceed 65°C for the hot flue test, and 100°C for the flue fire test.

(b) It shall have a ventilated double unperforated casing in accordance with the requirements of Clause 4.5.1.2(b) (see Note 1).

The distance from the top of the flue pipe to the top of the chimney chase shall be a minimum of 600 mm (for example, see Figure 3.7 or 3.8).

NOTE: Casings should extend to the point determined by Appendix B tests.

3.4.2.4 *Built-in appliance mantelshelves*

Unless a specific mantelshelf arrangement has been shown to be satisfactory during Appendix B testing, mantelshelf arrangements specified for fireplace insert appliances may be used.

3.4.3 Freestanding installations installed in fireplaces or masonry enclosures

If an appliance designed for freestanding installation is installed in a masonry enclosure, the clearance between the appliance and any heat-sensitive material shall be in accordance with the requirements of Clause 3.4, as appropriate.

NOTE: Installers should be aware that in some circumstances heat-sensitive materials may be obscured by masonry.

3.5 STABILITY

Appliance installation shall be stable so as to not detract from the designed normal operation of the appliance nor to create a hazard for users of the appliance.

3.6 WATER CONNECTIONS

All water connections to an appliance shall be in accordance with the appropriate requirements of AS/NZS 3500.4 and the regulatory authority, as appropriate.

3.7 ELECTRICAL CONNECTIONS

All electrical connections to and within an appliance shall be in accordance with the requirements of AS/NZS 3000, AS/NZS 3100 or ER 93, and the regulatory authority, as appropriate.

3.8 SEISMIC RESTRAINT

Where required by the regulatory authority, provision shall be made for seismic restraint of the floor protector and the appliance. The seismic restraint shall be capable of resisting a seismic loading equal to 0.4 times the mass of the appliance. The load shall be applied horizontally in any direction at the mid-height of the firebox. The appliance shall not move, tilt or be dislodged from its installed position during application of the load.

Where the appliance is secured to the floor protector, the test shall be applied to the combination at a point approximately 100 mm above the top surface of the floor protector.

SECTION 4 FLUE SYSTEM INSTALLATION

4.1 GENERAL REQUIREMENTS

Each appliance shall be individually flued. The flue shall be effective in providing a free passage for the discharge of products of combustion generated within the appliance so that all gases and particles entering the flue are discharged outside the building in which the appliance is installed, and outside any other enclosed space or confined space.

Airtight access ports shall be provided to enable cleaning of the inner surface of the entire flue without any dismantling other than that normally carried out by a chimneysweep. Any appliance relying on natural draught shall not be attached to a flue system which requires the products of combustion to travel downwards. The axis of the flue system shall be vertical. A departure from vertical may be used, provided—

(a) flue lengths between 0° and 30° from the horizontal do not exceed 900 mm;

(b) flue lengths between 30° and 60° from the horizontal do not exceed 1800 mm; and

(c) all fixings are in accordance with the requirements of Clause 4.10.

These limits shall not be exceeded as thermal expansion may reduce the integrity of the flue system.

If, in the vicinity of the flue system, any loose materials (e.g. cloth, loose fill insulation, straw or the like) are present, or could become present, a guard shall be provided to maintain the minimum clearances specified in this Section.

Bends and extensions to the length of a flue system may be used, provided the clearance between the flue pipe and casings, heat shields and heat-sensitive materials are maintained.

NOTE: A tested flue system altered from the original specification, other than adding bends or extensions, is deemed to be an ‘untested’ flue system for installation purposes.

4.2 FLUE PIPES

The cross-sectional area of the flue shall be one of the following:

(a) Equal to or within 20% of the cross-sectional area of the flue collar opening of the appliance.

(b) The cross-sectional area designed for the appliance.

(c) The cross-sectional area that provides the required flue draught for the appliance when the appliance is operated under the conditions specified by the manufacturer for flue draught measurement.

All seams in the flue pipe shall be lock-folded or continuously welded. The total thickness of lock-folded seams shall be four times the maximum thickness of the material to ensure sealing of the seam, as shown in Figure 4.1. Where the seam is twisted, there shall be no apparent movement in the seam.

Seams in elbow sections may be spot-welded, provided intervals do not exceed 10 mm.

The flue pipe shall have a close-fitting connection to the appliance.

All joints between sections of flue pipe shall be push-fitted so that the upper section enters the lower section. The sections shall be secured by at least three fasteners spaced approximately equally around the joint so as to prevent unintentional or accidental separation.

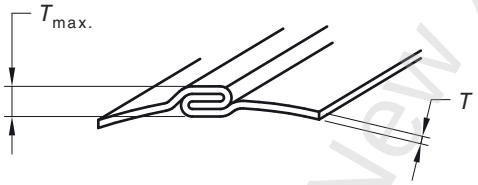
Stainless steel non-self-locking flue pipes shall have a minimum overlap of 40 mm. Self-locking flue pipes shall have a minimum overlap of 25 mm.

Vitreous enamelled flue pipe sections within a room may be joined without fasteners, provided a series of overlapping sections having a minimum overlap of 50 mm are used. When vitreous enamel flue pipe sections are joined using overlapping sections, no mechanical fixing is required. When vitreous enamel sections are joined to stainless steel sections, they shall be secured mechanically.

Stainless steel or Monel fasteners shall be used to secure enamelled and stainless steel sections.

Parts of vitreous enamelled flue sections exposed to products of combustion shall not be cut, drilled or otherwise modified, except where mechanical fixings are required to maintain stability of the flue system.

Vitreous enamelled sections exposed to products of combustion shall only be installed in locations where the flue is visible after installation is completed.



LEGEND:
T = wall thickness of the pipe
$T_{max.}$ = maximum permissible thickness of the folded seam = 4 × T

NOTE: When twisted, there should be no apparent movement of the seam.

FIGURE 4.1 LOCK-FOLDED FLUE PIPE SEAMS

4.3 FLUE-PIPE CASINGS

Flue systems beyond the wall or ceiling penetrations shall be provided with either a double casing or a tested single casing in accordance with the requirements of Clause 4.5.1 as appropriate.

Flue-pipe casings constructed from copper or brass shall have at least a 25 mm air gap from the flue pipe.

Flue-pipe casings shall extend over any part of the flue pipe where protection is required, except that a double casing shall be used when the length from the ceiling penetration to the top of the flue system exceeds 4 m. Means shall be provided to exclude rain and wind-blown debris. Such means shall include an overhanging ‘shed’ or ‘skirt’. The exclusion device shall not restrict the flow of air from the casing(s).

4.4 WALL PENETRATION

Where the installation of an appliance requires modification to the building structure, such alterations shall be in accordance with the appropriate requirements of the relevant building code. Any wall penetrated by the installation shall be sealed to prevent debris in the wall cavity coming in contact with the appliance or flue system.

4.5 FLUES WITHIN ROOMS AND SIMILAR AREAS

4.5.1 Safety clearance

4.5.1.1 *Sample flue system that has been tested*

Where a sample flue system has been tested in accordance with Appendix B, the safety clearance between a flue pipe and any heat-sensitive material within a room or similar area shall be any clearance which during the high fire and flash fire tests does not allow the temperature rise of the corresponding surface of the test enclosure to exceed the temperatures specified in Appendix B. The flue system shall retain its structural integrity.

The maximum surface temperature rise specified in Appendix B shall be valid for commonly used building materials only.

NOTE: Materials with high heat-sensitivity, e.g. plastics materials, may necessitate a reduction of the specified maximum temperatures.

4.5.1.2 *Sample flue system that has not been tested*

Where a sample flue system has not been tested in accordance with Appendix B, the clearance between a flue pipe and any heat-sensitive material within a room or similar area shall, subject to requirements of Clause 4.5.2, be not less than the following, as appropriate:

(a) *For a flue pipe having no casing or an unventilated casing* 4 times the maximum cross-section dimension of the flue pipe but not less than 600 mm.

(b) *For a flue pipe having a ventilated double unperforated casing with minimum 25 mm gaps between the flue pipe and inner casing and between the inner and outer casings* 0.5 times maximum cross-sectional dimension of flue pipe but not less than 75 mm, provided that the distance between the outer flue casing and any heat-sensitive material shall be not less than 25 mm.

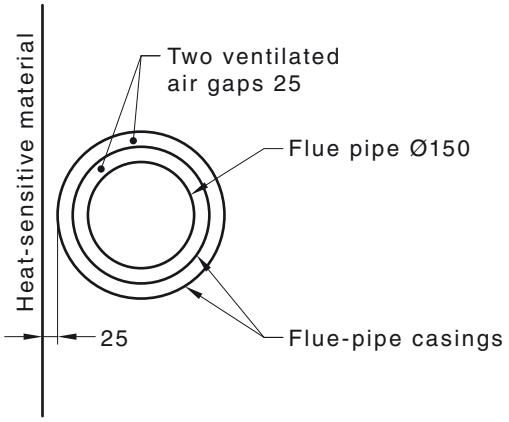
NOTE: For an example of the minimum clearance, see Figure 4.2.

(c) *For installations where the appliance has been tested to AS/NZS 4012 and the maximum power has been shown to be less than 25 kW* The ventilation openings at each end shall have an area of not less than 2500 mm^2 between the flue pipe and inner casing and between the inner and outer casings.

Spacers shall be arranged and distributed so as not to obstruct convection ventilation.

Clearances specified shall be valid for commonly used building materials only.

NOTE: Materials with high heat-sensitivity, e.g. plastics materials, may necessitate an increase in the specified clearances to prevent any adverse heat effects on the material.



NOTE: Where the thickness of the pipe is less than 1.0 mm the air gap may include the thickness of the material.

DIMENSIONS IN MILLIMETRES

FIGURE 4.2 EXAMPLE OF MINIMUM CLEARANCE OF A VENTILATED DOUBLE UNPERFORATED UNTESTED FLUE SYSTEM

4.5.2 Shielding for flues

4.5.2.1 *General*

Safety clearances between the flue and a heat sensitive material, for tested and untested flue systems as per Clause 4.5.1, may be reduced by the provision of a wall-mounted (Clause 4.5.2.2), or a flue mounted (Clause 4.5.2.3), heat shield.

4.5.2.2 *Wall mounted heat shielding*

Unless otherwise required below, a wall-mounted heat shield construction shall conform to Clause 3.2.3. Accordingly, the clearance factors given in Tables 3.1 and 3.2 shall apply.

NOTE: For a typical example, see Figure 4.3(b).

Wall shields made of a heat-tolerant material, or whose material is not continuous, the shield construction shall conform to Clause 3.2.4, as appropriate.

A wall-mounted heat shield shall conform to one of the following:

(a) Where the safety clearance has been determined between the flue and the heat sensitive material under Appendix B testing, the extent of the wall-mounted flue shielding in any direction, except where the heat shield's size is restricted by an abutment with the floor, a wall or another heat shield, shall be not less than the applicable safety clearance, established by Appendix B testing of the flue.

(b) Where a safety clearance has not been determined between the flue and the heat sensitive material under Appendix B testing, the extent of the shielding, except where the heat shield's size is restricted by an abutment with the floor, a wall or another heat shield, shall be—

  (i) horizontally—the unobstructed straight line distance from the flue to a heat sensitive material not less than the applicable safety clearance established by Appendix B testing of the appliance; and

  (ii) vertically—not less than 2300 mm above the floor protector; or to within 100 mm of the ceiling, ensuring shielding ventilation is in accordance with Clause 3.2.3.

(c) Where the appliance has not been tested, the shielding requirements under Clause 3.2.3(a)(ii) shall apply.

4.5.2.3 *Flue mounted heat shielding*

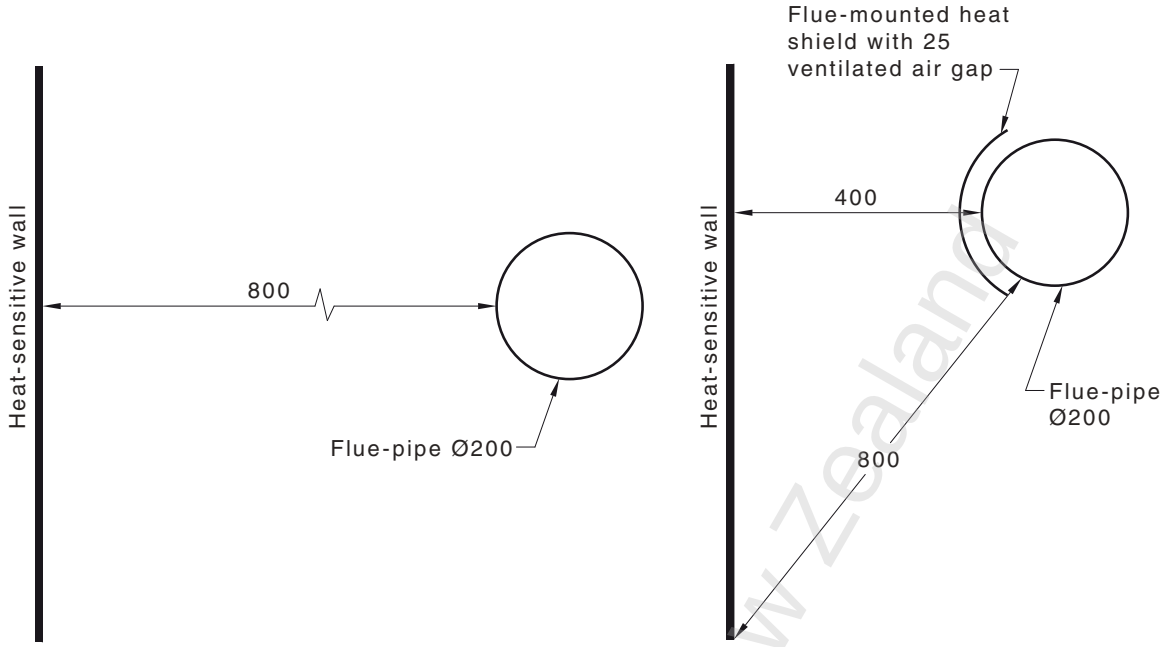
A flue-mounted shield shall consist of heat-resistant material, of the type and thickness as specified in Clause 2.4, and shall be separated from the flue pipe by an air gap of not less than 25 mm. To minimize the funnelling of hot air onto the ceiling, the shield shall terminate not less than 600 mm below the ceiling, unless the appliance has been tested with the flue shield in accordance with Appendix B.

Provided the flue-mounted heat shield is not less than 1200 mm tall, the portion of the flue between the top of the shield and the ceiling shall be deemed to be shielded when applying the clearance factor.

Provided test results show that the flue gases have cooled considerably by the time they reach the top of the flue-mounted heat shield, the shielding effect of the flue shield shall not be required above this height.

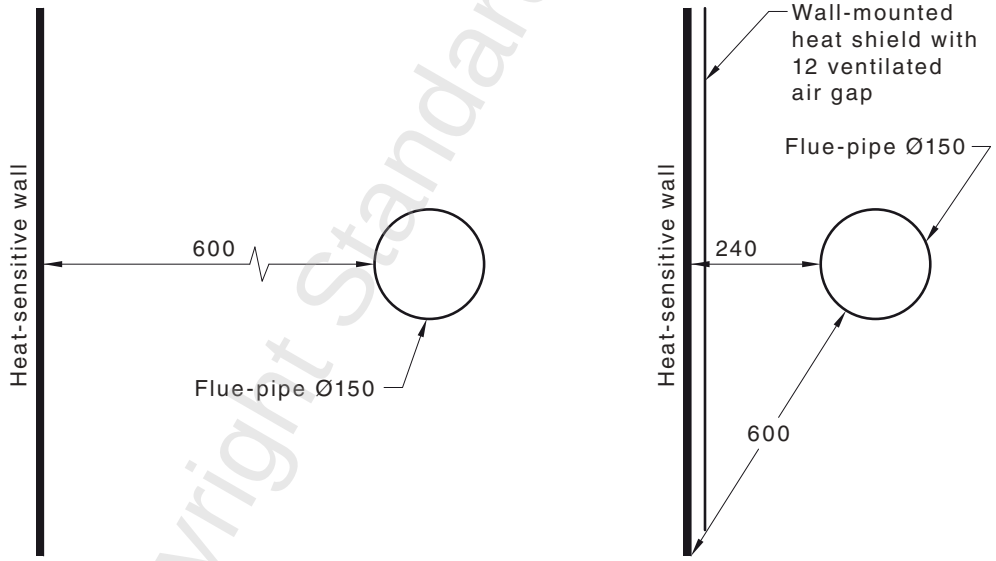
Any such heat shield shall have a clearance factor of 0.5 when applying Clause 3.2.3 for heat shield constructions.

NOTE: For examples of the use of heat shields to reduce flue pipe clearances for untested flues below ceiling level, see Figure 4.3.



NOTE: Safety clearance multiplied by the clearance factor for single ventilated heat shield gives reduced clearance, e.g. 800 (see Clause 4.5.2 200 diameter flue × 4) × 0.5 (see Clause 4.5.2) = 400.

(a) Heat shield spacing for 200 diameter flue pipe



NOTE: Safety clearance multiplied by the clearance factor for single ventilated heat shield gives reduced clearance, e.g. 600 (Clause 4.5.1.2, minimum clearance) × 0.4 (Table 3.1) = 240 for an untested flue-system.

The use of an unencased flue beyond the ceiling or wall is not permitted.

(b) Heat shield spacing for flue up to 150 diameter

DIMENSIONS IN MILLIMETRES

FIGURE 4.3 EXAMPLES OF THE USE OF HEAT SHIELDS TO REDUCE FLUE PIPE CLEARANCES BELOW CEILING LEVEL

4.5.3 Guarding

A flue guard of heat-resistant material shall be provided in any storage area (including cupboards) or living area other than that in which the appliance is installed (see Note 1).

Where a flue system in a house passes through a cupboard or small enclosure having a horizontal cross-section area less than 1 m^2 and the flue system has not been tested in accordance with Appendix B for this configuration, the cupboard or enclosure shall have ventilation openings at the top and bottom. Each of the openings for ventilation shall be not less than 10 000 mm^2 (see Notes 2 and 3).

Additionally, the entire length of the flue system in the cupboard or enclosure shall be guarded to maintain the minimum safe clearance from the outer flue casing and any articles which may be placed in the enclosure.

Except in a cupboard or enclosure, or where the flue guard has unobstructed ventilation into the flue-pipe casing(s) above the ceiling level (see Note 3), the flue guard shall terminate at a distance from the lower surface of a heat-sensitive ceiling by one of the following, as appropriate:

(a) Where a sample flue system has been tested in accordance with Appendix B, a distance which ensures the temperature rise of the wall or ceiling of the test enclosure does not exceed the temperature specified in Appendix B during the high fire and flash fire tests.

(b) Where a sample flue system has not been tested in accordance with Appendix B, a distance of not less than 600 mm.

NOTES:

1 A flue guard may be provided in the living area in which the appliance is installed for the purpose of preventing accidental contact with the casing of a flue pipe.

2 10 000 mm^2 is equivalent to a 100 mm × 100 mm square opening or 50 mm × 200 mm rectangular opening or a 113 mm diameter hole.

3 When the cupboard or enclosure is externally ventilated, the openings should be bird and vermin proofed.

4 Venting the flue guard into the flue-pipe casing(s) above the ceiling level will cause heat loss from the room.

4.6 FLUES PENETRATING CEILINGS, FLOORS AND WALLS

4.6.1 General

Where a flue pipe penetration (see Clause 1.4.37) passes through a ceiling, floor, or a wall containing heat-sensitive material, it shall be cased and the flue-pipe casing(s) shall pass through the entire thickness of ceiling, floor or wall. The penetration arrangement may be tested or untested. If the penetration arrangement is untested, it shall be in accordance with the requirements of Clause 4.6.3. If the penetration arrangement is tested, it shall be in accordance to Appendices F and B with each model appliance with which it is to be installed.

If an appliance has not been tested to Appendix B, it shall only be installed with ceiling, floor or wall penetrations that are specified in Clause 4.6.3.

If the penetration arrangement is tested, it shall be in accordance with both Clause 4.6.2(a) and 4.6.2(b).

If an appliance has been tested and is in accordance with the requirements of Appendix B, it shall be installed with ceiling, floor or wall penetrations that are specified in Clause 4.6.3, or it shall be installed with a flue system having identical construction and clearances used in the Appendix B test, provided this flue system has been tested and is in accordance with the requirements of Appendix F.

Where there are minor variations in the construction, a written opinion, as to whether the variation necessitates retesting to this Standard, shall be conducted and reported by accredited laboratories.

NOTE: Accreditation to AS ISO/IEC 17025 is a requirement by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA), with a relevant scope of accreditation to cover the tests being performed. In Australia, the National Association of Testing Authorities (NATA) and in New Zealand, International Accreditation New Zealand (IANZ) are signatories (ILAC) (MRA).

4.6.2 Tested penetrations

The arrangement shall be in accordance with both of the following:

(a) Where a sample installation is tested in accordance with Appendix B, the temperature rise of the wall, ceiling and enclosure surfaces of the test enclosure, as appropriate, shall not exceed the allowable temperatures specified in Appendix B during the high fire and flash fire tests, as applicable.

(b) Where a sample installation is tested in accordance with Appendix F, the temperature rise of the wall, ceiling, roof and enclosure surfaces of the test rig, as appropriate, shall not exceed 65°C during the hot flue test and 100°C during the flue fire test, and the flue assembly shall retain its structural integrity.

NOTES:

1 The maximum surface temperature rises specified in Appendix B are only valid for commonly used materials. Uncommon materials or those with high heat-sensitivity, e.g. plastics materials, may necessitate an increase in the specified clearances to prevent any adverse heat effects on the material.

2 Where the surface of the ceiling, floor or wall is uneven or bumpy, the minimum clearance at any point between the shielding plate and the heat-sensitive surface should be the larger clearance determined by Item (a) or Item (b).

4.6.3 Untested penetrations

Where a sample installation has not been tested in accordance with Appendices B and F, the passage of the flue pipe through ceiling, floor or wall shall be in accordance with one or more of the following, as appropriate:

(a) *Ceiling and floor penetrations* For ceiling penetrations or floor penetrations, the distance the ventilated double flue casing extends shall be in accordance with one of the following, as appropriate:

(i) Not less than 300 mm above the upper surface and 300 mm below the lower surface of a heat-sensitive material through which the flue pipe passes, and the outer flue-pipe casing shall be separated from the heat-sensitive material by an air gap of not less than 25 mm.

(ii) Not less than 300 mm above the upper surface and 150 mm below the lower surface of a heat-sensitive surface through which the flue pipe passes, and the outer flue-pipe casing shall be separated from the heat-sensitive material by an air gap of not less than 25 mm. In addition, a shielding plate, constructed from metal having a thickness of not less than 0.5 mm shall surround the flue pipe for a distance of not less than 300 mm in all directions, and shall be mounted below the inner surface of the ceiling so that it is separated from heat-sensitive material by an air gap of not less than 12 mm, except that for installations where the appliance has been tested to AS/NZS 4012 and the maximum power has been shown to be less than 25 kW, the shielding plate shall extend for a distance of not less than 150 mm in all directions.

If a ceiling shielding plate intersects a wall shield or a wall, the ceiling shielding plate shall be trimmed accordingly.

NOTE: For examples of ceiling and ceiling and roof penetrations for untested flue systems, see Figures 4.4 and 4.5.

(b) *Sloped ceiling penetrations* Only ventilated double cased flue systems [see Clause 4.5.1.2(b)] shall be used for untested sloping ceiling penetrations where the ceiling slope is greater than 30° from the horizontal. The casings shall extend upwards through the ceiling and roofing material and be terminated in accordance with Clause 4.9.1 and downward not less than 150 mm below the lowest surface of a heat-sensitive surface through which the flue pipe passes, and the outer flue-pipe casing shall be separated from any heat-sensitive material by an air gap of not less than 25 mm. In addition, a shielding plate, constructed from metal having a thickness of not less than 0.5 mm, shall surround the flue pipe for a distance of not less than 150 mm in all directions. All unshielded heat-sensitive material shall be separated from the active flue by a distance of at least three times the flue diameter. The shielding plate shall be mounted below the inner surface of the ceiling so that it is separated from heat-sensitive material by an air gap of not less than 12 mm.

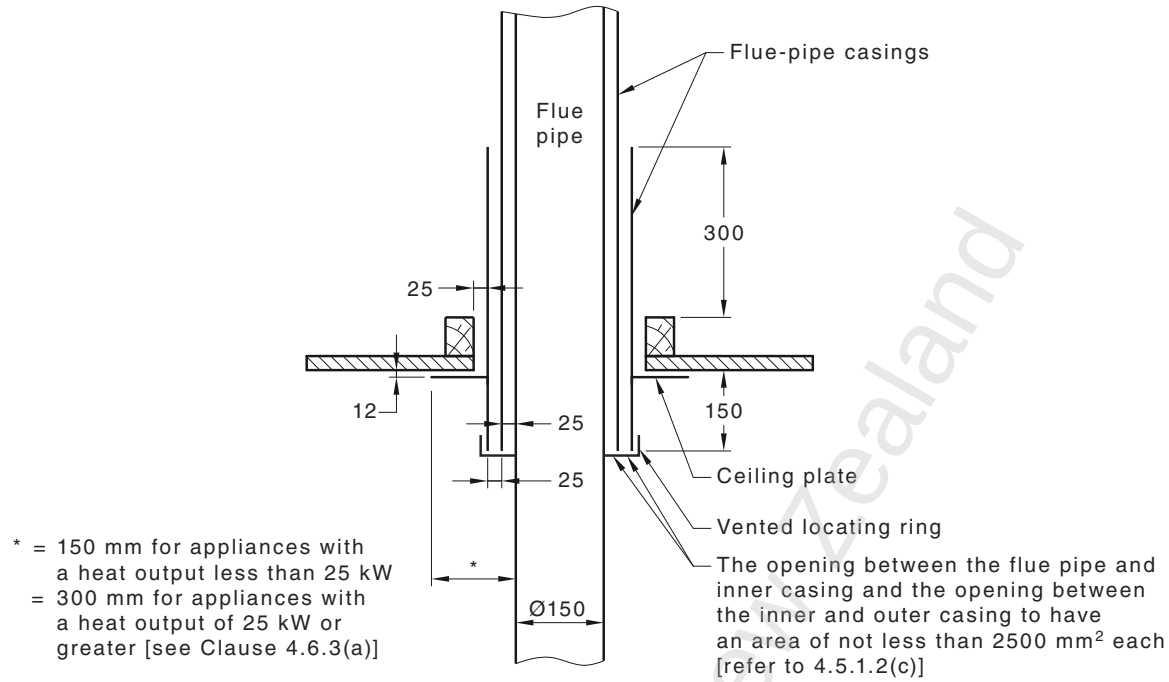
NOTE: For an example of a sloped ceiling and roof penetration for an untested flue system, see Figure 4.6.

(c) *Wall penetration* For wall penetrations with vertical rise of at least 900 mm, the ventilated double flue-pipe casing shall extend for a distance of not less than 150 mm on both sides from the surface of a heat-sensitive wall through which the flue pipe passes. Ceiling clearances for unprotected flues shall be according to Clause 4.5.1.2. The outer casing shall be separated from the heat-sensitive material by an air gap of not less than 25 mm. In addition, a shielding plate constructed from metal having a thickness of not less than 0.5 mm shall surround the flue pipe for a distance of not less than 150 mm in all directions, and shall be mounted to both sides of the wall so that it is separated from heat-sensitive material by an air gap of not less than 12 mm.

NOTES:

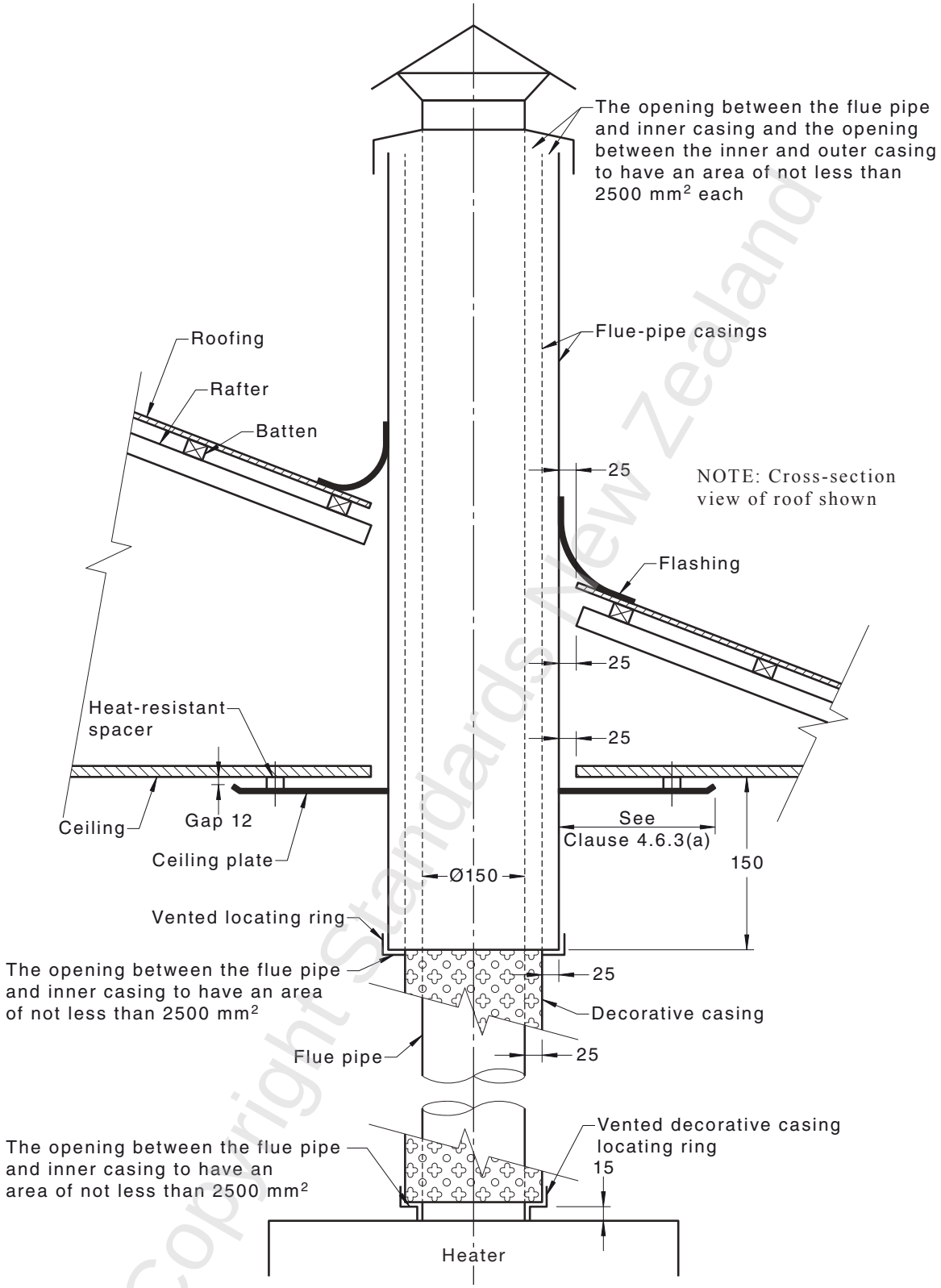
1 The shielding plate may be omitted where a double flue-pipe casing extends more than 300 mm on both sides of the wall to be penetrated (see Figure 4.7).

2 The maximum surface temperature rises specified in Appendix F are only valid for commonly used materials. Uncommon materials with high heat-sensitivity, e.g. plastics materials, may necessitate an increase in the specified clearances.



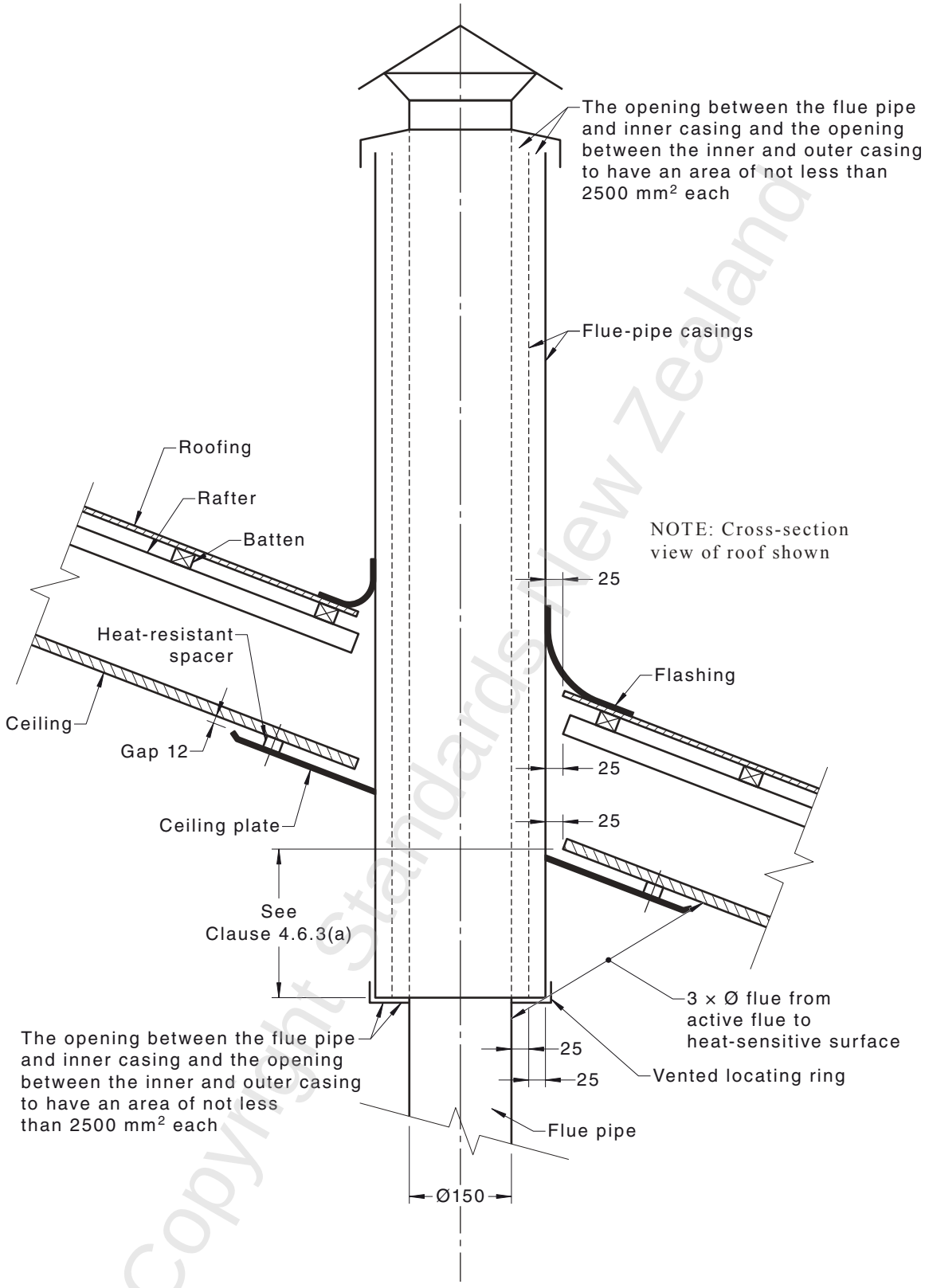
DIMENSIONS IN MILLIMETRES

FIGURE 4.4 EXAMPLE OF CEILING PENETRATION FOR UNTESTED FLUE SYSTEMS



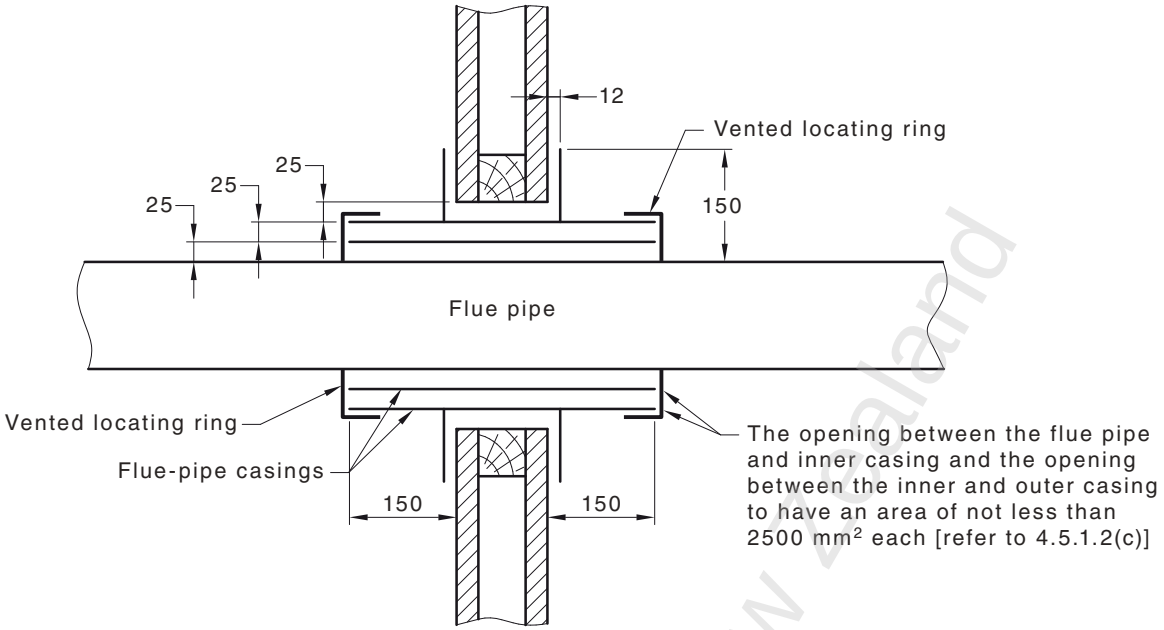
DIMENSIONS IN MILLIMETRES

FIGURE 4.5 EXAMPLE OF A CEILING AND ROOF PENETRATION WITH DECORATIVE CASING FOR AN UNTESTED FLUE SYSTEM



DIMENSIONS IN MILLIMETRES

FIGURE 4.6 EXAMPLE OF A SLOPED CEILING AND ROOF PENETRATION FOR AN UNTESTED FLUE SYSTEM



DIMENSIONS IN MILLIMETRES

FIGURE 4.7 EXAMPLE OF WALL PENETRATION FOR AN UNTESTED FLUE SYSTEM

4.6.4 Shielding plate clearance

Where the surface of the ceiling, floor or wall is uneven or bumpy, the minimum clearance at any point between the shielding plate and the heat-sensitive surfaces shall be the clearance determined by Clause 4.6.3(a) and 4.6.3(b), as appropriate.

4.7 FLUES WITHIN ATTIC SPACES

All flue systems installed in an attic space shall be in accordance with the appropriate requirements of Clause 4.5.1 with the exception that unencased flue systems shall not be used.

4.8 ROOF PENETRATION

4.8.1 General

Where a flue system passes through a roof, it shall be provided with a casing in accordance with the appropriate requirements of Clause 4.5.1. The casing(s) shall pass through the entire section of the roof.

Where a sample installation has been tested in accordance with Appendix F, the temperature rise of the roof of the test rig shall not exceed 65°C above ambient during the hot flue test and 100°C above ambient during the flue fire test.

Where a sample installation has not been tested in accordance with Appendix F, a ventilated double unperforated casing in accordance with the requirements of Clause 4.5.1.2(b) shall be used.

4.8.2 Flashing

Where a flue system penetrates the roof of the building, flashing shall be installed to weatherproof the building in accordance with the requirements of the appropriate building code.

4.9 EXTERNAL REQUIREMENTS

4.9.1 General

The products of combustion shall discharge not less than 12 mm and not more than one flue pipe diameter beyond the end of the flue-pipe casing. The flue exit and the end of the flue-pipe casing shall both be fitted with means to prevent ingress of water and debris, and such means shall be constructed and fitted so as not to obstruct flue discharge and convection ventilation of the flue-pipe casing, where required.

The flue exit shall be located outside the building in which the appliance is installed so that—

(a) the flue pipe shall extend not less than 4.6 m above the top of the floor protector;

(b) the minimum height of the flue system within 3 m distance from the highest point of the roof shall be 600 mm above that point as shown in Figure 4.8;

(c) the minimum height of a flue system further than 3 m from the highest point of the roof shall be 1000 mm above roof penetration as shown in Figure 4.8;

(d) no part of any building lies in or above a circular area described by a horizontal radius of 6 m about the flue system exit;

NOTE: In New Zealand the 6 m radius of the circular area may be accepted, as shown in Figure 4.8.

(e) termination of the flue system does not constitute a risk of fire to heat-sensitive materials; and

(f) there is no foreseen risk of penetration of flue gases through nearby windows or other openings, fresh air inlets, mechanical ventilation inlets or exhausts, or the like.

NOTE: Where a flue pipe terminates in a region of high pressure relative to the combustion air inlet of the appliance, products of combustion may enter the building instead of being exhausted outside—this is known as a downdraught.

The products of combustion may contain carbon monoxide, carbon dioxide, unburnt hydrocarbons and water vapour. A downdraught condition shall always be corrected as these products of combustion may otherwise build up to concentrations that may be hazardous to health.

Correction of downdraught conditions shall be as follows:

(i) Ensure that the flue system is sized correctly for the appliance.

(ii) Extend the flue into a region of undisturbed airflow.

NOTE: This is the most important and successful corrective measure.

(iii) Provide an outside source of combustion air to the appliance.

(iv) Ensure the flue is not being overcooled.

(v) Remove any causes of negative pressure within the building.

(vii) Fit an appropriate cowling.

NOTES:

1 Common causes of downdraught are as follows:

(a) Termination of the flue in a high pressure zone such as on the downstream side of a nearby obstruction to airflow (e.g. trees, hills, adjacent buildings or parts of the building where the appliance is installed).

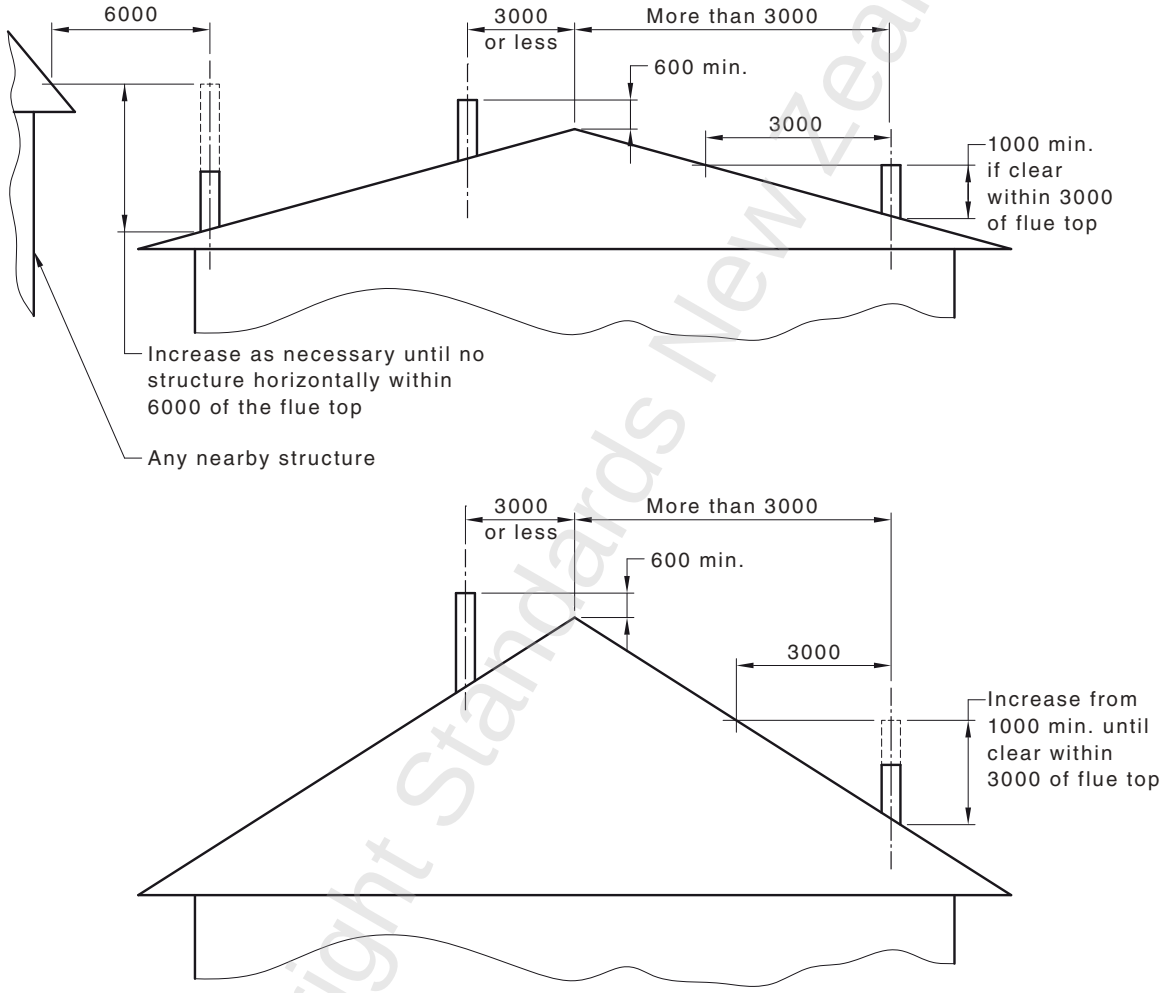
(b) Generation of negative pressures within the building caused by air exhaust systems, air-conditioning systems and window openings on the side of the building away from the wind direction.

(c) Overcooling of the flue system, caused for example by the exposure of the flue to cold outside air or use of too large a flue system.

2 Downdraughts may become apparent in low fire conditions and are often affected by the wind direction at the time. Spillage into the building may also occur for other reasons (e.g. use of too small a flue system or lack of a proper combustion air supply to the appliance due to the airtightness of the building).

3 Momentary puffs of spillage may also occur during reloading an appliance or when fuel loading doors are opened too rapidly; however, this is not normally of concern.

4 For information on causes and solutions to downdraught and smoke spillage, see Appendix H.



DIMENSIONS IN MILLIMETRES

FIGURE 4.8 MINIMUM HEIGHT OF FLUE SYSTEM EXIT

4.9.2 Additional requirements for flue systems adjacent to external walls

4.9.2.1 *General*

In addition to the requirements of Clause 4.9.1, any section of flue pipe adjacent to an external wall shall be cased. The safety clearances shall be in accordance with Clause 4.9.2.2 or Clause 4.9.2.3, as appropriate.

4.9.2.2 *Safety clearance where a sample flue system (or prototype flue system) has been tested*

Where a sample flue system has been tested in accordance with Appendix F, the distance between a flue pipe and any heat-sensitive material shall be any clearance that does not allow the temperature rise of the corresponding surface of the test rig to exceed 65°C above ambient during the hot flue test and 100°C above ambient during the flash fire test and the flue system retains its structural integrity.

The specified maximum surface temperature rise of 65°C and 100°C shall be valid for commonly used building materials only.

NOTE: Materials with high heat-sensitivity, e.g. plastics materials, may necessitate a reduction of the specified maximum temperatures.

4.9.2.3 *Safety clearance where a sample flue system has not been tested*

Where a sample flue system has not been tested in accordance with Appendix F, the distance between a flue pipe and any heat-sensitive material shall be not less than 0.5 times maximum cross-sectional dimension of flue pipe but not less than 75 mm, provided the distance between the outer flue casing and heat-sensitive material shall be not less than 25 mm (see Figure 4.2). The clearances specified shall be valid for masonry and timber building materials only.

NOTE: Materials with high heat-sensitivity, e.g. plastics, may necessitate an increase in the specified clearances to prevent any adverse heat effects on the material.

If any loose material is present in the vicinity of the flue system, e.g. loose fill insulation or clothing, a guard shall be provided to maintain minimum clearances specified in this Clause.

4.10 FIXING

Except where it is situated within a chimney (see Clause 4.11), a flue pipe shall be retained in its designed position by galvanically compatible metal brackets connected to the outer casing of the flue system, as appropriate. Provision shall be made for thermal expansion of the flue pipe. Brackets shall be spaced along the length of the flue system at intervals not greater than the following:

(a) For a flue system having a departure from vertical not greater than 5° ..... 3 m.

(b) For a flue system having a departure from vertical greater than 5° and not greater than 45° ..... 2 m.

(c) For a flue system having a departure from vertical greater than 45° ..... 1 m.

(d) For any change in flue system direction not otherwise supported .... 300 mm each way from the change point.

NOTES:

1 It is necessary to ensure that the weight of the flue system is supported.

2 Stainless steel flue pipes can expand up to 7 mm per metre length between ambient and operating temperatures.

4.11 FLUE PIPES IN CHIMNEYS

For appliances discharging combustion products through a chimney, the chimney shall be inspected for soundness and thoroughly cleaned before a flue pipe is installed. The air gap between the flue pipe and the chimney shall be open at the top of the chimney to the extent that the total opening area is not less than 10 000 mm^2. The chimney exit shall be fitted with means to prevent ingress of water and debris, and such means shall be constructed and fitted to maintain a total opening area at the chimney exit of not less than 10 000 mm^2.

The flue pipe shall terminate outside the chimney in accordance with the requirements of Clause 4.9.1.

4.12 FLUE DAMPERS

The appliance installation shall not include a flue damper unless such a device has been approved in writing by the appliance manufacturer.

4.13 FLUE COWLS

A flue cowl to exclude rain from the flue shall be fitted above the flue discharge point. The flue cowl and its attachment system shall not restrict the airflow from the flue-pipe casings.

Some flue cowl systems are designed to restrict airflow from the flue-pipe casings; any such system shall be deemed to be not in accordance with the requirements of this Standard.

NOTE: Some regulatory authorities may require certain designs of flue cowl, which can improve dispersion of flue gases.

SECTION 5 MODIFICATIONS AND VARIATIONS

5.1 APPLIANCE MODIFICATIONS

The addition of a component or any other modification before, during and after installation of an appliance shall not conflict with any part of the manufacturer's specification relating to the appliance (e.g. tampering with controls that regulate the air intake of an appliance).

Alterations to the air control system of a tested appliance may result in it no longer conforming with safety and air quality standards. Any appliance so modified shall be deemed to be an untested appliance unless the original testing agency provides a written opinion to the contrary.

Additional components to the installation (e.g. add-on catalytic combustor, water jackets or draught regulator) shall be deemed to be appliance modifications.

5.2 APPLIANCE VARIATION

Variation of appliances from as-tested configurations shall be subject to the following requirements:

(a) Whenever any subsequent change is made in the design or method of construction of an appliance that could affect the heat output or modify the flow of convection air, or the distribution of radiated heat that could increase temperatures on surrounding heat-sensitive materials, the appliance shall either be retested or a written opinion shall be obtained from an accredited laboratory that the change will not increase either flue emissions or the temperatures on surrounding heat-sensitive materials, and therefore will not necessitate retesting. Where a written opinion is not available, the appliance shall be deemed to be an untested appliance.

(b) A written opinion as to whether a design or construction change made to an appliance necessitates retesting to this Standard shall be conducted and reported by accredited laboratories.

NOTE: Accreditation to AS ISO/IEC 17025 is a requirement by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA), with a relevant scope of accreditation to cover the tests being performed. In Australia, the National Association of Testing Authorities (NATA) and in New Zealand, International Accreditation New Zealand (IANZ) are signatories (ILAC) (MRA).

The opinion shall give particulars of the change, and shall give detailed reasons as to how the change will affect the temperatures of surrounding heat-sensitive materials.

SECTION 6 ADDITIONAL REQUIREMENTS

6.1 VENTILATION

Where an appliance is installed in an enclosed location, the area shall be ventilated to allow unrestricted operation of the flue.

NOTE: For installations in well-sealed buildings, the minimum ventilation area should be one-half the cross-sectional area of the flue. Where exhaust fans or additional combustion appliances are installed in the sealed enclosure, additional ventilation may be required.

6.2 WATER HEATING EQUIPMENT

Any water heating appliance installed in conjunction with the heating appliance shall be vented and in accordance with the requirements of AS/NZS 3500.4 or NZBC G12 and the relevant building authority, as appropriate.

6.3 EMISSION AND EFFICIENCY LIMITS

Where required by the regulatory authority, the emission and efficiency limits for appliances installed in accordance with this Standard shall be in accordance with the requirements of AS/NZS 4012 and AS/NZS 4013.

6.4 TESTING LABORATORY

All testing in accordance with Appendices A to F shall be conducted and reported by accredited laboratories.

NOTE: Accreditation to AS ISO/IEC 17025 is a requirement by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA), with a relevant scope of accreditation to cover the tests being performed. In Australia, the National Association of Testing Authorities (NATA) and in New Zealand, International Accreditation New Zealand (IANZ) are signatories (ILAC) (MRA).

APPENDIX A

EVALUATION OF HEAT SHIELD CLEARANCE FACTORS

(Normative)

A1 SCOPE

This Appendix sets out the method for determining appropriate shield clearance factors for shields not specified in Clause 3.2.3, that is those with material service temperature ratings below 250°C.

A2 PRINCIPLE

An unscreened wall is exposed to radiation from a heated plate and the separation between the two is adjusted until the wall is at its maximum allowable surface temperature. A shield is introduced in front of the wall and the distance to the radiating plate is reduced until the wall or the shield surface temperature has reached its allowable limit. The final wall to radiating plate distance is divided by the original distance to obtain the clearance factor.

A3 APPARATUS

The following apparatus is required:

(a) Test equipment as described in AS/NZS 1530.3, or other equipment that will yield essentially the same result.

(b) A number of K type (chromel-alumel) thermocouples having diameters not greater than 0.6 mm.

All thermocouples shall be in 'standard' tolerance, i.e. ±2.2°C or 1.5%, whichever is the greater, in accordance with IEC 60584-1. Each batch shall be calibrated by accredited laboratories.

NOTE: Accreditation to AS ISO/IEC 17025 is a requirement by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA), with a relevant scope of accreditation to cover the tests being performed. In Australia, the National Association of Testing Authorities (NATA) and in New Zealand, International Accreditation New Zealand (IANZ) are signatories (ILAC) (MRA).

(c) A temperature meter capable of responding to the outputs of the thermocouples specified in (b) above to provide temperature measurements over the range 10°C to 150°C with an overall accuracy of ±3°C.

(d) Side shields to prevent room draughts from affecting the temperature measurements.

A4 PREPARATION

The preparation shall be as follows:

(a) A steel radiating plate approximately 450 mm × 600 mm × 12 mm shall be mounted approximately 50 mm in front of the gas-fired radiant panel, and a 450 mm × 600 mm wall shall be mounted directly in front of, parallel to and facing the radiant panel. The wall shall be made of 18 mm to 20 mm thick plywood, painted matt black on the face receiving the radiation, with a 50 mm thick 450 mm × 600 mm expanded polystyrene insulator (density 35 kg/m^3) in contact with the side not facing the plate.

(b) A suitable support shall be prepared so that part way through the test the shield can be positioned in front of, and parallel to, the wall at the desired spacing.

(c) Thermocouple junctions shall be fixed at the centre of the radiating plate and at the points on the surfaces of the wall and shield which are nearest, and normal to, the radiating plate thermocouple.

NOTE: Thermocouples should be fastened to wooden surfaces with staples located at a distance of 12 mm from the thermocouple junction, and to metal surfaces with a screw and washer or a pop rivet. The thermocouple junction should be welded, and be in contact with the surface of the test enclosure or appliance (see Figure D2, Appendix).

(d) A thermocouple shall be mounted as appropriate to measure the ambient temperature.

(e) If the test shield is directly attached to the wall with adhesive or mechanical fixings of a type which will be used in the ultimate domestic installation, additional thermocouples shall be mounted on the test wall not further than 10 mm from the point of attachment.

A5 PROCEDURE

The procedure shall be as follows:

(a) With the shield removed from the wall, ignite the radiant panel and adjust the gas flow until the radiating plate has stabilized at 500 ±5°C.

(b) Adjust the wall position relative to the radiating plate until the wall temperature has stabilized at 65°C above ambient. Shields shall be used to prevent room draughts affecting temperature measurements.

(c) Record the distance between the plate and the wall.

(d) Install the shield in front of the wall.

(e) Move the wall and shield closer to the radiating plate, and monitor the wall and shield temperatures.

(f) When the temperatures have stabilized (less than ±3°C change in 10 min) and the wall or shield has reached its maximum allowable service temperature, record the wall to plate distance.

(g) Calculate the clearance factor for the particular shield material at the tested spacing from the wall by dividing the distance obtained in Step (c) by the distance from Step (f). The factor shall be rounded up to the nearest 0.05.

A6 REPORT

The following shall be reported:

(a) The name of the testing agency, the date of the test and the name of the person responsible for the test.

(b) A full description of the shield material, including its heat tolerance rating, its thickness and details of any surface finish.

(c) The distance the shield was spaced away from the wall.

(d) The shielded wall to plate distance at the maximum allowable wall temperature.

(e) The shielded wall to plate distance at the maximum allowable wall or shield temperature, and the wall and shield temperature rises at that distance.

(f) The ambient temperature.

(g) The clearance factor resulting from the test as calculated in Paragraph A5(g).

(h) A reference to this test method i.e. Appendix A of AS/NZS 2918.

APPENDIX B

THERMAL TESTING OF INSTALLATION CLEARANCES

(Normative)

B1 SCOPE

This Appendix sets out the method for determining the maximum temperature rise above ambient temperature of heat-sensitive materials at specified installation clearances from a solid fuel burning appliance, including specified floor protector, shields and flue system.

B2 PRINCIPLE

The appliance is installed as designed within a prescribed environment, fired in a given manner, and appropriate surface temperatures of the test enclosure are measured.

B3 TEST ROOM

The test shall be carried out in a well-ventilated test room having an internal volume of not less than 60 m^3, and in which the test room air velocity does not exceed 0.5 m/s with the exception of thermally induced air velocities. Provision shall be made to ensure that for the duration of the test procedure the ambient air temperature in the test room remains within the range 10°C to 35°C. Ambient temperature for the test room shall be determined by means of a shielded thermocouple located 150 mm from the plane of the side wall of the test enclosure, inside the test enclosure, 1.2 m above the floor of the test enclosure, and 2.1 m from the rear wall.

B4 APPLIANCE SPECIFICATION

Design plans of the appliance shall include drawings and instructions for the appliance and its proposed installation and shall be supplied to the testing agency.

These shall include:

(a) Overall dimensions.

(b) Firebox dimensions.

(c) Dimensions of the airways, including the cross-sectional area of restrictive inlets and outlets, and the dimension and location of the methods of control of gas movement through the appliance.

(d) The total cross-sectional area of all combustion air inlets when the appliance is operating at its maximum and minimum burn rates.

(e) Dimensions and location of baffle systems.

(f) Dimensions and location of refractory and insulation materials and details of their heat capacity and thermal resistance.

(g) The dimensions and location of the flue gas outlet.

(h) The dimensions, type, fit and location of all gasket materials.

(i) Details of the outer shielding and coverings, including dimensions and location.

(j) The dimensions, location, type and manufacturer of the combustor, if the appliance is fitted with a catalytic combustor.

(k) The location, dimensions, cross-sectional area and gap tolerances of any bypass dampers.

(l) The position, type and specification of any air circulation fan.

(m) The position, type and specification of any water heating device.

All dimensions shall be in millimetres and tolerances shall be stated.

NOTE: The cross-sectional area of each of the combustion air inlets when the appliance is operating at its maximum and minimum burn rates.

B5 APPARATUS

The following apparatus is required:

(a) A temperature-indicating system for measuring ambient temperatures in the range 10°C to 40°C, with an accuracy of ±3°C.

(b) A number of J-type (iron-constantan), T-type (copper-constantan) or K-type (chromel-alumel) thermocouples having a diameter of not greater than 0.6 mm, as required (see Paragraph B8).

All thermocouples shall be in 'standard' tolerance, i.e. ±2.2°C or 1.5%, whichever is the greater, in accordance with IEC 60584-1. Each batch shall be calibrated by accredited laboratories.

NOTE: Accreditation to AS ISO/IEC 17025 is a requirement by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA), with a relevant scope of accreditation to cover the tests being performed. In Australia, the National Association of Testing Authorities (NATA) and in New Zealand, International Accreditation New Zealand (IANZ) are signatories (ILAC) (MRA).

(c) A temperature meter, capable of responding to the outputs of thermocouples specified in Item (b) above, to provide temperature measurements over the range 10°C to 150°C, with an overall accuracy of ±3°C.

B6 TEST ENCLOSURE

Within the test room, the test shall be carried out in a test enclosure in accordance with the following:

(a) For a freestanding appliance, the test enclosure shall comprise two vertical side walls forming a corner at an angle of 90°, a horizontal floor forming corners with each of the two side walls, and a horizontal ceiling situated 2.4 ±0.1 m above the floor to form corners with each of the two side walls. The corners formed between the ceiling and side walls shall be sealed against airflow, and provision shall be made to vary the horizontal positioning of the side walls with respect to the floor and ceiling. The ceiling, walls and floor shall extend a minimum of 1.20 m beyond the horizontal perimeter of the appliance, and the side walls and ceiling shall be finished matt black over the inward-facing surfaces.

(b) Where a freestanding appliance is designed for installation in a confined space, e.g. ceiling height less than 2.3 m or in an alcove, the test enclosure shall simulate the intended installation.

(c) For a built-in appliance, the test enclosure shall simulate the intended installation, and shall consist of a vertical wall not less than 100 mm thick extending between a horizontal ceiling and floor situated 2.4 ±0.1 m apart. The wall shall be of stud construction faced both sides with material having a thermal resistance between 0.1 m^2K/W and 0.2 m^2K/W (e.g. 15 mm plywood). A section shall be cut out of the wall to allow for fitting of the appliance in accordance with the manufacturer's installation instructions for minimum clearance. Ceiling and floor shall extend a minimum of 1.20 m beyond the horizontal perimeter of the appliance, and both sides of the wall and the inward-facing surface of the ceiling shall be finished matt black.

If the manufacturer's installation instructions allow for additional enclosure of the appliance, it shall be enclosed at the minimum clearance specified in the manufacturer's installation instructions. Where the manufacturer's installation instructions do not state minimum venting requirements for the enclosure it shall be sealed against airflow.

(d) For a fireplace insert appliance, the test enclosure shall be in accordance with Item (a) above. In addition, a simulated fireplace shall be set in the rear test enclosure wall to allow simulation of the designed installation of the appliance. The base of the appliance shall be level with the top surface of the floor protector unless the manufacturer's installation instructions state otherwise.

For the purpose of testing, the simulated mantelpiece or mantelshelf shall—

(i) be of the same material as the test enclosure walls;

(ii) project 250 ±10 mm into the test enclosure;

(iii) be finished matt black over the downward-facing surface; and

(iv) extend to 300 mm either side of the appliance.

The simulated fireplace surround columns shall—

(A) be of the same material as the test enclosure walls;

(B) project 100 ±10 mm into the test enclosure on both sides of the appliance;

(C) be finished matt black over the sides facing the appliance; and

(D) extend from the simulated mantelpiece to the floor.

(e) For all test enclosures, the side walls, floor, ceiling and other enclosures, with the exception of the vertical wall in Item (c) above, shall be constructed from material having a thermal resistance between 0.1 m^2K/W and 0.2 m^2K/W (e.g. 15 mm thick plywood).

B7 TEST FUEL

The test fuel of differing appliances shall be as follows:

(a) For wood-only burning appliances, the test fuel shall comprise a quantity of untreated Pinus radiata having a moisture content between 10% and 15%, expressed as a percentage of wet-weight mass. Each wood piece shall have a rectangular cross-section of 95 ±10 mm by 45 ±5 mm, and a length of not less than 50% nor greater than 70% of the longest axis of the combustion chamber of the appliance to be tested.

(b) Coal fuel shall be sub-bituminous coal with a volatile content not less the 30%, and a calorific value of not less than 22 MJ/kg on a wet basis.

(c) For appliances capable of using wood fuel or coal fuel, the procedures of Paragraph B9 shall be repeated for each test fuel type specified in Items (a) and (b) above.

B8 PREPARATION

The appliance and apparatus shall be prepared as follows:

(a) The test enclosure shall be set up in the test room.

(b) For all types of appliances, thermocouples shall be fastened to the floor of the test enclosure at intervals not exceeding 150 mm along each of two straight lines that cross at right angles beneath the centre position of the appliance combustion chamber and extend either to the perimeter of the floor protector or to a corner formed by the floor and a wall of the test enclosure.

Thermocouples shall be attached to the floor of the test enclosure directly under the points where the appliance will contact the floor protector or the floor. In addition, thermocouples shall be attached to the floor of the test enclosure at intervals not exceeding 150 mm along any line contact between the appliance and floor protector or the floor.

NOTES:

1 Where the heat transfer characteristics of an appliance are symmetrical about a vertical plane, thermocouples may be omitted on one side of the plane.

2 A thermocouple should be fastened to a wooden surface with a staple located at a distance of 12 mm from the thermocouple junction, and to a metal surface with a screw and washer or a pop rivet. Black, pressure-sensitive tape should be placed over the thermocouple junction and over the adjoining connecting wires for a length of 100 mm. Thermocouple junctions should be welded and be in contact with the surface of the test enclosure or appliance.

(c) For appliances designed to be built-in, additional thermocouples shall be attached as follows:

(i) To the appliance at the intended points of contact between the appliance and the test enclosure.

(ii) To the appliance at intervals not exceeding 150 mm, along any intended line contact between the appliance and the test enclosure.

(iii) To the appliance, in a rectangular grid at intervals not exceeding 150 mm, to any area of contact between the appliance and the test enclosure.

(iv) To all heat-sensitive surfaces in number and positions to ensure the highest temperatures are recorded.

NOTE: Where the heat transfer characteristics of an appliance are symmetrical about a vertical plane, thermocouples may be omitted on one side of the plane.

(d) For appliances designed to be built-in, additional thermocouples shall be attached to all heat-sensitive surfaces in number and positions adequate to ensure that the highest temperatures are recorded.

NOTE: Thermocouples are not required within the simulated fireplace. Where the heat transfer characteristics of an appliance are symmetrical about a vertical plane, thermocouples may be omitted on one side of the plane.

(e) Floor protector, appliance, flue pipe, heat shield(s), and guarding (as required) shall be installed within the test enclosure so as to simulate the intended installation. The intended wall clearances shall be confirmed with respect to the appliance and flue pipe The intended ceiling penetration or wall penetration of the flue pipe shall be effected, as appropriate. The flue pipe shall be terminated inside the test room at a height of 4.6 ±0.1 m above the top surface of the floor protector, or at the minimum height specified by the manufacturer, whichever is the greater.

(f) Appliances containing removable water heating devices shall be installed as described in the manufacturer's installation instructions but shall be tested without water in the system.

(g) The appliance shall be installed in the test enclosure with a ceiling penetration specified by the manufacturer and the casings shall extend at least 300 mm above the ceiling.

(h) Appliances constructed with a water jacket or other non-removable water-heating device shall be tested with water passing through the water-heating device either through natural convection or forced flow such that the temperature of the water discharged from the device is greater than 90°C. The installation instructions for an appliance fitted with a non-removable water-heating device shall include provisions to ensure that the appliance is supplied with water at all times while in operation.

(i) If the installation includes heat-tolerant heat-shielding positioned less than 250 mm from the appliance, thermocouples shall be attached to the heat shield in number and positions adequate to ensure that the highest temperatures are recorded.

(j) A preliminary firing of the appliance shall be performed in accordance with Paragraphs B9.1 and B9.2. The position to within 50 mm on each wall, the ceiling, the floor beyond the floor protector and any mantelpiece or fireplace surround of the test enclosure, at which the highest surface temperature attributable to the appliance occurs, and the position to within 50 mm on each wall and the ceiling of the test enclosure at which the highest surface temperature attributable to the flue occurs shall be located. Thermocouples shall be attached to the position at which the highest surface temperatures occur and these temperatures shall be monitored to within ±3°C.

(k) Every thermocouple shall be connected individually to the temperature meter in the test enclosure through switching or other selective means.

B9 PROCEDURE

B9.1 High fire procedure

The high fire procedure shall be as follows:

(a) If wood fuel is to be used, load the test fuel, as appropriate, in the appliance fuel chamber until it is approximately 75% full by volume and record fuel mass. The test fuel pieces shall be located so that they do not form a solid block.

NOTE: Horizontal spacing between wood pieces should be approximately 25 mm.

If coal fuel is to be used, load the test fuel, as appropriate, in the appliance fuel chamber until it is approximately 75% full by volume or until the fuel level cannot safely be contained in the fuel chamber, and record fuel mass.

(b) Fully fire the appliance. Add test fuel at intervals of approximately 10 min or as required to maintain a 50% to 75% full volume level in the appliance fuel chamber throughout the remainder of the test procedure. Rake the fire bed level, as necessary, before each fuel loading.

If embers build up to a level of one-half the fuel loading door opening height, a smaller fuel load shall be used to maintain a fuel bed not exceeding this height. A smaller fuel load shall be used if a greater temperature rise can be produced.

NOTE: To maintain consistency of test results, regular fuel loading intervals and fuel quantities should be used throughout the test.

(c) Monitor each of the thermocouples and, taking into account the effects of adjusting any air controls, dampers, or other controls designed for adjustment during normal operation and the effects of the operation of any fans, identify the appliance operating condition that causes the maximum temperature rise above ambient temperature for each surface of the test enclosure [see Paragraph B8(j)].

(d) Applying the operating conditions determined in Step (c), as appropriate to each surface, monitor thermocouples at 1 min intervals, until the maximum temperature rises above ambient temperature have been attained. Where the average rate of temperature rise in not greater than 1°C in 30 min, provided the readings are 20°C or more below the maximum allowable temperature rise, the maximum temperature rise shall be deemed to have occurred. If the readings are less than 20°C below the maximum allowable temperature rise, then the measured temperatures shall be deemed to have declined below the maximum for a period of at least 20 min.

B9.2 Flash fire procedure

The flash fire procedure is not applicable to coal-only burning appliances. It shall be performed immediately after the high fire procedure (see Paragraph B9.1) as follows:

(a) Remove sufficient embers from the appliance fuel chamber to bring the fire bed to a level not less than 15% full or greater than 25% full by volume.

(b) Load the appliance with 70% of the mass of test fuel as recorded in Paragraph B9.1(a), and allow the appliance test fuel to ignite.

(c) Monitor each of the thermocouples and, taking into account the effects of adjusting any air controls, dampers, doors, ash removal doors or traps, or other openings, the effects of the operation of any fans, and overriding any automatic controls, identify the appliance operating condition which causes maximum temperature rise above ambient temperature for each surface of the test enclosure [see Paragraph B8(j)].

(d) Applying operating conditions determined in Step (c), as appropriate to each surface, selectively monitor thermocouples, at 1 min intervals, until it is apparent that the maximum temperature rises above ambient temperature have been attained.

B10 MAXIMUM ALLOWABLE TEMPERATURE RISES

To be in accordance with the temperature limits of this Standard, the temperature rise above ambient temperature of monitored surfaces shall not exceed 65°C for the high fire test, and 85°C for the flash fire test.

B11 REPORT

The following shall be reported:

(a) Name of the testing agency, date of test, and the name of the person responsible for the test.

(b) Make, type and model of the appliance and flue system.

(c) The manufacturer’s name and address.

(d) A copy of the operation and installation manuals, and design plans of the appliance and flue system with a copy of the test report, which shall be held by the testing agency for a minimum of 10 years.

(e) A description of the installation including floor protector, flue assembly, heat shielding and flue guarding.

(f) Full details relating to clearances between the appliance and flue, and the appropriate surfaces of the test enclosure.

(g) Details of fuelling rates and all operating conditions and settings during tests.

(h) Maximum temperature rise above ambient temperature for both the high fire and flash fire tests, where applicable, for all surfaces.

(i) Range of ambient temperatures during tests.

(j) A reference to this test method, i.e. Appendix B of AS/NZS 2918.

APPENDIX C

DETERMINATION OF THE MATERIAL SERVICE TEMPERATURE FOR SHIELDING AND INSULATING MATERIALS

(Normative)

C1 SCOPE

This Appendix sets out the method for determining safe service temperatures for sheet materials, including any surface finishes applied to them, intended for shielding and insulating.

C2 PRINCIPLE

Material samples are oven-heated for an extended period and then examined for any deterioration. The test may be used simply to confirm the manufacturer's claimed service temperature, or a series of tests may be conducted, rising by 10°C each time to establish the maximum working temperature.

C3 APPARATUS

The following apparatus is required:

(a) A thermostatically controlled oven capable of holding a given temperature setting within ±5°C, fitted with a temperature recording system accurate to ±2°C to enable the verification of the temperature exposure.

(b) The equipment detailed in Clauses 91 to 94 of ASTM D1037-12.

C4 PREPARATION

Three representative sample sheets, each 300 mm× 300 mm, shall be prepared.

NOTE: Any proposed surface finish may be on at least one face.

C5 PROCEDURE

The procedure shall be as follows:

(a) Support two of the sample sheets vertically, at least 25 mm apart, in the thermostatically controlled oven which is raised to the appropriate test temperature (±5°C). Hold the test sheets at the test temperature for at least 96 hours.

(b) At the end of the 96 hours period, remove one sample from the oven and allow to cool naturally.

(c) Remove the other heated sample from the oven at test temperature and immediately subject it to the falling ball impact test [see Paragraph C3(b)], except that drop the steel ball once only from a height of 100 mm on to the decorated surface (if any).

C6 PASS CRITERIA

When cool, the heated samples shall be compared with the unheated sample to determine whether the heated samples, and any surface finish applied thereto are free from—

(a) visible cracks and fractures;

(b) visible indication of delamination;

(c) linear distortion in excess of the equivalent of 10 mm per metre; and

(d) deterioration of the appearance of any surface finish.

If the material shows none of the defects above, it shall be deemed to qualify as heat-tolerant (XXX°C), where XXX is the next lower multiple of 10°C below the test temperature.

C7 REPORT

The following shall be reported:

(a) The name of the testing agency, the date of the test and the name of the person responsible for the test.

(b) A full description of the material under test, including sheet thickness and details of any surface finish.

(c) The oven set temperature for the test, and the duration of the test at that temperature.

(d) The results of the inspection detailed in Paragraph C6.

(e) The heat tolerance rating resulting from the test if no defects as listed in Paragraph C6 are observed.

(f) A reference to this test method, i.e. Appendix C of AS/NZS 2918.

APPENDIX D

THERMAL TESTING OF A FLOOR PROTECTOR

(Normative)

D1 SCOPE

This Appendix sets out the method to compare and assess the performance of any floor protector with the performance of the floor protector specified in Clause 3.3.3(a) (see also Figure 3.2). Where the tested floor protector is shown to be equal to or better than the one specified in Clause 3.3.3(a), it may then be used with any heater that has a firebox at least 50 mm above the floor protector surface.

D2 PRINCIPLE

The floor protector is installed as intended within a prescribed environment. The top surface is then heated electrically and appropriate surface temperatures of floor beneath the floor protector are measured.

D3 TEST ROOM

The test shall be carried out in a ventilated test room having an internal volume of not less than 60 m^3, in which the test room air velocity does not exceed 0.5 m/s with the exception of thermally induced air velocities. Provision shall be made to ensure that for the duration of the test procedure the ambient air temperature in the test room remains within the range 15°C to 30°C. Ambient temperature for the test room shall be determined by means of a shielded thermocouple located 600 mm to the side of the floor protector and 300 mm above the test floor.

D4 FLOOR PROTECTOR

Full materials and construction specifications, including drawings and instructions, for the floor protector and its proposed installation shall be supplied.

D5 APPARATUS

The following apparatus is required:

(a) A temperature-indicating system for measuring ambient temperatures in the range 10°C to 40°C with an accuracy of ±3°C.

(b) A number of K-type (chromel-alumel) thermocouples having a diameter not greater than 0.6 mm.

All thermocouples shall be in ‘standard’ tolerance, i.e. ±2.2°C or 1.5%, whichever is the greater, in accordance with IEC 60584-1. Each batch shall be calibrated by accredited laboratories.

NOTE: Accreditation to AS ISO/IEC 17025 is a requirement by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA), with a relevant scope of accreditation to cover the tests being performed. In Australia, the National Association of Testing Authorities (NATA) and in New Zealand, International Accreditation New Zealand (IANZ) are signatories (ILAC) (MRA).

(c) A temperature meter, capable of responding to the outputs of thermocouples specified in Item (b) above, to provide temperature measurements over the range 10°C to 150°C, with an overall accuracy of ±3°C.

(d) An electric resistance heater with a minimum capacity of 4 kW placed between two 500 mm × 500 mm × 12 mm steel plates and a temperature controller capable of controlling in the range 150°C to 350°C.

D6 TEST FLOOR

Within the test room, the test shall be carried out on a horizontal floor with at least a 25 mm ventilated air gap underneath. The area of the test floor shall provide a 100 mm minimum wide perimeter around the floor protector. The floor shall be constructed from material having a thermal resistance between 0.1 m^2K/W and 0.2 m^2K/W (e.g. 15 mm thick plywood) with its upper surface painted matt black.

D7 PROCEDURE

D7.1 Test 1

The procedure shall be as follows:

(a) Attach nine thermocouples to the centre of the test floor in a 150 mm square grid pattern (see Figure D1).

NOTES:

1 Thermocouples should be attached to metal surfaces by screws, rivets, or by silver soldering, brazing or welding of the tip to the metal surface (see Figure D2).

2 Thermocouples should be fastened to wooden surfaces with staples located at a distance of 12 mm from the thermocouple junction, and to metal surfaces with a screw and washer or a pop rivet. It is recommended that the thermocouple junction be welded, and be in contact with the surface of the test enclosure or appliance (see Figure D2).

3 Thermocouples should be attached to cement-like material surfaces by having the tip and at least 25 mm of the lead wires embedded into the material so as to be flush with the surface of the material. Furnace cement is to be smoothed over such indentations to maintain thermal contact.

(b) Place the floor protector on the centre of the floor and attach another nine thermocouples to the centre of the upper surface of the floor protector in a 150 mm square grid pattern (see Figure D1).

(c) Place the electric resistance heater on top of the centre of the floor protector and cover it with approximately 100 mm of insulation material with a thermal conductivity no greater than 0.1 W/m.

NOTE: A fibretex dura blanket 100 kg/m^3 is in accordance with this requirement.

(d) Raise and maintain the surface temperature of the floor protector at 180°C until the test floor has stabilized at its maximum temperature.

(e) Record the maximum temperature above ambient of the test floor.

(f) Remove the insulation material and heater and allow the surface temperature of the floor protector to drop to the ambient temperature of the test room.

(g) Repeat Steps (c) to (f) twice (3 tests) and record the mean of the test results.

D7.2 Test 2

The procedure shall be as follows:

(a) If the stabilized temperature difference above ambient on the test floor from Test 1 does not exceed 65°C, then raise the surface temperature of the floor protector within a 30 min period to 300°C. This test shall be performed immediately after Test 1.

(b) When the surface of the floor protector reaches 300°C, record the time interval for the test floor to exceed 85°C above ambient temperature of the test room. This test shall be stopped after 2 h if the temperature does not exceed 85°C.

D8 PASS CRITERIA

The following requirements shall apply:

(a) *Test 1* The test floor temperature shall not exceed 65°C above ambient when a temperature of 180°C is maintained continuously on the surface of the floor protector.

(b) *Test 2* The test floor temperature shall not exceed 85°C above ambient less than 80 min after the floor protector surface reaches 300°C.

Conformity with both these requirements indicates that the performance of the thermal resistance of the floor protector is at least equal to the standard floor protector specified in Clause 3.3.3(a) and, as such, when installed under any heater that has a firebox positioned 50 mm or greater above the floor protector, is in accordance with the requirements of Clause 3.3.

D9 REPORT

The following shall be reported:

(a) Full description of the floor protector.

(b) Any preparation or conditioning of the protector.

(c) Name of the testing agency, date of test, and the name of the person responsible for the test.

(d) Date on which the test was carried out or, if carried out over a period, the dates of commencement and completion of the test.

(e) The number of replicate results from which the test result has been derived, e.g. ‘single test result’ or ‘the mean of duplicates’ or ‘the mean of three determinations on identical protectors’.

(f) The identity of any reference material used to assist in the validation of the test result.

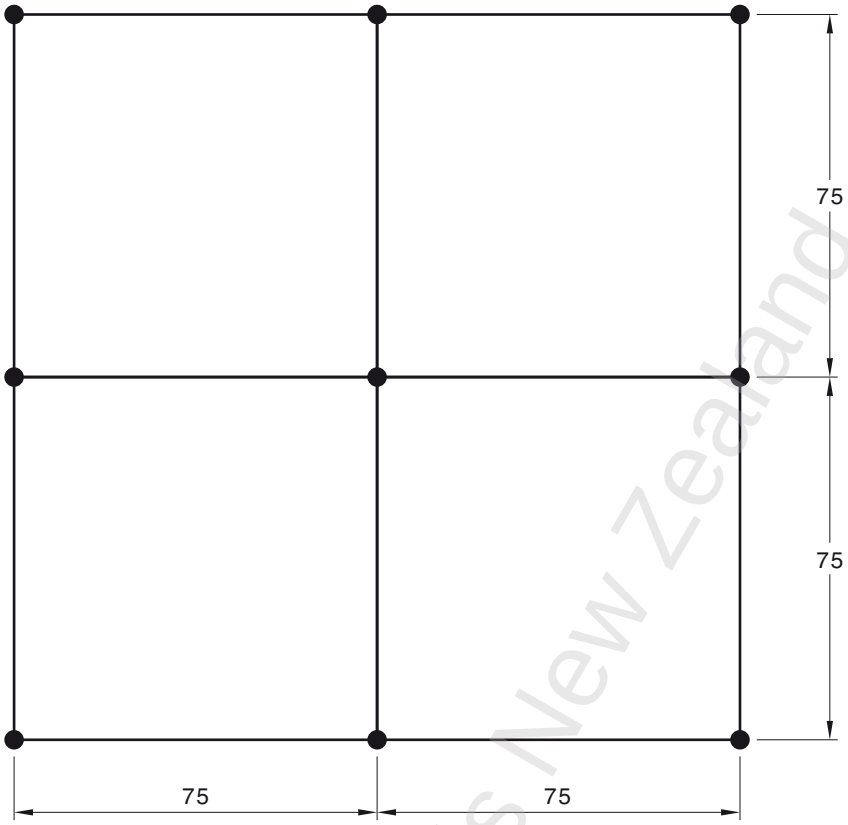
(g) Any observation, in relation to either the floor protector or the performance of the test, which may assist in the correct interpretation of the test results.

(h) Range of ambient temperatures during tests.

(i) The temperature in Test 1.

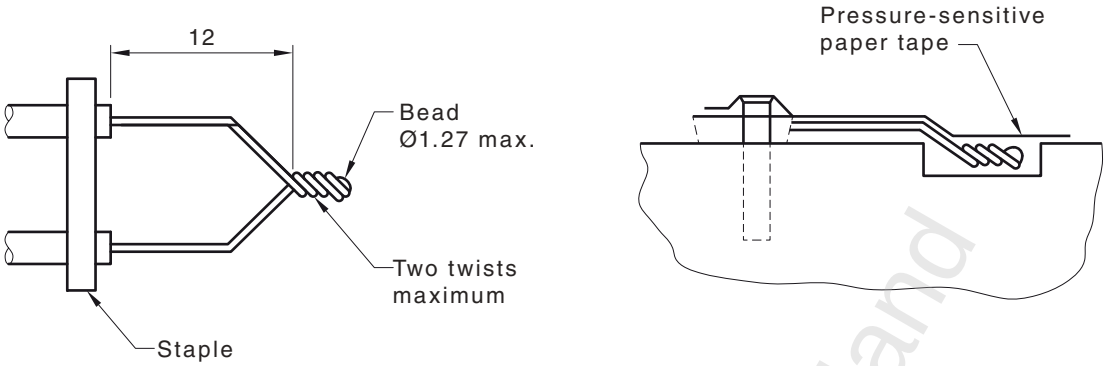
(j) The time interval (in Test 2) taken for the temperature to exceed 85°C.

(k) A reference to this test method, i.e. Appendix D of AS/NZS 2918.

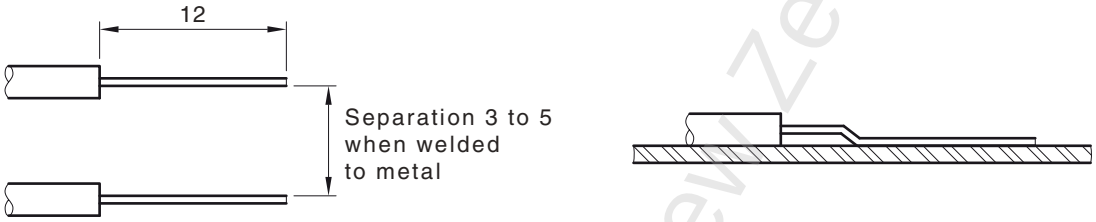


DIMENSIONS IN MILLIMETRES

FIGURE D1 PLAN VIEW OF THERMOCOUPLE POSITIONS

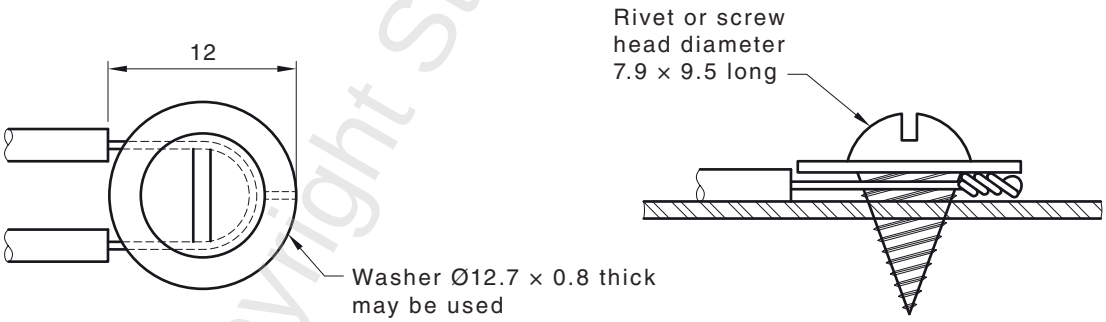


(a) Thermocouples for wood surfaces



(b) Thermocouple welded to metal surfaces

(c) Thermocouple soldered to metal surfaces



(d) Thermocouple secured to metal surfaces

DIMENSIONS IN MILLIMETRES

FIGURE D2 THERMOCOUPLE INSTALLATION METHODS

APPENDIX E

THERMAL TESTING OF FIREPLACE INSERT INSTALLATIONS

(Normative)

E1 SCOPE

This Appendix sets out the method for verifying the safe installation of a fireplace insert into a masonry fireplace that may have timber in contact with the masonry.

NOTE: Although this test uses a 'pumice-concrete' chimney, the results obtained may be applied to all chimneys of masonry construction.

E2 PRINCIPLE

The appliance is installed as designed within a prescribed environment, fired in a given manner and appropriate surface temperatures measured.

The test requires the construction of a simulated wall module containing an exterior lightweight pumice-concrete precast fireplace and chimney, with all wall, roof and soffit framing positioned in contact with the concrete surfaces of the fireplace and chimney unit.

E3 TEST ROOM

The test shall be carried out in a ventilated concrete floored test room in which the air velocity does not exceed 0.5 m/s with the exception of thermally induced air velocities. Provision shall be made to ensure that, for the duration of the test procedure, the ambient air temperature in the test room remains within the range 15°C to 35°C. Ambient temperature for the test room shall be determined by means of a shielded thermocouple located at the end of the simulated wall 150 mm from its face at a point 1200 mm above the floor of the test enclosure (see Figures E3 and E4).

E4 APPLIANCE SPECIFICATION

Full details as described in Appendix B, Paragraph B4 of this Standard, including drawings and instructions for the appliance and its proposed installation, shall be supplied to the testing agency as required.

E5 APPARATUS

The following apparatus is required:

(a) A temperature indicating system for measuring ambient temperatures in the range 10°C to 40°C, with an accuracy of ±3°C.

(b) A number of J-type (iron-constantan), T-type (copper-constantan) or K-type (chromel-alumel) thermocouples having a diameter of not greater than 0.6 mm, as required. Only 'K'-type thermocouples having a wire diameter of not more than 2 mm shall be used for temperatures in excess of 150°C.

All thermocouples shall be in 'standard' tolerance, i.e. ±2.2°C or 1.5%, whichever is the greater, in accordance with IEC 60584-1. Each batch shall be calibrated by accredited laboratories.

NOTE: Accreditation to AS ISO/IEC 17025 is a requirement by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA), with a relevant scope of accreditation to cover the tests being performed. In Australia, the National Association of Testing Authorities (NATA) and in New Zealand, International Accreditation New Zealand (IANZ) are signatories (ILAC) (MRA).

(c) A temperature meter, capable of responding to the outputs of thermocouples specified in Item (b) above, to provide temperature measurements over the range 10°C to 150°C, with an overall accuracy of ±3°C.

E6 TEST STRUCTURE

Within the test room the test shall be carried out in a test structure in accordance with the following:

(a) The test structure shall consist of a precast exterior wall pumice-concrete fireplace and chimney, plus a section of exterior residential wall, 1.8 m in overall length, with soffit and roof framing as shown in Figures E1 and E2.

NOTE: The test structure may be installed on a chimney base slab.

(b) The precast pumice concrete fireplace and chimney units shall be dimensioned substantially as shown in Figures E1, E2, E3 and E4 and shall conform to provisions of the *New Zealand Building Code—Acceptable Solutions* C1/AS1. Variations from conformity with the dimensional and material proportions of this Standard shall not be such that they would result in a decrease of any observed temperatures.

(c) The wall framing and roof rafters shall be in accordance with NZS 3603, as appropriate, with a moisture content 16% or less and shall be 100 mm × 50 mm dressed No. 1 framing grade radiata pine, with the soffit framing and fireplace lintel being 100 mm × 50 mm.

(d) The wall framing shall be constructed such that the trimming studs are in contact with the fireplace jambs, the lintel trimmer is in contact with the horizontal edge of the breast block, and the centre jack stud is cut at its lower end to be in contact with the breast block. The weatherboards, soffit framing and rafters shall be in contact with the chimney blocks.

(e) Timber weatherboards of any standard profile shall be fitted over breather type building paper.

(f) The roof and soffit framing shall be clad with sheet material to minimize air circulation around the chimney at eaves level.

(g) The sides of the chimney shall be sealed to the profile of the weatherboards.

(h) One half of the test structure shall have the wall framing insulated with glass fibre blanket of R1.6 thermal resistance.

(i) The inside of the wall and underside of the ceiling shall be lined with standard 9.5 mm thickness gypsum plasterboard.

(j) The fireplace surround shall be a precast concrete unit, 70 mm in thickness, 1200 mm in width and 1000 mm in overall height, with an aperture 760 mm high and 800 mm wide, sealed against the front surface of the fireplace with heat-resistant airtight insulation and fastened to the wall framing with wire ties or screws.

NOTE: All dimensions are nominal.

(k) A mantelshelf of material having a thermal resistance between 0.1 m^2K/W and 0.2 m^2K/W (e.g. 15 mm plywood) painted matt black shall be positioned against the top of the concrete surround and project not less than 70 mm beyond the front surface of the surround.

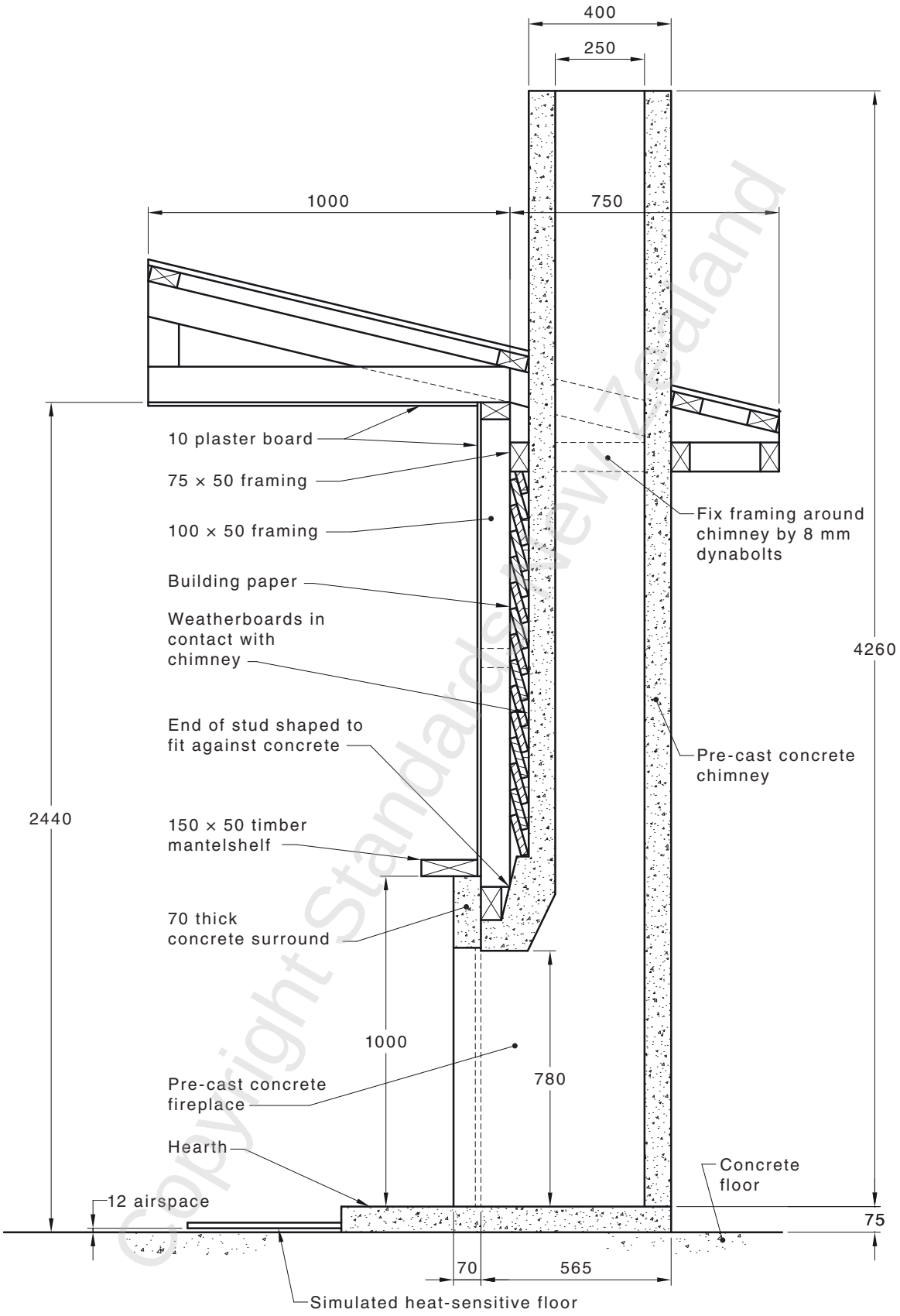
NOTE: The mantelshelf and mantel column dimensions specified in Appendix B may be used (see Paragraph E12).

(l) A floor protector in accordance with Clause 3.3.2 shall extend sufficiently to allow for the determination of the minimum floor protector projection distance for heat-sensitive floors. A simulated floor shall be constructed in front of the floor protector. This shall consist of one layer of 17.5 mm to 20 mm plywood supported by timber spacers so that a minimum 12 mm airspace is maintained between the underside of the plywood and the concrete floor of the test room. If the appliance manufacturer's installation instructions allow heat-sensitive materials beneath the floor protector, the simulated floor shall extend underneath the floor protector.

(m) The manufacturer shall specify the minimum discharge area required for ventilating the chimney cavity. If not specified, the appliance cannot be tested and as such does not conform to the testing requirements of Appendix E.

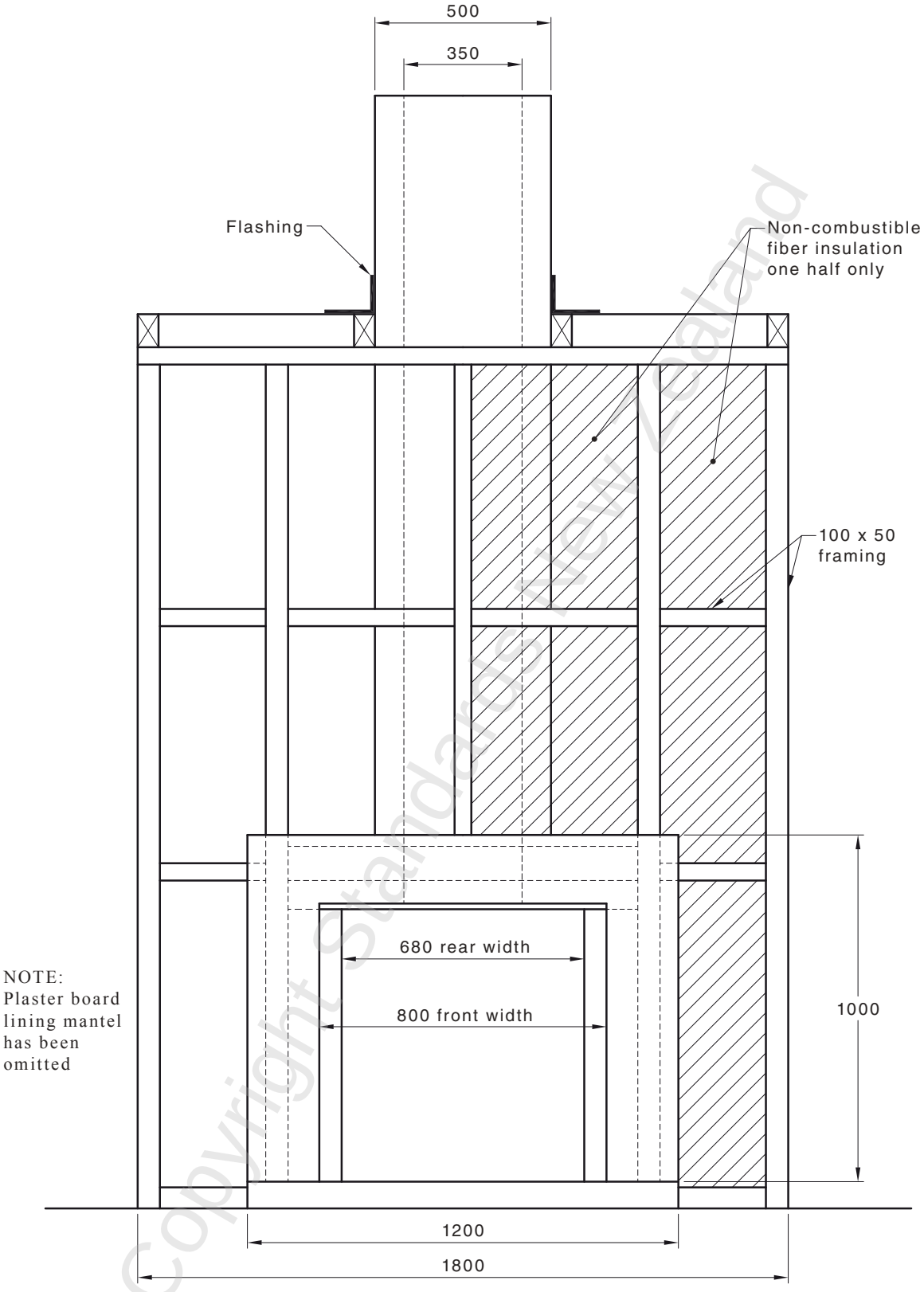
NOTE: The manufacturer shall specify the means to exclude rain and wind-blown debris from the chimney exit (see Appendix G).

(n) The chimney shall be fitted with a cap with an outlet hole which allows air to be vented from the chimney cavity with a venting area between the cap and flue which matches that in the manufacturer's installation instructions.



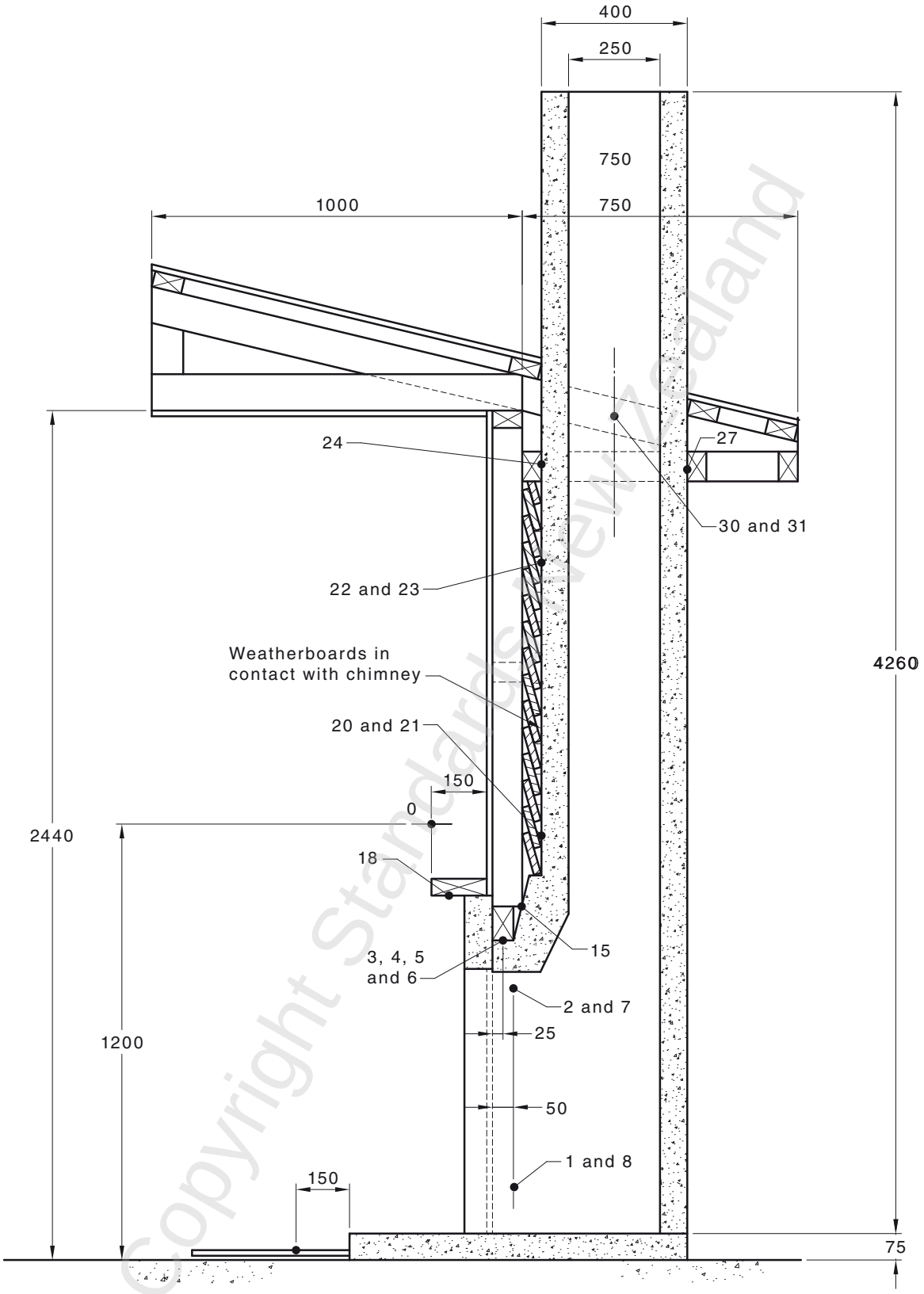
DIMENSIONS IN MILLIMETRES

FIGURE E1 CROSS-SECTION OF EXTERNAL CHIMNEY TEST STRUCTURE



DIMENSIONS IN MILLIMETRES

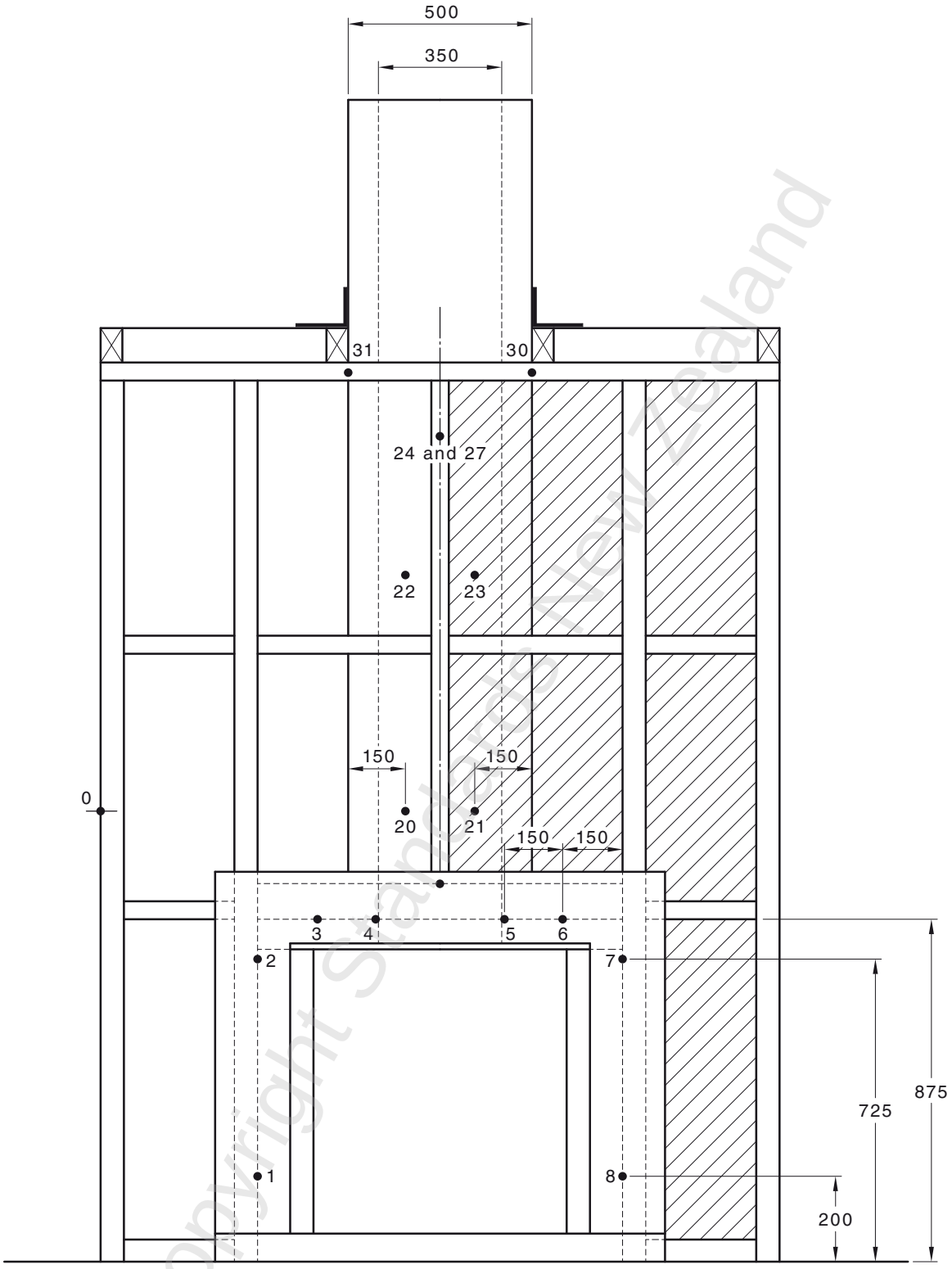
FIGURE E2 FRONT ELEVATION OF EXTERNAL CHIMNEY TEST STRUCTURE



LEGEND:
● = Thermocouple locations

DIMENSIONS IN MILLIMETRES

FIGURE E3 CROSS-SECTION OF EXTERNAL CHIMNEY TEST STRUCTURE SHOWING LOCATIONS OF THERMOCOUPLES



LEGEND:
● = Thermocouple locations

DIMENSIONS IN MILLIMETRES

FIGURE E4 FRONT ELEVATION OF EXTERNAL CHIMNEY TEST STRUCTURE SHOWING LOCATIONS OF THERMOCOUPLES

E7 TEST FUEL

The test fuel shall be in accordance with Appendix B, Paragraph B7.

E8 TEMPERATURE MEASUREMENTS

Temperatures shall be measured at each of the locations shown in Figures E3 and E4.

NOTE: Thermocouples should be attached in accordance with the requirements set out in Appendix D (see Figure D2).

E9 MAXIMUM TEMPERATURE

During high fire operation, the maximum temperature for each thermocouple shall be defined as having been reached when three consecutive readings at 60 min intervals have not increased by more than 0.2°C, or have declined.

E10 ALLOWABLE TEMPERATURE

The maximum allowable temperature rise for thermocouples within the test structure shall be 70°C during the high and flash fire procedures. The allowable temperature rises for other thermocouples shall be in accordance with Appendix B.

E11 PREPARATION

Prior to installation of each fireplace insert appliance to be tested, the test fireplace shall be inspected for cracks in the pumice concrete and mortar joints, and any cracks shall be sealed against air leakage with heat-resistant cement or sealant. The joint between the precast concrete surround and the front face of the pumice concrete firebox shall be checked to ensure it is completely sealed with the heat-resistant insulation (ceramic fibre rope or equivalent) seal.

E12 APPLIANCE INSTALLATION

The fireplace appliance to be tested shall be installed in accordance with the manufacturer's installation instructions and with all flue system connections, offset bends and additional internal flue system shielding generally as constrained by the dimensions of the test fireplace. The base of the appliance shall sit directly on the base of the fireplace.

NOTE: Care should be taken to ensure the flue system is centrally positioned in the chimney.

If the appliance is available with a convection booster fan, then this shall be fitted in the test appliance, but not operated during the test.

Where the appliance has an optional convection air deflector to limit temperatures of the underside of the mantelshelf, the appliance shall be tested with and without the deflector in position.

Whether or not such a convection air deflector is fitted, the person performing the test shall initially position the mantelshelf against the top of the fireplace surround. If during the course of the test the mantelshelf temperature exceeds the prescribed limit, the mantelshelf may be raised to determine a conforming height. Additionally, the person performing the test may establish the elevations at which various wider screened and unscreened heat-sensitive mantelshelves remain below the specified limits.

E13 TEST PROCEDURE

E13.1 High fire procedure

The appliance shall be operated in accordance with Paragraph B9.1, Appendix B.

Firing of the appliance shall continue until all recorded temperatures have reached a maximum value in accordance with Paragraph E9. When testing alternative floor protector constructions only, maximum temperatures need only be attained on the floor and the floor protector.

E13.2 Flash fire procedure

The flash fire procedure shall be performed immediately after the high fire procedure (see Paragraph E13.1). The flash fire procedure is not applicable to 'coal-only' appliances.

The procedure for the flash fire test shall be as follows:

(a) Remove sufficient embers from the appliance fuel chamber to bring the fire bed to a level not less than 15% full or greater than 25% full by volume.

(b) Load the appliance with 70% of the mass of test fuel as recorded in the high fire test procedure, and allow the appliance test fuel to ignite.

(c) Monitor each thermocouple and, taking into account the effects of adjusting any air controls, dampers, doors, ash removal doors or traps, or other openings, the effects of the operation of any fans and, overriding any automatic controls, identify the appliance operating condition which causes maximum temperature rise above ambient temperature.

E14 REPORT

The following shall be reported:

(a) Name of the testing agency, date of test, and the name of the person responsible for the test.

(b) Make, type and model of the appliance.

(c) A description of the installation including the fireplace hearth, flue system assembly, heat shielding and flue guarding.

(d) Dimensional details of any mantelpiece, mantelpiece columns and mantelshelf.

(e) Details of fuelling rates and all operating conditions and settings during tests.

(f) Maximum temperature rise above ambient temperature for both the high fire and flash fire tests, where applicable, for all surfaces.

(g) Range of ambient temperatures during tests.

(h) Details of the minimum floor protector extension necessary to prevent the floor from exceeding the maximum allowable temperature.

(i) A reference to this test method, i.e. Appendix E, AS/NZS 2918.

APPENDIX F

THERMAL TESTING OF FLUE SYSTEMS AND FLUE SYSTEM CLEARANCES

(Normative)

F1 SCOPE

This Appendix sets out the method for determining the maximum temperature rise above ambient of heat-sensitive materials at specified installation clearances for a flue system assembly. It also sets out a method for determining the structural integrity of the flue system assembly when heated to high temperatures.

F2 PRINCIPLE

The flue system is installed, as designed, within a prescribed environment, fired in a given manner, and appropriate surface temperatures are measured.

F3 TEST ROOM

The test shall be carried out in a ventilated test room having an internal volume of not less than 60 m^3, and in which the test room air velocity does not exceed 0.5 m/s with the exception of thermally induced air velocities. Provision shall be made to ensure that, for the duration of the test procedure, the ambient air temperature in the test room remains within the range 15°C to 35°C. Ambient temperature for the test room shall be determined by means of a shielded thermocouple located 1.2 m below the simulated ceiling and 2 m from the flue pipe under test.

F4 FLUE SYSTEM SPECIFICATION

Details of the flue system and its proposed installation including drawings and instructions shall be supplied to the testing agency.

F5 APPARATUS

The following apparatus is required:

(a) A temperature indicating system for measuring ambient temperatures in the range 10°C to 40°C, with an accuracy of ±3°C.

(b) A number of J-type (iron constantan), T-type (copper constantan) or K-type (chromel-alumel) thermocouples having a diameter not greater than 0.6 mm as required (see Paragraph F7). Only K-type thermocouples having a wire diameter of not more than 2 mm shall be used for temperatures in excess of 150°C.

(c) All thermocouples shall be in ‘standard’ tolerance, i.e. ±2.2°C or 1.5%, whichever is the greater, in accordance with IEC 60584-1. Each batch shall be calibrated by accredited laboratories.

NOTE: Accreditation to AS ISO/IEC 17025 is a requirement by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA), with a relevant scope of accreditation to cover the tests being performed. In Australia, the National Association of Testing Authorities (NATA) and in New Zealand, International Accreditation New Zealand (IANZ) are signatories (ILAC) (MRA).

(d) A temperature meter capable of responding to the outputs of thermocouples as specified in Item (b) above to provide temperature measurements over the range 10°C to 150°C, with an overall accuracy of ±3°C and over the range 500°C to 1200°C with an overall accuracy of ±10°C.

(e) A gas, electric or oil hot air generator capable of developing the temperature and power conditions required (see Paragraph F8).

NOTE: The power requirements for unspecified flue diameters should be interpolated, based upon the cross-sectional area of the flue.

F6 TEST STRUCTURE

Within the test room, the test shall be carried out with a test rig in accordance with Figure F1 for flat ceiling cavity and roof penetrations, Figure F2 for sloping ceiling and roof penetrations and Figure F3 for wall and roof penetrations, and in conformance with the following:

(a) There shall be a straight length of flue pipe 1 m long before the ceiling or wall penetration. This length of flue shall be encased in a casing as specified in the manufacturer's installation instructions.

(b) There shall be a 2 m length of flue pipe and casing below the simulated roof.

(c) The casing, as specified in the manufacturer's installation instructions, shall extend 600 mm above the simulated roof and shall terminate with the flue cowl as specified in the manufacturer's installation instructions. The length of the flue shall be such as to position the flue cowl as per the manufacturer's installation instructions.

(d) Ceiling or wall penetration shielding shall be as given in the installation instructions, using minimum specified clearances.

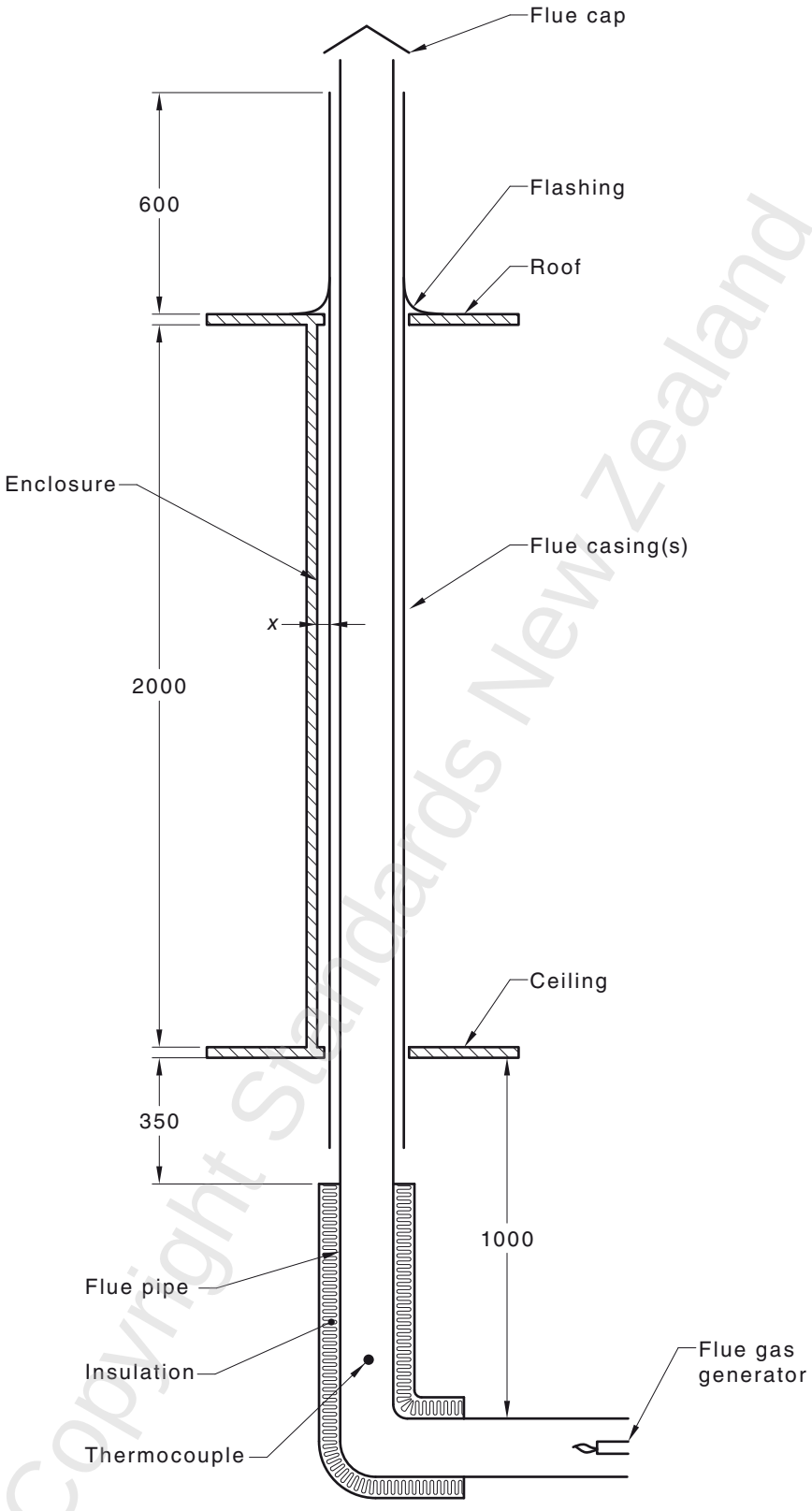
(e) The simulated ceiling shall be constructed from material having a thermal resistance between 0.1 m^2K/W and 0.2 m^2K/W (e.g. 15 mm thick plywood) and both sides of the ceiling shall be finished matt black (see Figures F1 and F2).

(f) The simulated wall shall be of stud construction faced both sides with material having a thermal resistance between 0.1 m^2K/W and 0.2 m^2K/W (e.g. 15 mm plywood) and shall be not less than 100 mm thick and both sides of the wall shall be finished matt black (see Figure F3).

(g) The simulated roof shall be constructed from material having a thermal resistance between 0.1 m^2K/W and 0.2 m^2K/W (e.g. 15 mm thick plywood) and shall extend horizontally not less than 600 mm in all directions from the flue centre-line. The roof penetration system shall be sealed to the simulated roof to represent flashing.

(h) An enclosure comprising of two vertical side walls forming a corner at an angle of 90 ° shall be located at a clearance distance x away from the outer flue casing and shall extend at least 600 mm beyond the centre-line of the flue (see Figure F4). The enclosure shall be constructed from material having a thermal resistance between 0.1 m^2K/W and 0.2 m^2K/W (e.g. 15 mm thick plywood) and the inward-facing surfaces shall be finished matt black.

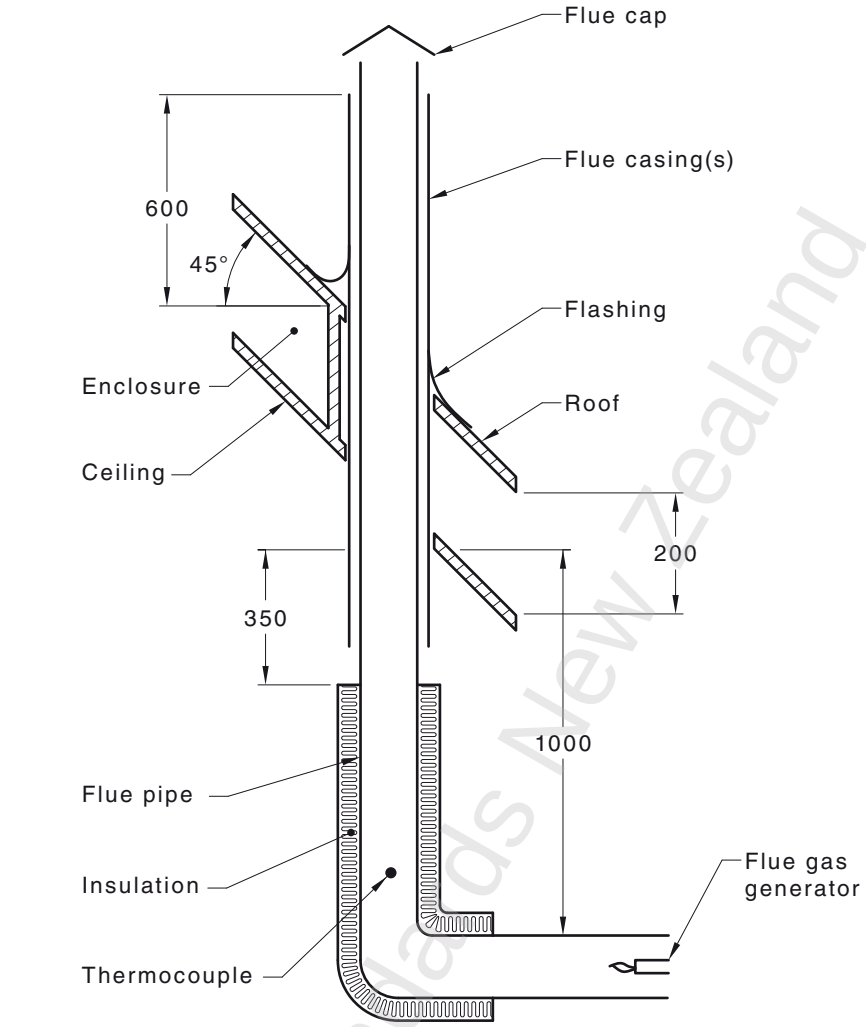
NOTE: The clearance distance x is the minimum clearance specified in the manufacturer's installation instructions (i.e. $x \geq 0$ mm).



LEGEND:
● = Thermocouple locations

DIMENSIONS IN MILLIMETRES

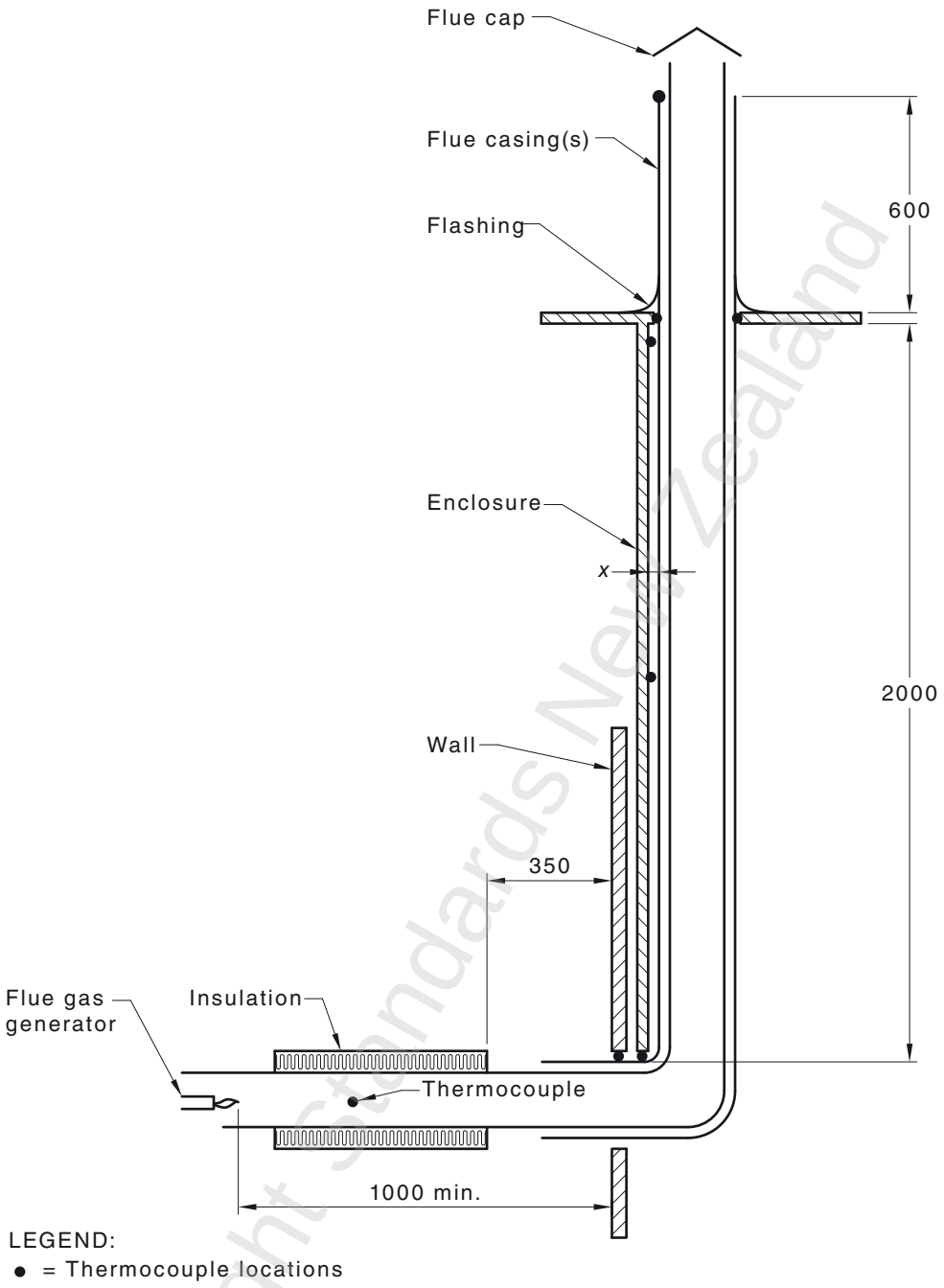
FIGURE F1 FLAT CEILING CAVITY AND ROOF PENETRATION



LEGEND:
● = Thermocouple locations

DIMENSIONS IN MILLIMETRES

FIGURE F2 SLOPING CEILING CAVITY AND ROOF PENETRATION



DIMENSIONS IN MILLIMETRES

FIGURE F3 WALL AND ROOF PENETRATION

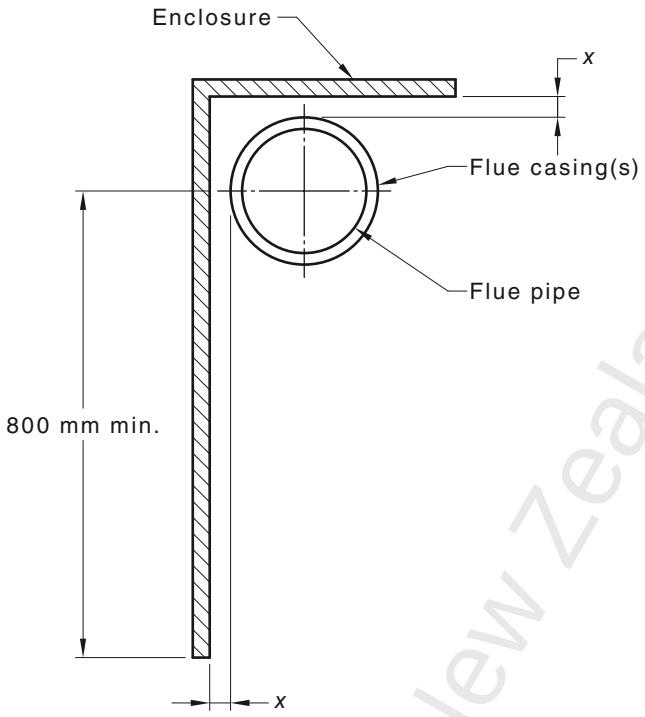


FIGURE F4 ENCLOSURE AROUND FLUE CASING

F7 PREPARATION

The flue system, test structure and apparatus shall be prepared as follows:

(a) The flue system assembly, including flue pipe, flue casing or casings, wall or ceiling penetration, shielding, roof penetration, flashing, and flue cowl shall be set up in accordance with the flue system manufacturer's installation instructions and Paragraph F6. If the manufacturer's installation instructions allow additional enclosure or point contact with heat-sensitive material, then the test enclosure shall be modified to simulate the intended installation, e.g. flue casings fastened to timber noggins or battens, or enclosed on all sides in a wall cavity or cupboard. Where the manufacturer's installation instructions allow enclosure of the flue casing/s on all sides, the minimum enclosure venting requirements shall be in accordance with those instructions. If no minimum venting is stated, the enclosure shall be unvented.

(b) Thermocouples, as appropriate, shall be fastened to the wall, ceiling, roof, and enclosure surfaces as shown in Figure F5 for ceiling and roof penetration and Figure F6 for sloping ceiling and roof penetrations, and Figure F7 for wall and roof penetrations. Additional thermocouples shall be attached to any surface of the flue system which is designed to be in direct contact with heat-sensitive surfaces. They shall be placed at the point/s of contact facing the enclosure.

NOTE: A thermocouple should be fastened to a wooden surface with a staple located at a distance of 12 mm from the thermocouple junction, and to a metal surface with a screw and washer or a pop rivet. Black pressure-sensitive tape should be placed over the thermocouple junction and over the adjoining connecting wires for a length of 100 mm. It is recommended that thermocouple junctions be welded, and be in contact with the surface of the test rig.

(c) A thermocouple shall be located in the centre of the flue, 750 mm from the ceiling or wall surface, as appropriate (see Figures F5 and F6 or Figure F7).

(d) The flue gas generator shall be located at the entrance to the flue pipe under test.

(e) Every thermocouple shall be individually connected through the switching or other selective means to the appropriate temperature meter.

(f) The flue pipe shall be insulated with high temperature insulation of thermal resistance greater than 0.2 m^2K/W between the flue gas generator and a point 350 mm below or before the simulated ceiling or wall, as appropriate (see Figures F1 and F2).

F8 PROCEDURE

F8.1 Hot flue test

The procedure for the hot flue test shall be as follows:

(a) Operate the flue gas generator so that the temperature of the flue gas measured 750 mm from the wall or ceiling surface [see Paragraph F7(c)] is 760 ±20°C.

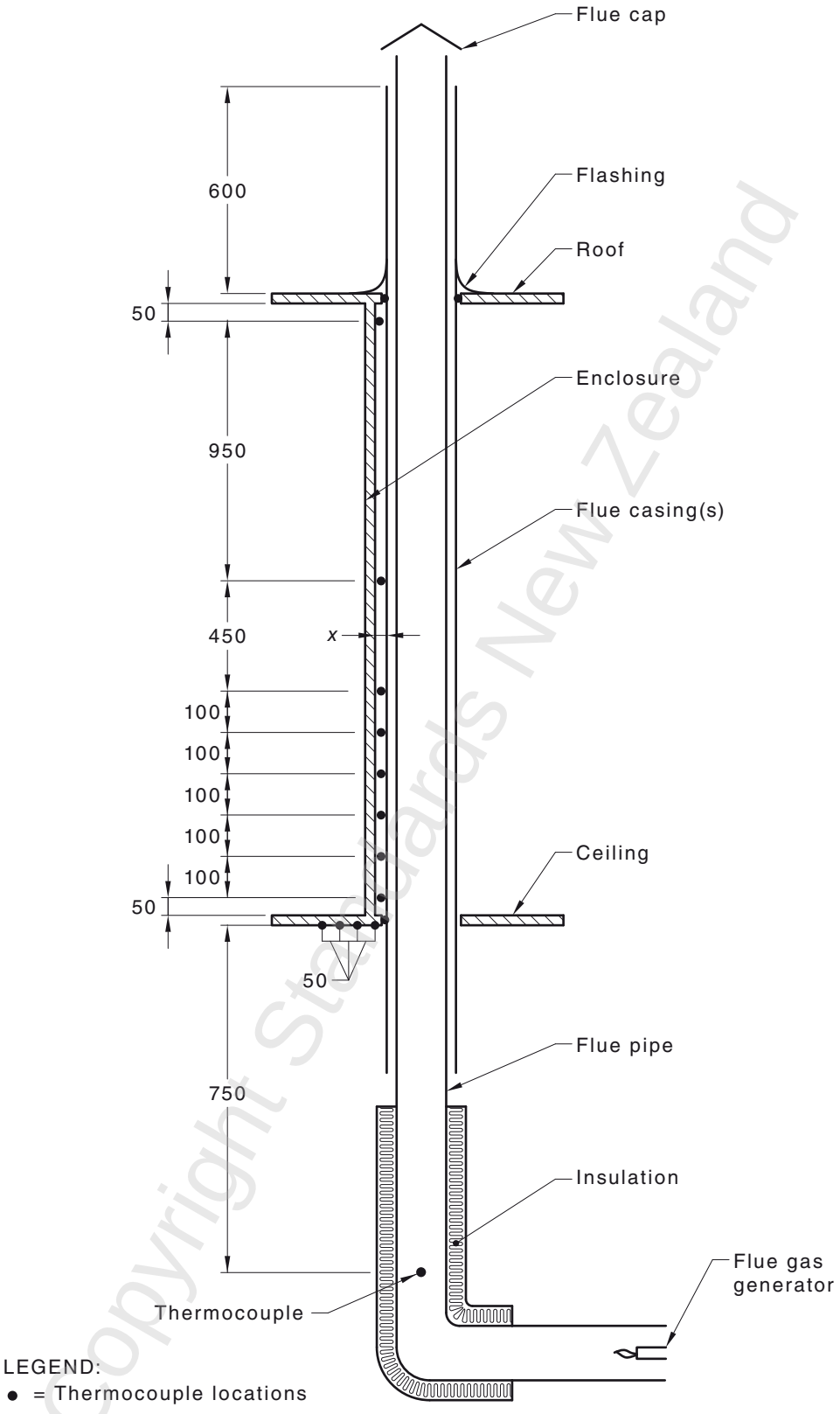
The input power required for the flue gas generator shall be not less than the following:

(i) For a 100 mm diameter flue ..... 6 kW.

(ii) For a 150 mm diameter flue ..... 15 kW.

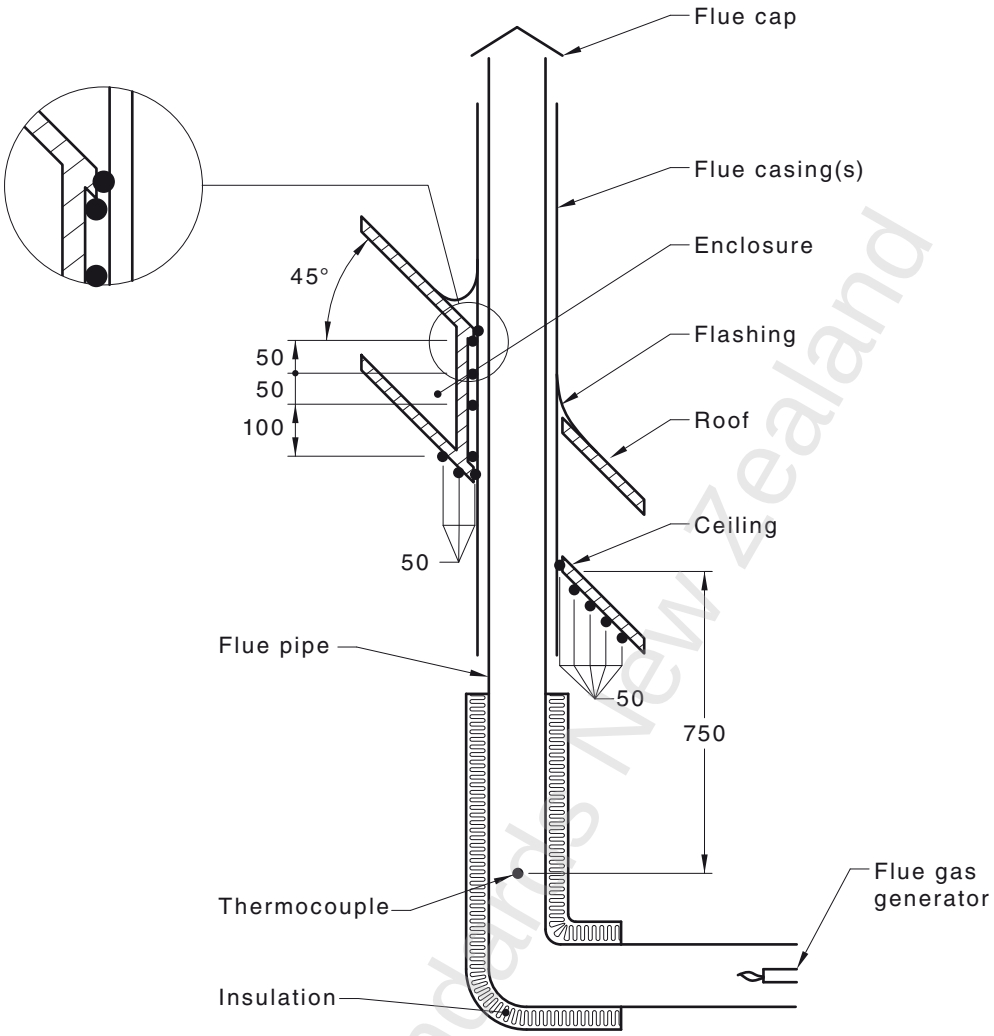
(iii) For a 200 mm diameter flue ..... 25 kW.

(b) Continue operation of the flue gas generator and selectively monitor thermocouples, at intervals, until it is apparent that the maximum temperature rises for all surfaces have been attained.



DIMENSIONS IN MILLIMETRES

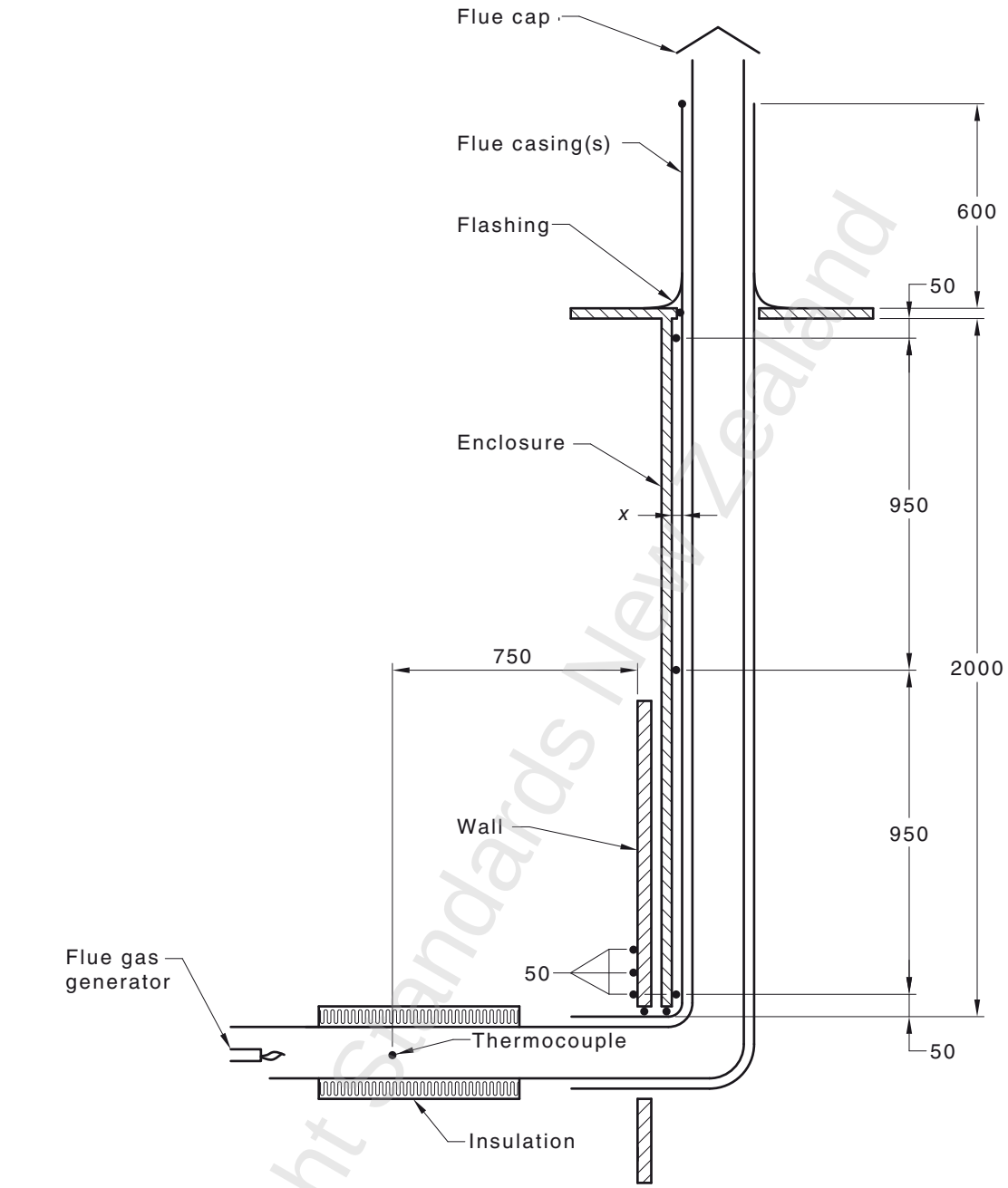
FIGURE F5 THERMOCOUPLE POSITIONS FOR FLAT CEILING CAVITY AND ROOF PENETRATION



LEGEND:
● = Thermocouple locations

DIMENSIONS IN MILLIMETRES

FIGURE F6 THERMOCOUPLE POSITIONS FOR SLOPING CEILING CAVITY AND ROOF PENETRATION



LEGEND:
● = Thermocouple locations

DIMENSIONS IN MILLIMETRES

FIGURE F7 THERMOCOUPLE POSITIONS FOR WALL AND ROOF PENETRATION

F8.2 Flue fire test

The flue fire test shall be performed immediately after the hot flue test (see Paragraph F8.1) as follows:

(a) Operate the flue gas generator so as to raise the temperature of the flue gas from 760 ±20°C to 1125 ±20°C within a time interval of 10 min.

The input power required for the flue gas generator shall be not less than the following:

(i) For a 100 mm diameter flue ..... 12 kW.

(ii) For a 150 mm diameter flue ..... 28 kW.

(iii) For a 200 mm diameter flue ..... 50 kW.

(b) Continue operation of the flue gas generator maintaining a temperature of 1125 ±20°C and selectively monitor thermocouples for a period of 30 min.

F8.3 Structural integrity test

The structural integrity test shall be performed immediately after the flue 760°C fire test (see Paragraph F8.2) as follows:

(a) Repeat the procedures of Paragraph F8.1 and maintain the flue gas temperature for 30 min. Measurements of temperature rise for heat-sensitive material shall not be taken.

(b) Repeat the procedures of Paragraph F8.2 except that the 1125°C flue gas temperature shall only be maintained for 10 min. Measurements of temperature rise for heat-sensitive materials shall not be taken.

(c) Repeat Steps (a) and (b) above, making a total of three consecutive hot flue and flue fire tests.

(d) Dismantle flue and inspect all flue system components for structural integrity. The failure of vitreous enamel or galvanized coatings shall not be taken as a deficiency in the structural integrity of the flue system assembly.

F9 MAXIMUM ALLOWABLE TEMPERATURE RISES

To conform to the temperature limits of this Standard, the temperature rise above ambient temperature of monitored surfaces shall not exceed 65°C for the hot flue test, and 100°C for the flue fire test.

F10 REPORT

The following shall be reported:

(a) Make, type and model of the flue system.

(b) A full description of the flue system installation.

(c) Full details relating to clearances between the flue system assembly and the appropriate surfaces of the test rig.

(d) Any sample preparation or conditioning.

(e) The name of the test laboratory or authority responsible for performing the tests.

(f) Date on which the test was carried out or, if carried out over a period, the dates of commencement and completion of the test.

(g) The number of replicate results from which the test result has been derived, e.g. ‘single test result’ or ‘the mean of duplicates’ or ‘the mean of three determinations on identical test material’.

(h) The identity of any reference material used to assist in the validation of the test result.

(i) Any observation, in relation to either the test sample or the performance of the test, which may assist in the correct interpretation of the test results.

(j) Maximum temperature rise for both the hot flue and flue fire tests for the wall, ceiling, roof and enclosure surfaces.

(k) Range of ambient temperatures during tests.

(l) Any degradation of the structural integrity of the flue system assembly.

(m) A reference to this test method, i.e. Appendix F, AS/NZS 2918.

APPENDIX G

INSTALLATION AND OPERATING INSTRUCTIONS

(Informative)

G1 GENERAL

The installation and operating instructions should be either in a single manual or in separate manuals and shall be packed with the appliance. Instructions for the installation of the flue system should be packed with the flue system or may be packed with the appliance.

The instructions should make reference to the manufacturer's or private labeller's catalogue designation, or equivalent, for both the appliance and related parts and should include the manufacturer's or private labeller's name and addresses. All warning statements given in this Appendix should be in bold face upper case letters. All caution statements should be in upper case letters.

NOTE: Where the manufacturer allows for future adaption to be made to the appliance, the applicable instructions should be included with the appliance.

G2 INSTALLATION INSTRUCTIONS

Instructions shall be provided for the installation of the appliance and flue system. These instructions should include the following details, as applicable:

(a) The following warnings:

WARNING: THE APPLIANCE AND FLUE SYSTEM SHOULD BE INSTALLED IN ACCORDANCE WITH AS/NZS 2918 AND THE APPROPRIATE REQUIREMENTS OF THE RELEVANT BUILDING CODE OR CODES.

WARNING: APPLIANCES INSTALLED IN ACCORDANCE WITH AS/NZS 2918 SHOULD CONFORM TO THE REQUIREMENTS OF AS/NZS 4013 AND AS/NZS 4012 WHERE REQUIRED BY THE REGULATORY AUTHORITY, THAT IS. THE APPLIANCE SHOULD BE IDENTIFIABLE BY A CONFORMANCE PLATE WITH THE MARKING 'TESTED TO AS/NZS 4013 AND AS/NZS 4012' AS SPECIFIED IN AS/NZS 4012.

ANY MODIFICATION OF THE APPLIANCE THAT HAS NOT BEEN APPROVED IN WRITING BY THE TESTING AUTHORITY IS CONSIDERED TO BE IN BREACH OF THE APPROVAL GRANTED FOR CONFORMANCE TO AS/NZS 4013.

CAUTION: MIXING OF APPLIANCE OR FLUE SYSTEM COMPONENTS FROM DIFFERENT SOURCES OR MODIFYING THE DIMENSIONAL SPECIFICATION OF COMPONENTS MAY RESULT IN HAZARDOUS CONDITIONS. WHERE SUCH ACTION IS CONSIDERED, THE MANUFACTURER SHOULD BE CONSULTED IN THE FIRST INSTANCE.

CAUTION: CRACKED AND BROKEN COMPONENTS, FOR EXAMPLE GLASS PANELS OR CERAMIC TILES, MAY RENDER THE INSTALLATION UNSAFE.

(b) The following additional warnings for appliances operating as water heaters:

WARNING: DO NOT CONNECT TO AN UNVENTED HOT WATER SYSTEM.

INSTALL IN ACCORDANCE WITH AS/NZS 3500.4 OR NZS 4603 AND THE APPROPRIATE REQUIREMENTS OF THE RELEVANT BUILDING CODE OR CODES.

(c) A listing of the appliance and flue system combinations that conform to this Standard.

(d) The parts and materials required and the step-by-step process for installing the appliance and its accessories.

(e) The type of floor protector and the position of the appliance on the floor protector.

(f) The minimum installation requirements including the floor protector, wall clearances, ceiling and wall penetrations, as appropriate.

G3 OPERATING AND MAINTENANCE INSTRUCTIONS

G3.1 General

The operating instructions should be packed with the appliance. All specified warning statements in these instructions should be in bold face upper case letters and caution statements should be in upper case letters.

G3.2 Operating and maintenance instructions

Operating and maintenance instructions should include at least the following, as appropriate for the appliance:

(a) The statement ‘Keep these instructions for future reference’.

(b) The name and address of the manufacturer.

(c) The model of the appliance.

(d) The following warnings and cautions:

WARNING: ANY MODIFICATION OF THE APPLIANCE THAT HAS NOT BEEN APPROVED IN WRITING BY THE TESTING AUTHORITY IS CONSIDERED AS NOT CONFORMING TO AS/NZS 4013.

WARNING: DO NOT USE FLAMMABLE LIQUIDS OR AEROSOLS TO START OR REKINDLE THE FIRE.

WARNING: DO NOT USE FLAMMABLE LIQUIDS OR AEROSOLS IN THE VICINITY OF THIS APPLIANCE WHEN IT IS OPERATING.

WARNING: DO NOT STORE FUEL WITHIN HEATER INSTALLATION CLEARANCES.

WARNING: WHEN OPERATING THIS APPLIANCE AS AN OPEN FIRE, USE A FIRE SCREEN.

WARNING: OPEN AIR CONTROL (AND DAMPER WHEN FITTED) BEFORE OPENING FIRING DOOR.

WARNING: DO NOT BURN WOOD THAT IS PAINTED; OR IS COATED WITH PLASTIC; OR HAS BEEN TREATED WITH ANY CHEMICAL.

CAUTION: DO NOT OPERATE THIS APPLIANCE IF GLASS IS CRACKED OR BROKEN.

CAUTION: THIS APPLIANCE SHOULD BE MAINTAINED AND OPERATED AT ALL TIMES IN ACCORDANCE WITH THESE INSTRUCTIONS.

(e) The description of any normally replaceable components of the appliance.

(f) The type of fuel recommended for use with the appliance and recommendations on how to store fuel.

(g) The limitations for the maximum fuel charge if it is physically possible to overcharge.

(h) Directions for the procedure to follow if there is a soot or creosote fire.

(i) A statement that excess ashes should be removed when necessary, placed in a non-combustible container with a tightly fitting lid and moved outdoors immediately to a location clear of combustible materials.

(j) Service and maintenance schedules.

(k) Any additional requirements for the operation and maintenance of ducted heaters and water-heating appliances.

(l) A statement that the appliance or flue system should not be modified in any way without the written approval of the manufacturer.

(m) For mechanical stokers, the operating, maintenance and fault-finding information.

(n) Details of suitable replacement glass.

(o) Directions for cleaning glass surfaces.

G4 ADDITIONAL OPERATING INSTRUCTIONS FOR APPLIANCES UTILIZING CATALYTIC COMBUSTORS

The following additional instructions for appliances with catalytic combustors should be included:

(a) Details on the use of catalytic combustors or any special firing, clean-out or fuel recommendation to optimize performance.

(b) Procedure to determine if the combustor is still functioning.

(c) Details on how to adjust the appliance for optimum performance.

(d) Details on how to replace and how to clean a combustor if it becomes blocked by ash or creosote.

(e) Part or serial number of the combustor.

(f) Details on where to obtain a replacement combustor.

(g) Details on how to operate the appliance if the combustor becomes inactive.

G5 REPLACEMENT OF COMBUSTOR KIT

The replacement combustor should be clearly marked with the manufacturer's name and serial or part number.

APPENDIX H

CAUSES AND SOLUTIONS TO DOWNDRAUGHT AND SMOKE SPILLAGE

(Informative)

H1 GENERAL

Products of combustion should never enter the living space. However, this problem may occur even if an appliance is installed in accordance with this Standard under certain wind conditions, if air pressure in the living space is reduced (e.g. due to exhaust fans), if the average temperature in the flue drops too low, if the flue becomes partially blocked with creosote or if air leaks into the flue. External factors such as nearby tall buildings, trees, topography or the shape of the building in which the appliance is installed may create turbulence or regions of reduced air pressure under certain wind directions and wind speeds. This turbulence and pressure reduction can contribute to downdraught and smoke spillage.

In this Appendix downdraught refers to a condition where the flow direction in the flue is reversed (i.e. air is drawn into the top of the flue rather than the products of combustion exiting through the top of the flue) and smoke spillage refers to the condition where smoke escapes through the fuel loading door when it is opened.

H2 COMMON CAUSES OF DOWNDRAUGHT AND SMOKE SPILLAGE

If the gas pressure at the base of the flue is greater than the air pressure at the combustion air inlets, the gas flow in the flue will reverse (i.e. the combustion products will flow down the flue and into the living area).

Causes of downdraught:

(a) Downdraught may occur if the living room pressure is reduced when an exhaust fan in a kitchen or bathroom is turned on.

(b) Downdraught may occur if the living room pressure is reduced when strong winds cause a pressure drop on the downwind side of the house.

(c) Downdraught may occur if the temperature of the flue gas drops to near the room temperature. This may occur because the fire is nearly out or the flue is poorly insulated and cold outdoor temperatures cause low flue gas temperatures.

(d) Downdraught may occur if turbulence in the outdoor airflow causes pressure increases at the top of the flue.

If the volume of combustion products is greater than the volume of gas the flue can cope with because the velocity in the flue is too low then smoke spillage will occur when the fuel loading door is opened.

Causes of spillage:

(i) Smoke spillage may occur if creosote builds up on the walls of the flue reducing the cross section of the open flue.

(ii) Smoke spillage may occur if cooler flue temperatures occur due to a smouldering fire. This reduces the draught and so reduces the flow rate.

(iii) Smoke spillage may occur if a large volume of air enters the appliance through a large fuel loading door.

(iv) Smoke spillage may occur if living room air pressure is reduced through use of exhaust fans.

(v) Smoke spillage may occur if air leaks into a flue through poorly fitting flue pipe joins. The air leaks mean less products of combustion are drawn out of the combustion chamber.

H3 REDUCING DOWNDRAUGHT AND SMOKE SPILLAGE

The critical factor in ensuring all the products of combustion exit the appliance through the flue is the gas volume flowrate up the flue. This is determined by the difference in pressure between the bottom of the flue and the room pressure, and the cross-section of the flue. The pressure difference between the flue and the room (sometime referred to as flue draught) is a function of the average density of the gas in the flue and the flue height. Increasing the height of the flue leads to an increase in the draught. Increasing the average temperature of the flue gas leads to an increase in the draught because the density of the gas in the flue is reduced.

Means of reducing downdraught and smoke spillage:

(a) The most effective means of reducing downdraught and smoke spillage is to increase the height of the flue. If the height of the flue discharge point above the appliance combustion air inlet is increased from, say, 4 m to 5 m the draught is increased by about 10%. If the height is increased from 4 m to 6 m the draught increases by about 20%.

(b) When the flue height is increased the flue casings will also have to be lengthened so that the top of the casings is within one half flue diameter of the top of the flue. This reduces the cooling effect of the longer flue.

(c) Smoke spillage may be reduced by always opening the combustion air inlets fully for several minutes before opening the fuel loading door. This increases the rate of burning and so increases the flue temperature. The fuel loading door should be opened slowly to minimize smoke spillage.

(d) If downdraught or smoke spillage occurs under certain wind directions then opening a window on the up-wind side of the house may reduce the problem.

(e) If smoke spillage seems to be gradually getting worse over a period of weeks it is likely that creosote is building up in the flue. The flue should be cleaned.

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Standards Australia

Standards Australia is an independent company, limited by guarantee, which prepares and publishes most of the voluntary technical and commercial standards used in Australia. These standards are developed through an open process of consultation and consensus, in which all interested parties are invited to participate. Through a Memorandum of Understanding with the Commonwealth government, Standards Australia is recognised as Australia's peak national standards body.

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